2015
Water System Plan Update
Washington State University
Pullman, Washington

Final REPORT

VOLUME 1OF 3 REPORT

Washington State University
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Prepared By

Taylor Engineering, Inc.
245 E. Main Street
Pullman, Washington 99163

2015

WATER SYSTEM PLAN UPDATE

FOR

WASHINGTON STATE UNIVERSITY

PULLMAN, WASHINGTON

FINAL REPORT

FOR THE

WASHINGTON STATE DEPARTMENT OF HEALTH

Date: April 1, 2016

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WASHINGTON STATE UNIVERSITY
April 1, 2016

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GLOSSARY

AC	=	Asbestos-cement pipe (a.k.a. Transite pipe)
ADD	=	Average Daily Demand for water system, (gallons per day).
ANSI	=	American National Standard Institute
APWA	=	American Public Works Association
ASCE	=	American Society of Civil Engineers
ASME	=	American Society for Testing and Materials
AWWA	=	American Water Works Association
BAT	=	Backflow Assembly Tester
C	=	Multiplicative Coefficient used in the general equation to determine PHD.
CTU	=	Central Terminal Unit
DOH	=	Washington State Department of Health (Division of Drinking Water)
EH&S	=	Environmental Health & Safety (WSU)
EPA	=	Environmental Protection Agency
ERU	=	Equivalent Residential Unit
ES	=	Equalizing Storage or the portion of a system's storage that is used for those periods when the source capacity can not meet the system demands, (gallons).
F	=	Additive factor used in the general equation to determine PHD.
FOMS	=	Facility Operation and Maintenance Specialist (WSU)
FSS	=	The amount of storage designated fire suppression purposes for a system, (gallons).
gpd	=	gallons per day
gpm	=	gallons per minute
HOA	=	Hand, Off, Automatic Switch

HVAC	=	Heating, ventilation, and air conditioning
IOC	=	Inorganic chemical
mg	=	million gallons
MCL	=	Maximum Contaminant Level
MDD	=	Maximum Daily Demand for a water system, (gallons per day).
mgd	=	millions gallons per day
N	=	Number of ERU's for any individual water system.
OS	=	Operational storage volume for pump motor protection and level controls.
OSHA	=	Occupational Safety and Health Administration/Act
PBAC	=	Palouse Basin Aquifer Committee
PE	=	Professional Engineer
PHD	=	Peak Hourly Demand for a water system, (gallons per minute)
PRV	=	Pressure Reducing Valve
psi	=	pounds per square inch
psig	=	pounds per square inch, gauge
Qa	=	Annual withdrawal from a water source as applied to water rights determinations, (acre-feet per year)
Qi	=	Instantaneous rate of withdrawal from water source as applied to water rights determinations, (gallons per minute).
QL	=	The flow rate of the source that is the largest of all sources available to the system, (gallons per minute).
Qs	=	Total flow capacity of all installed sources of supply, except emergency sources (gallons per minute)
RCW	=	Revised Code of Washington (state statutes).
SB	=	Standby Storage for a system, (gallons).

SDWA	=	Safe Drinking Water Act
SEPA	=	State Environmental Policy act
SOC	=	Synthetic Organic Chemical or Compound
UBC	=	Uniform Building Code
UL	=	Underwriters Laboratory
UPC	=	Uniform Plumbing Code
USGS	=	United State Geological Survey
VOC	=	Volatile Organic Chemical or Compound
WAC	=	Washington Administrative Code (state regulations)
WFI	=	Water Facility Inventory and Report Form (DOH form)
WSDOT	=	Washington State Department of Transportation
WSU	=	Washington State University

1.0 Water System Description

1.1 Ownership and Management

The Washington State University (WSU) water system, Washington State Department of Health (DOH) Identification No. 93200Q, is a publicly owned Group A community water system maintained to serve the main campus in Pullman, WA. A copy of the DOH Water Facility Inventory Form (WFI) is located in Appendix A-1.

WSU's current mailing address is:

Washington State University
Facility Operations
P.O. Box 641150
Pullman, WA 99164-1150

Individuals responsible for the water system are shown in Table 7-1 including titles, names, telephone numbers, and areas of responsibilities.

The ultimate authority for the WSU Pullman Campus water system is the WSU Water Board, which comprises staff from Facilities Operations, Environmental Health and Safety (EH&S), Capital Planning and Development, Housing and Dining Services and the Regional Campuses and Research Units. Facilities Operations, EH&S, Capital Planning and Development and Housing and Dining Services are under WSU's Office of Business & Finance. Central responsibility for operations and maintenance lies with Facilities Operations with assistance from EH&S for drinking water sampling, monitoring, reporting and ensuring compliance (see Exhibit 7-2).

Facilities Operations, through its several branches, is responsible for operation, maintenance and development. The planning and construction of the various elements of the water system are the responsibility of the Architectural and Engineering Services branch. This staff includes professional engineers and technicians experienced in the fields of civil, sanitary, mechanical, electrical engineering and surveying (see Appendix G-11). When time frame or situation requires, outside consultants are employed to address specific projects. Capital funding is provided via the office of Business & Finance.

The duty of daily operation and maintenance is the responsibility of the Maintenance & Utilities Services branches (see Appendix G-11). The Maintenance & Utilities Services branches maintain two certified water works operators directing the operation of the water supply and distribution system. This group is responsible for control of the well pumps, treatment components, valve operation, meter reading and other daily tasks associated with the water system as well as trouble-shooting. The Maintenance & Utility Services branches also provide system maintenance both, routine and emergency, for water related issues outside building perimeters. Their personnel include journeymen plumbers, pipefitters, mechanics and electricians.

1.2 System Background

1.2.1 History

The WSU water system has grown form its inception at the turn of the 19th Century to its present state. The system's growth was a direct response to the facility needs of WSU. The following is a summary of major water system components with their corresponding implementation dates:

Date	Component	Remarks
1934	Well No. 1	Pumphouse installed 1938
1938	Well No. 2	Drilled and Placed in Service
1946	Well No. 3	Drilled and Placed in Service
1946	Transfer Station	Constructed
	Elevated Storage Tank at Observatory Hill	
1947	Observatory Hill No. 1 Storage Tank	Constructed
1949	Roundtop Reservoir	Constructed
1963	Well No. 4	Drilled and Placed in Service
1963	Observatory Hill No. 2 Storage Tank	Constructed
1964	Well No. 5	Drilled and Placed in Service
1975	North Fairways Reservoir	Constructed
1976	Chilled Water Plant	Constructed
1979	Well No. 6	Drilled and Placed in Service
1987	Well No. 7	Drilled
1987	Well No. 5	Designated as Emergency Backup
1995	Well No. 2	Decommissioned
1998	Well No. 7	Put into Service
1999	Well No. 1	Designated as Emergency
2000	Well No. 3	Designated as Emergency
2003	Well No. 8	Drilled
2005	Well No. 8	Pump installed
2006	Well No. 8	Placed in Service
2007	Well No. 5	Used as Monitoring Well
2014	Well No. 6	Broken shaft repaired and pump raised 5 feet

1.2.2 Geography

Washington State University is in, and adjacent to, the City of Pullman, Whitman County, Washington (see Exhibit 1-1). It is geographically situated in the Palouse Basin, which is a shallow elliptical basin, bordered on three sides by a broken horseshoe shaped ring of mountains and hills. The basin measures approximately 20 miles in an east-west direction and is about 15 miles wide. The crest of Moscow Mountain in Idaho forms the eastern boundary of this basin. The land consists of a lava plain covered with a clay-silt soil forming low rolling hills. The soil thickness varies from one to 150 feet. The irregularly shaped rounded hills rise only 200 to 300 feet above the intervening drainage channels. A more detailed geology of the basin can be found in the Pullman-Moscow Groundwater Management Plan and the Palouse Basin

Aquifer Committee (PBAC) 2014 Annual Report provided herein as Appendices A-2 and A-3, respectively.

The City of Pullman is a commercial center for a richly productive agricultural district whose principle product is winter wheat, grown by dry-land farming. Irrigation is mostly limited to municipal and University purposes.

Precipitation averages about 21.5 inches per year in Pullman and increases slightly toward the eastern edge of the basin. Two thirds of the annual precipitation occurs during the months October through March. The growing season months, May through September, receive only about one-fourth of the total. Approximately 20 percent of the precipitation falls as snow.

The average temperature at Pullman is 47°F and average daily temperatures range from 28°F to 69°F. A high of 110°F and a low of –32°F define the temperature extremes. Usually, August is the warmest and January is the coldest month of the year.

The Pullman area is drained by two perennial and many intermittent streams. The South Fork of the Palouse River and Paradise Creek usually run all year, while all others go dry in late summer or early autumn. Flow in the perennial streams, which originate in Moscow Mountain, is maintained during most of the year by groundwater discharge through springs and seeps. Paradise Creek would dry up during most summers if it did not receive effluent from the Moscow wastewater treatment facility. The individual sources are usually quite small and they often dwindle to slow seeps or cease entirely during the summer months. These small streams are not a satisfactory source of water supply because of the limited quantity and contamination.

1.2.3 Neighboring/Adjacent Water Purveyors

The City of Pullman provides water service for City users outside the campus boundaries with the exception of the airport terminal and the new WSU Conference Center/Hotel Residence Inn. See Exhibit 1-2 for the City of Pullman city limits and service area boundary (exhibit provided courtesy of Anchor QEA from the 2014 City of Pullman Water System Plan Update and updated to provide new annexations and zone changes).

The City of Moscow and the University of Idaho, while not bordering the WSU service area, are major nearby purveyors drawing from the same aquifer. For more information, see the PBAC 2013 annual report provided herein as Appendix A-3.

1.3 Inventory of Existing Facilities

The WSU water system is supplied solely by groundwater wells with the exception of four emergency interties with the City of Pullman. The wells pump domestic water from the Grande Ronde Aquifer. The water network fed by these groundwater wells is divided into two pressure zones: high and low. The transfer station pumps water from the low zone to the high zone. Several reservoirs are dispersed throughout the site to maintain pressure and provide fire flow storage. Exhibit 1-3 shows the areas served by each pressure zone and other system components as described below (Exhibits 3-2 & 3-3 show the water system pipes 6” and greater in each zone):

- (4) active wells with pumps (Wells 4, 6, 7 & 8)
- (3) emergency wells (Wells 1, 3 & 5)

- (4) reservoirs
- (1) transfer pump station with two pumps
- A network of distribution lines from 6" to 12" diameter with approximately 4,215 service connections as calculated by DOH in the Water Facility Inventory (see Appendix A-1)
- Manual and pressure actuated valves
- Fire hydrants
- Gas chlorination at each active well
- Flow meters at each pump house

1.4 Related Plans

As a member of PBAC, WSU is impacted by the Ground Water Management Plan (GWMP) for the aquifer (see Appendix A-2). The Pullman-Moscow Water Resources Committee became PBAC. The PBAC committee is comprises six entities: WSU; University of Idaho; City of Pullman, Washington; City of Moscow, Idaho; Whitman County, Washington; and Latah County, Idaho. The committee was created and the plan drafted in response to the declining aquifer levels in the basin. There is a set of committee goals as well as an action plan for each entity which are presented in Chapter 6 of the GWMP. The GWMP was first published in 1992 and slightly updated in 1997. PBAC's goals were updated in 2006 (see Appendix A-4) and WSU's 1992 Action Plan is listed in Appendix A-5. Both committee goals and the WSU Action Plan are considered during the design and review of all new projects. The committee also publishes an annual report each year. The purpose of this report is to tabulate water usage of the entities and to monitor the progress of the committee towards its goals as well as provide an update of local water issues. A copy of PBAC's most recently published report (2014) is provided in Appendix A-3.

1.5 Existing Retail Service Area

The 2015 retail water service area for the WSU Water System contains approximately 1,400 acres (see Exhibit 1-4 and Appendix A-11 for a 24" x 36" map) and, except for the land in the vicinity of the Research Park, includes all of the contiguous University owned land in and adjacent to the City of Pullman, Washington. It also includes the Pullman-Moscow Regional Airport Terminal Facility and the Residence Inn along North Fairway Drive.

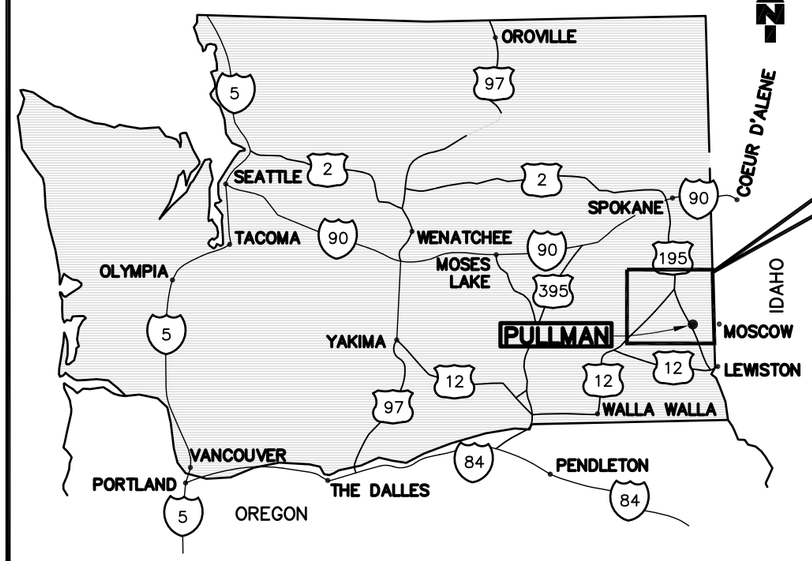
There are no established regulations for proposed construction on the campus as to the type of land or water use with the exception of the "airport approach zone". This is an area of land west of the airport and east of the Recreation Center that is designated to have no academic or residential facilities. This area is currently occupied by Palouse Ridge Golf Course.

The City of Pullman's zoning and land use map is included in Appendix A-6 (provided courtesy of Anchor QEA).

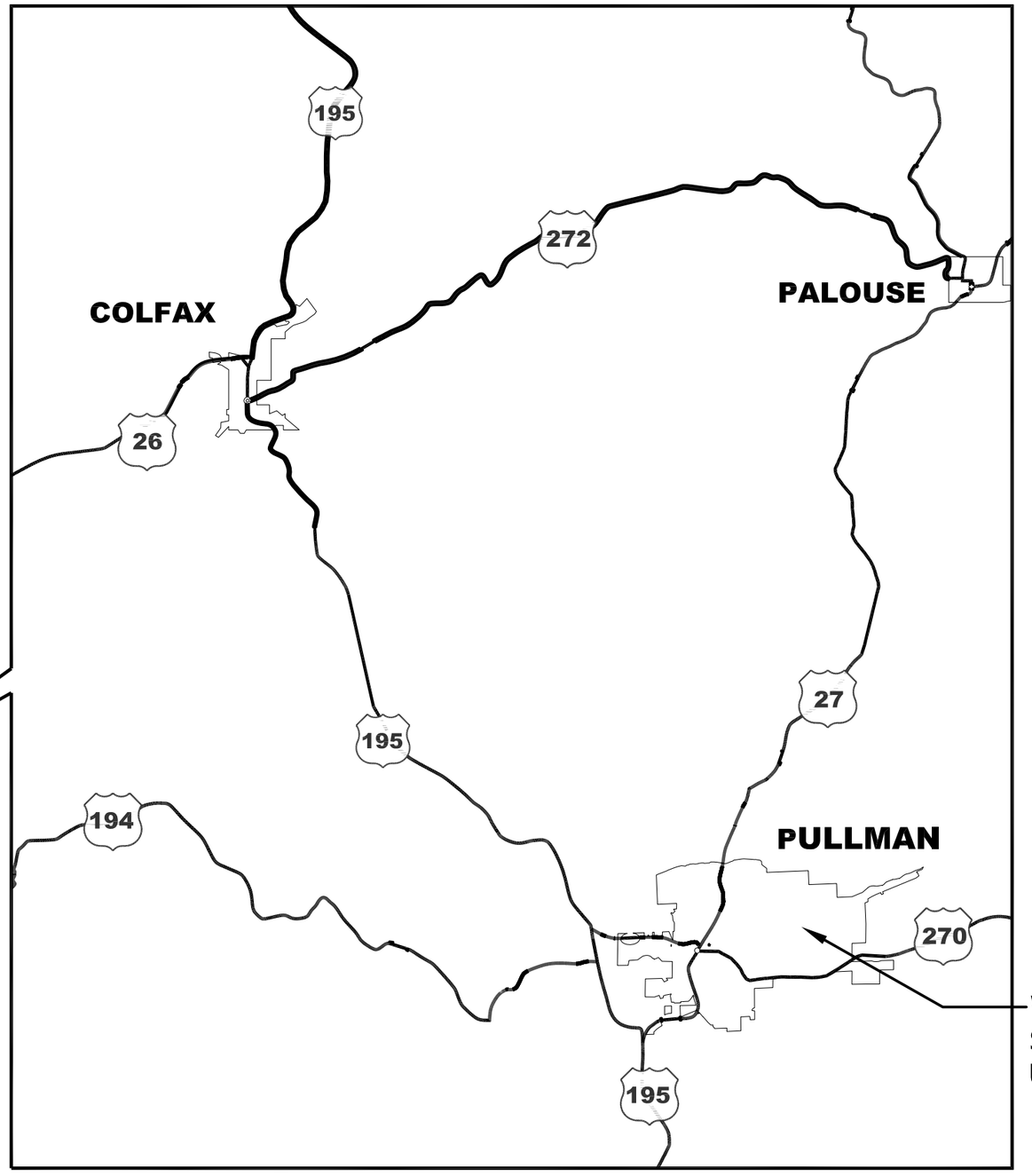
1.6 Future Retail Service Area

No future expansion of the retail water system service area is anticipated at this time or within the next 20 years.

WASHINGTON STATE



VICINITY MAP



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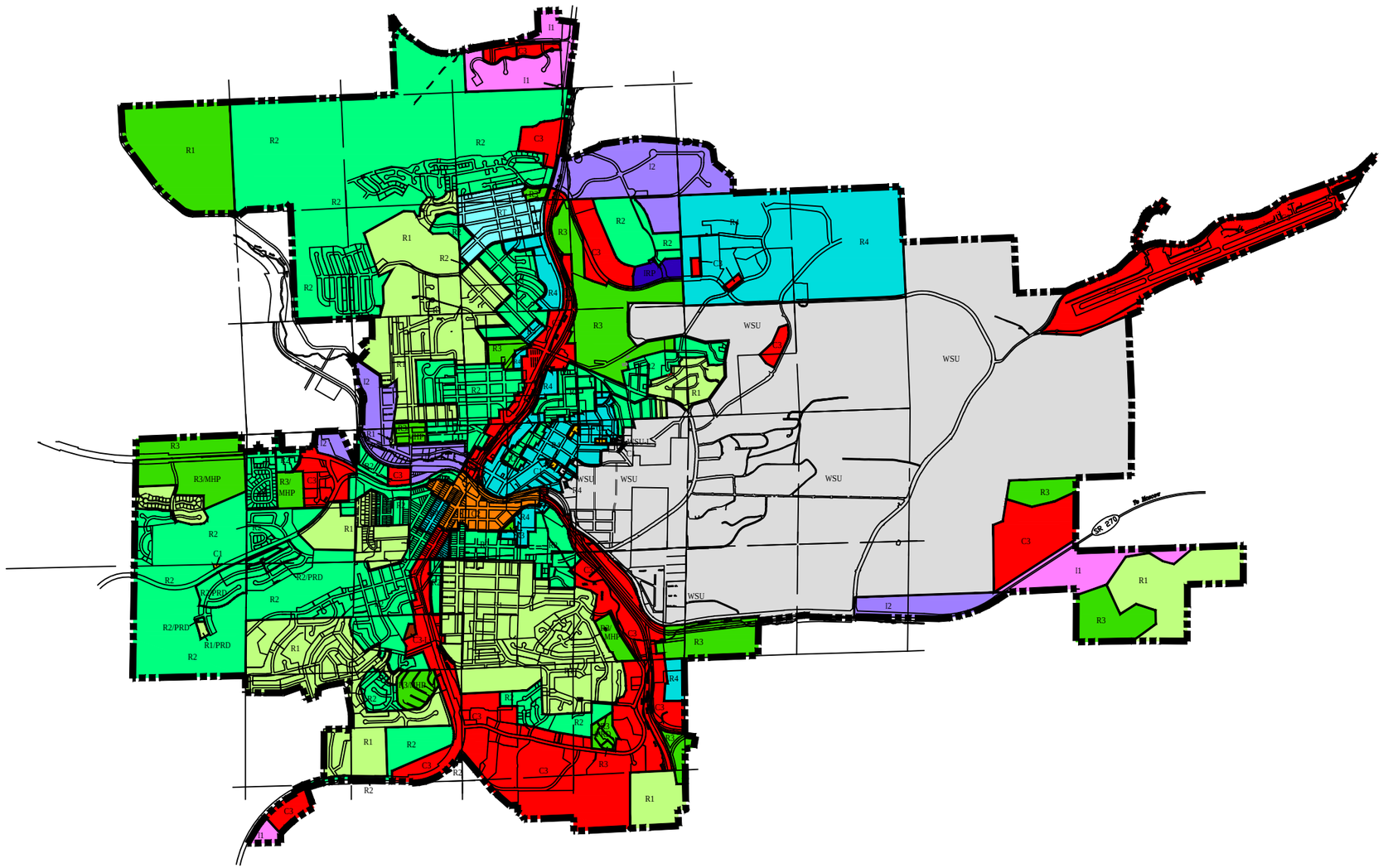
2015 WATER SYSTEM PLAN UPDATE

VICINITY MAP

EXHIBIT 1-1



LEGEND

- CITY LIMITS
- R1 - SINGLE FAMILY RESIDENTIAL DISTRICT
- R2 - LOW DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R3 - MEDIUM DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R4 - HIGH DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- C1 - NEIGHBORHOOD COMMERCIAL DISTRICT
- C2 - CENTRAL BUSINESS DISTRICT
- C3 - GENERAL COMMERCIAL DISTRICT
- C3-L - GENERAL COMMERCIAL DISTRICT
- I1 - LIGHT INDUSTRIAL DISTRICT
- I2 - HEAVY INDUSTRIAL DISTRICT
- IRP - INDUSTRIAL RESEARCH PARK DISTRICT
- WSU - WASHINGTON STATE UNIVERSITY
- WSU-L - WASHINGTON STATE UNIVERSITY

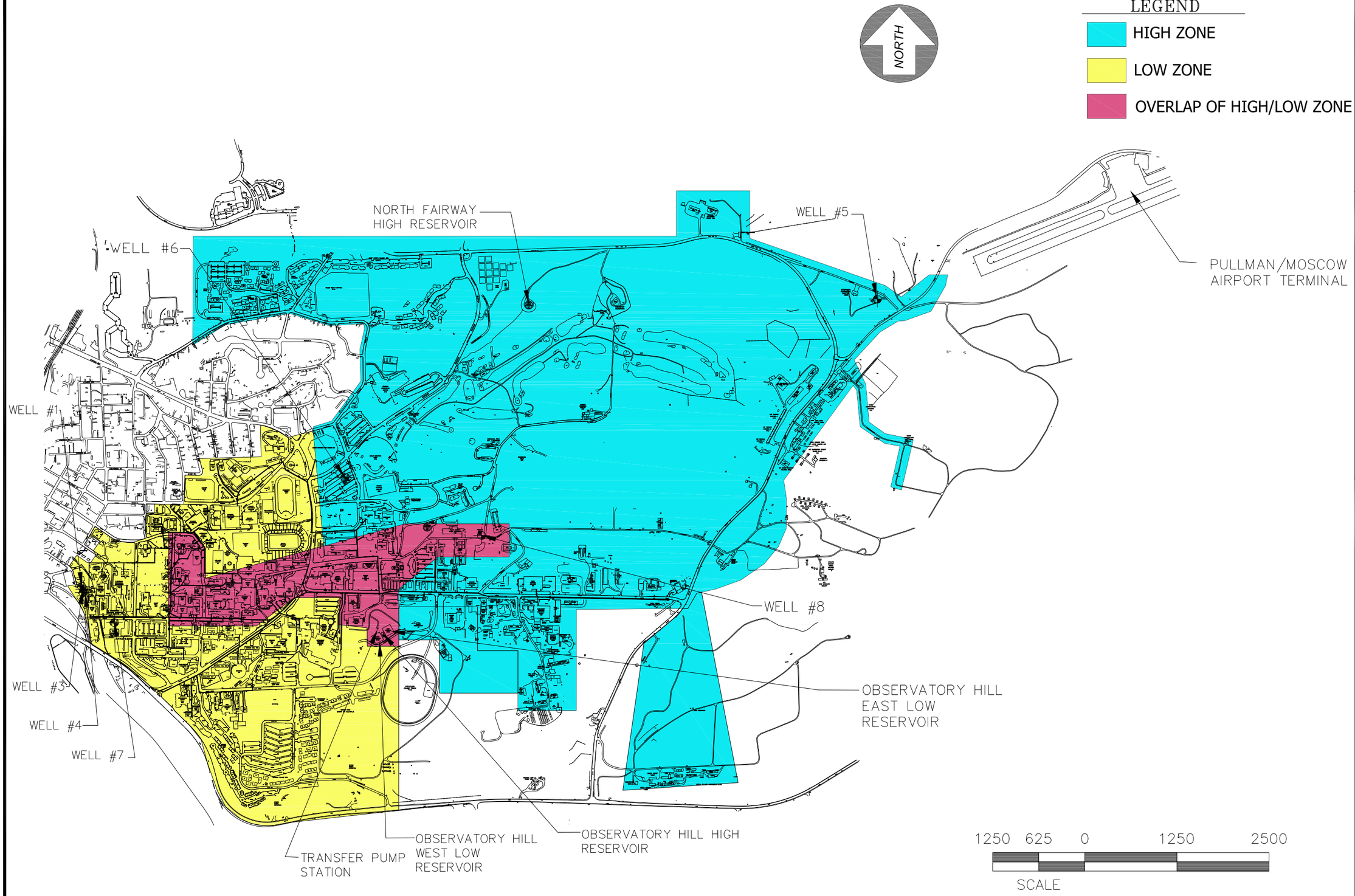
SOURCE: CITY OF PULLMAN
ENGINEERING DIVISION (2013)

0 3000
Scale in Feet

Mar 14, 2014 12:55pm drice I:\Projects\City of Pullman\2013 Water System Plan Update\CAD\0928-FG-3_1-2_Zoning Plan.dwg City Zoning Plan (2013)

ANCHOR QEA

Exhibit 3-1
City Zoning Plan (2013)
2013 Comprehensive Water System Plan
City of Pullman



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2015 WATER SYSTEM PLAN UPDATE

WATER SYSTEM COMPONENTS

EXHIBIT 1-3

NORTH

SCALE: 1" = APPROX. 1,250'

PULLMAN/MOSCOW AIRPORT TERMINAL

WATER RIGHTS PLACE OF USE BOUNDARY (CURRENT AND FUTURE EXTENT)

RESIDENCE INN

RETAIL WATER SERVICE AREA BOUNDARY (CURRENT AND FUTURE EXTENT)

STADIUM WAY

TERRE VIEW DRIVE

AIRPORT ROAD

MAIN STREET

SR 270

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DOMESTIC WATER SYSTEM

RETAIL WATER SERVICE AREA

EXHIBIT 1-4

1.7 Service Area Agreements

WSU provides water to the Pullman-Moscow Regional Airport under a water service agreement established June 7, 1989 between WSU and the Airport Board with Amendment No. 1 dated February 6, 2007. A copy of this agreement and the amendment is included in Appendix A-7a.

WSU provides water to the Residence Inn at the City of Pullman water rates through the lease agreement Contract C# 20070 in Appendix A-12. This hotel included a zone change from the WSU Zone to the City of Pullman C3 Zone in order for the hospitality business to be built and operated. However, since WSU water is the only available source in this area of campus it wasn't possible to tie into City of Pullman supply for the hotel.

While not binding, the memorandum copy in Appendix A-8 outlines the services provided by the City of Pullman and WSU. An intertie agreement between WSU and the City of Pullman was adopted for emergency water service. A copy is of this agreement is included in Appendix A-9.

1.8 Service Area Policies

The airport terminal and Residence Inn are the only non-WSU consumers that WSU invoices for monthly water use (the others are on campus: Student Book Store, WSU Campus Housing, Palouse Ridge Golf Course, and the Student Recreation Center). The airport is responsible for any modifications necessary to WSU's water system for increased demand beyond the original configuration when the service agreement was adopted. There have been no significant demand changes at the airport terminal.

WSU has a duty to provide service within its service area when four threshold factors are met (per DOH Fact Sheet DOH 331-366):

1. WSU has sufficient capacity to serve water in a safe and reliable manner,
2. The service is consistent with adopted plans and development regulations,
3. WSU has sufficient water rights to provide service and,
4. WSU can provide service in a timely and reasonable manner.

The only other established service area policy is the Cross-Connection Control Program (see Appendix G-4). Under this program, Facilities Operations has the authority and responsibility for inspection and maintenance of backflow prevention assemblies. The WSU Cross-Connection Control Specialists are responsible for review of all proposed remodel and new construction for backflow prevention assembly acceptability.

1.9 Conditions of Service

WSU does not intend to provide any additional water service beyond its campus boundaries and all current services outside of campus boundaries including the hotel and airport. The only anticipated future services are WSU related facilities. There are no established conditions of service for WSU facilities.

1.10 Local Government & Watershed Consistency

In accordance with the Municipal Water Law, documentation of consistency with local adopted plans, regulations and polices is required by DOH. The local government consistency

statement checklists (DOH attachment 5) have been signed by the City of Pullman and Whitman County and are included in Appendix A-10.

Per Revised Code of Washington (RCW) 90.03.386, this WSP must be "not inconsistent" with the Watershed Plan of the WRIA 34 planning unit. This WRIA 34 Watershed Plan was finalized on November 29, 2007. A review of the Watershed Plan was conducted for consistency with this WSP. The actions identified in this WSP related to supply, conservation and other water management measures are consistent with the Watershed Plan.

WSU is located within the South Fork Management Area, one of four management areas in the Watershed Plan. The Watershed Plan identifies objectives and actions relevant to WSU and the Pullman/Moscow aquifer. This information is found in Sections 5.2 and 6.4 of the Plan and has been summarized in the next two subsections (for the complete Watershed Plan, see http://www.ecy.wa.gov/watershed/misc/34wsplandraft.html).

Relevant Basin-Wide Objectives

- **BW8**: Encourage and improve coordination of Idaho and Washington water resource management to protect and enhance surface and groundwater supply and quality
- **BW10**: Conduct water resource management education and outreach, addressing topics including water use, water quality, conservation, reclamation, reuse, stormwater management and best management practices.
- **BW13**: Ensure adequate long term ground water resource availability to meet existing and future drinking water demand on public water systems and exempt wells, consistent with adopted city and county land use plans.
- **BW15**: Characterize surface and ground water availability and recharge/discharge balance and connectivity within the sub-basins and surrounding region.
- **BW17**: Identify and develop opportunities to enhance available water supply, emphasizing out of stream storage, shallow aquifer recharge, deep aquifer storage and recovery, source substitution, reclamation and reuse, and stormwater retention.
- **BW19**: Provide education opportunities that can raise public awareness on water quantity options.

Relevant South Fork Management Area Objectives and Actions

- **Objective SFP2**: Develop additional sustainable water supplies to provide for future needs.
- **Objective SFP5**: Encourage and improve coordination of Idaho and Washington water resource management to protect and enhance surface and ground water supply and quality.
- **Objective SFP6**: Continue ongoing efforts to better understand and characterize the area's hydrogeology and basalt ground water conditions.
- Characterize the hydrology, connectivity and interaction between surface water, groundwater, springs, and gravel beds and develop potential recharge and flow enhancement strategies, with specific analysis to be conducted at the following locations:
    - Moscow Mountain
    - Sand Road area
    - Smoot Hill
    - Kamiak Butte

    - Latah County (eastern basin)
    - City of Pullman
    - City of Moscow
    - Upper reaches of tributaries
- Identify and implement wastewater effluent reuse strategies where practicable, considering legal interpretation of obligation/amount of water to supply water rights below city discharge points. Conduct tentative determination of status and validity of existing water rights, claims, certificates and permits, including place of use, point of diversion and usage information for existing water right holders.
- Continue to characterize groundwater resources; map approximate location, depth, and extent of aquifers. Also determine regional quantities and movement of groundwater.
- Identify and evaluate potential aquifer recharge areas, such as winter flow diversions, ASR, Class A treated effluent, etc.
- Continue to implement DOH municipal conservation program elements as appropriate.
- Secure funding and implement community education program on water conservation and water quantity management options.
- Conduct an economic evaluation/feasibility study that addresses, with other new supply options, supply development (i.e. “harvesting”) opportunities, and compare costs.
- Conduct ongoing studies and data collection to monitor groundwater conditions, and to better understand how recharge occurs.

2.0 Basic Planning Data and Water Demand Forecasting

2.0 Introduction

This chapter discusses planning data and demand forecasts via three main sections. The first section summarizes historical and projected demographics. The second section summarizes historical supply characteristics including production, peaking factors, water balances and leakage. The third section combines the demographics and water supply characteristics to develop a demand forecast for the next 50 years.

2.1 Current Population, Service Connections, Equivalent Residential Units and Demographic Projections

2.1.1 Current Population

The current (2014) day-time campus population is approximately 24,094 which includes resident students (including their families), off-campus students, and faculty and support staff. Approximately 6,298 of this total reside on-campus in facilities served by the WSU water system. Approximately 4,481 of the total population are faculty or campus staff whom occupy the campus only during the day.

2.1.2 Total Service Connections

Table 2-1 contains an approximation of the number of service connections at WSU (see the Water Facilities Inventory in Appendix A-1):

Table 2-1
Number of Service Connections

Location	Number of Service Connections
Residence Hall Rooms (units)	4,096
Non-housing/Commercial	250
Total	4,346

Since metering is not complete at the campus and there is little metered water service data, the number of "non-housing' connections is not exact. The "non-housing" is made up of classrooms, labs, study facilities, campus administrative and maintenance buildings, recreation facilities and all buildings not providing residential facilities. Each of these building is listed as only one service connection while the residence buildings have been listed with a service connection for each unit that can be occupied. Because of the differences in water use between residential and non-housing buildings, the total number of service connections provides little useful data in quantifying and projecting water usage.

2.1.3 Equivalent Residential Units (ERUs)

An ERU is a unit of measure used to equate non-residential or multi-family residential water usage to a specific number of single-family residences. Since WSU does not currently meter individual consumption and few housing units are actually occupied by families, the following

statistics are generated as a *best available* reference. An approximate ERU rate is calculated as follows:

98.5 gallons per day per student (see Exhibit 2-6)
6,298 students & families in housing (see Table 2-4)
4,096 housing units (see section 2.1.2)

6,298/4,096 = 1.54 persons per housing unit

1.54 persons per housing unit X 98.5 gpd per student = 152 gpd (rounded)

This ERU rate of 152 gpd is used to develop Table 2-2 below using the average total water production (total water pumped from the wells):

Table 2-2
WSU ERU Calculation

Year	Mgpy	Mgpd	ERUs
2014	473	1.26	8,318

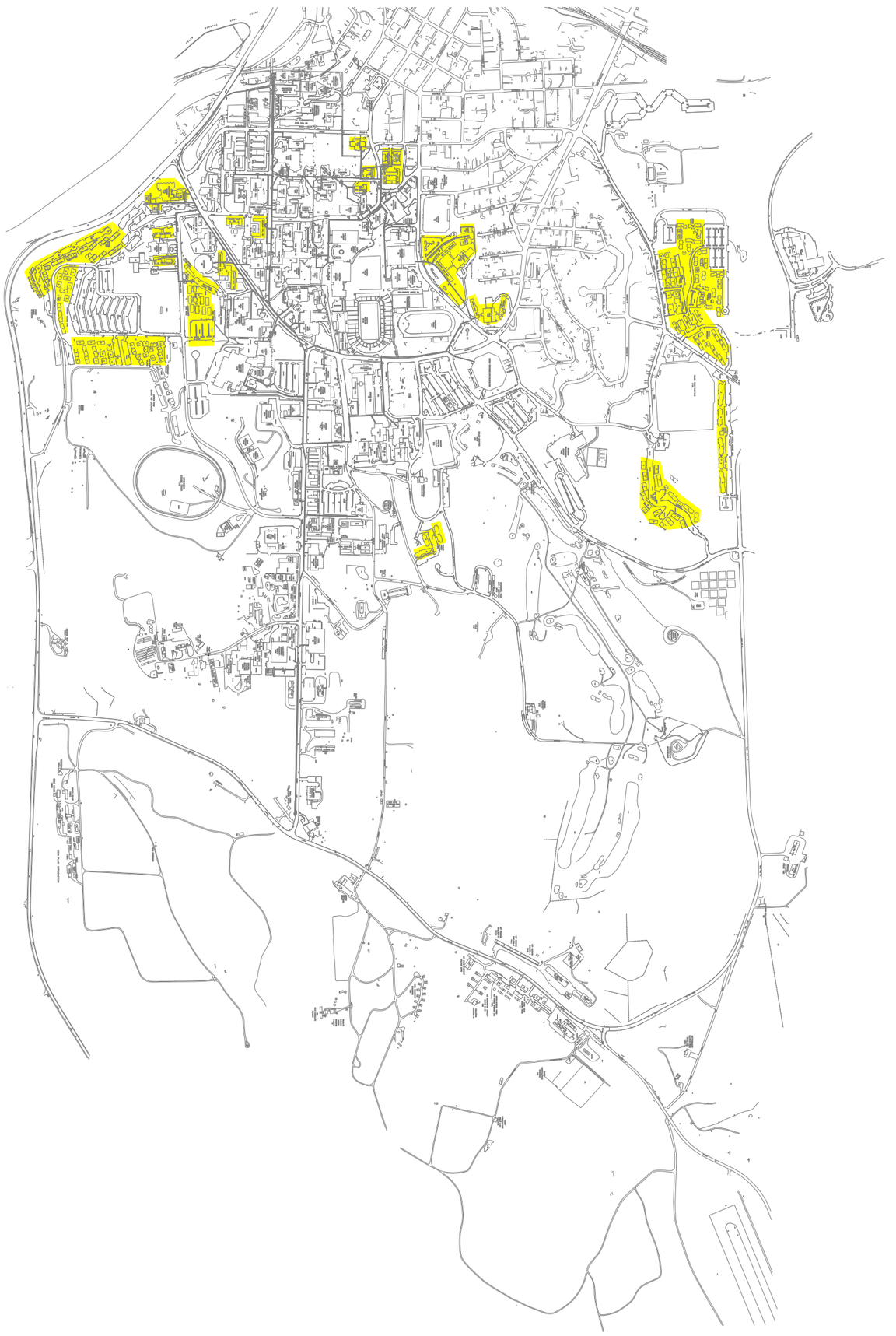
Mgpy = million gallons per year (production)
Mgpd = Average Day Demand (ADD) = million gallons per day (Mgpy/365)

The current allowed withdrawal rate of the active wells combined is 5,300 acre-feet/year (1.73 Bgpy – billion gallons per year, 4.73 Mgpd); this translates to 31,118 ERUs (4.73 Mgpd/152 gpd) which is well above the ERUs as shown in the table above. Due to the differences in water use between residential and non-housing buildings as well as the fact that water consumption by the resident population is not fully metered and does not comprise the majority of the campus water use, the number of ERUs provides minimal useful information.

2.1.4 Projected Land Use

As indicated in Chapter 1, other than the airport approach zone, there are no specific restrictions, such as city zoning codes, on the type of development that can occur at various locations of the campus. However, WSU's goal is to coordinate the facility development so that the various functions can be centralized. The athletic facilities are to the north, the agricultural facilities are along Grimes Way and veterinary medicine is southeast of Stadium Way. Similar generalities can be expressed for most campus functions but there are exceptions as well. The residence facilities are generally located around the perimeter of the campus (see Exhibit 2-1).

University development is planned and funded on a biennium basis. Since WSU is responsible for the water system as well as design and development of projects on the campus, there is good coordination and communication between proposed developments and the planning of future water projects. Table 2-3 lists the major development projects that are planned for the future. Since WSU is subject to state funding on most projects, the dates indicated are only estimates and may vary by two or more years depending on available funding. In some cases the projects may never receive funding for construction. The proposed developments will likely add approximately 10 to 15 new service connections each and will likely be large volume users.



SCALE
1250 625 0 1250 2500
FEET

NORTH

LEGEND
HOUSING AREA

2015 WATER SYSTEM PLAN UPDATE

CURRENT HOUSING AREAS

EXHIBIT 2-1

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

DRAWN BY: AJT

CHECKED BY: RGP

DATE: 03/25/15

LOG NO. 0

Table 2-3 Major Campus Developments (DRAFT)			
Current Project Title	**Approx. Square Footage**	**Current Capital Plan Forecast**	**Comments**
Clean Technology Lab	100,000	2013-15	New Facility
Global Scholars Hall	250 Beds	2015	New Facility
Baseball Clubhouse	12,000	2015-17	New Facility
Bookie Renovation	85,803	2015-17	Renovation
Chief Joseph Village Apartments	138,000	2015-17	Renovation and New Building
Dairy Research / teaching Milking Parlor	TBD	2015-17	Renovation / Addition
Digital Classroom	75,000	2015-17	New Facility
Food Science/Human Nutrition Addition	18,000	2015-17	Renovation / Addition
Fountain	2,500	2015-17	New Facility
Indoor Practice Facility	109,000	2015-17	Renovation / Addition
Multicultural Center	16,000	2015-17	New Facility
Police Building	17,000	2015-17	New Facility
Troy Hall Renovation	40,000	2015-17	Renovation / Addition
Animal Diagnostic/Research	75,000	2017-19	New Facility / Addition
Plant Science Building (REC 5)	100,000	2017-19	New Facility
Plant Growth Facilities Phase 1	25,000	2017-19	New Facility
Wilmer Davis	100,000	2017-19	Renovation / Addition
WSU Art Museum Addition Phase 1	15,000	2017-19	Renovation and New Addition
Agricultural Animal Health Research Facility	TBD	2019-21	Renovation / Addition
ARS Building (REC 3)	90,000	2019-21	New Facility
Carson College of Business Facility	150,000	2019-21	New Facility
Computational & Data Science Building	TBD	2019-21	New Facility
Fulmer Hall Renovation	40,000	2019-21	Renovation / Addition
Greenhouse Replacement	92,000	2019-21	New Facility
Holland Library Renovation	203,475	2019-21	Renovation / Addition
Infrastructure Improvements / Road Replacement		2019-21	Renovation / Addition
Kamiak Apartments	64,624	2019-21	Replacement
Murrow Hall Renovation	45,318	2019-21	Renovation
Terrace Apartments	63,629	2019-21	Replacement
Advance Energy Technology Lab	100,000	2021-23	Renovation / Addition
Eastlick Hall Renovation	110,428	2021-23	Renovation
Plant Biosciences Annex and Johnson Hall Demolition (REC 6)	100,000	2025-27	Renovation / Addition / Replacement
Bio Engineering Lab (REC 7)	100,000	2025-27	New Facility

SOURCE: WSU Capital Planning and Development, February 2015

2.1.5 Demographic Projections

Table 2-4 shows the historical and projected demographics from 2006 to 2034. These data were provided by WSU Institutional Research for historical data and the Washington State Office of Financial Management (OFM) for future projections. Forecasted demographics were developed using numbers provided by the OFM for headcounts for a four-year system. Demographic data comprised of three key elements: headcount of resident students (RS), headcount of off-campus students (OCS) and headcount of faculty and staff (FS). Exhibit 2-2 shows this information graphically.

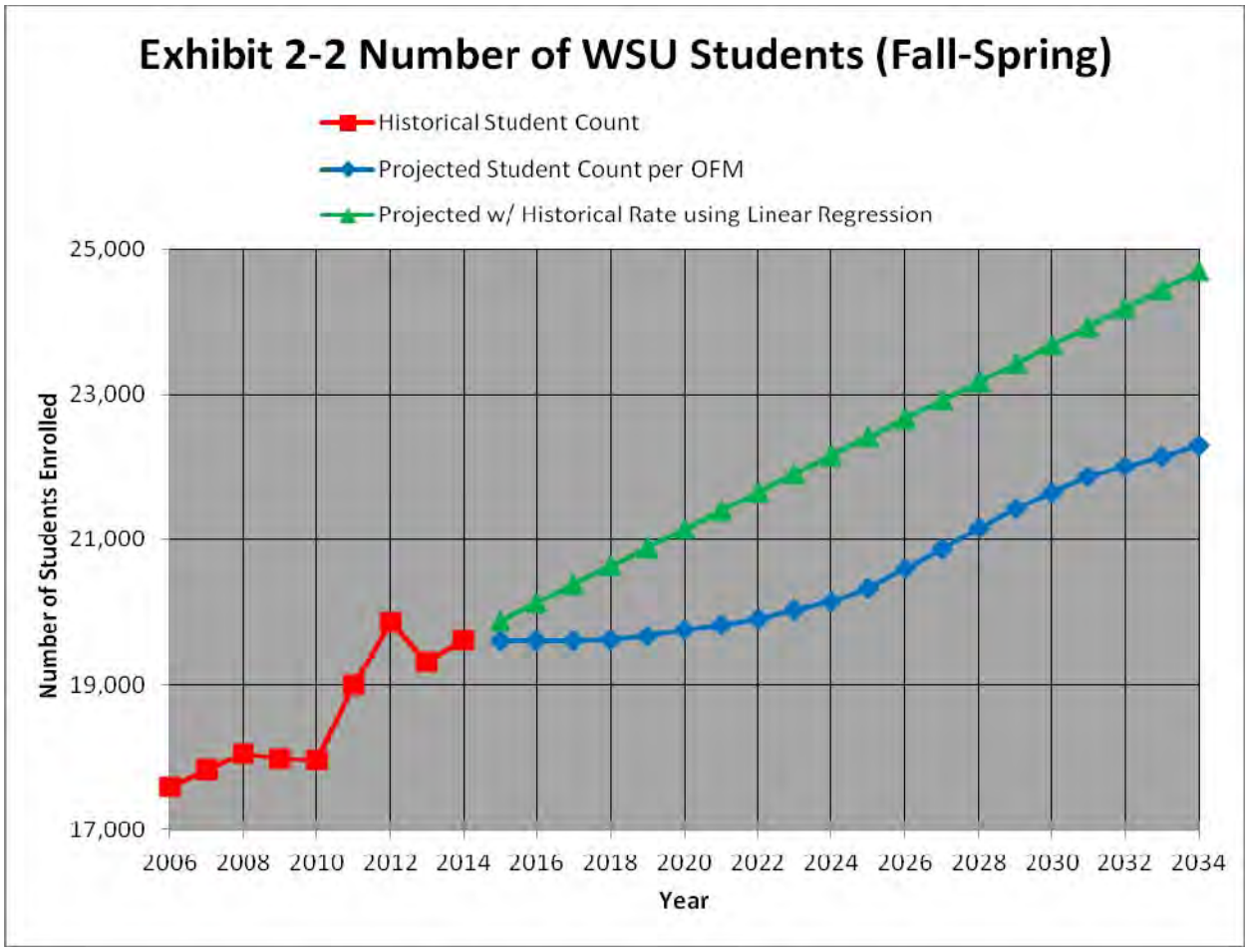
The actual number of students in 2014 is 19,613 (RS + OCS), 2015 is estimated at 19,605 students and the population is anticipated to increase to 19,760 by the end of the 6-yr planning period in 2020 and increase to 22,289 by the end of the 20-yr planning period in 2034. The resulting average annual growth rates during the 6-yr and 20-yr planning periods are 0.13% per year and 0.64% per year, respectively.

Table 2-4
WSU Historical and Projected Demographics

		Demographics						
		Fall and Spring Terms (274 days)				Summer Term (91 Days)		
Calendar Year	Plan Year	Headcount Resident Student (RS)[1]	Off Campus Student Headcount (OCS)[1]	Headcount of Faculty & Staff (FS)[2]	Growth Rate[3]	Headcount of Resident Students (RS)[1]	Off Campus Students Headcount (OCS)[1]	Head count Faculty & Staff (FS)[2]
2006	n/a	5,880	11,697	5,678	1.0094	1,700	3,735	4,206
2007	n/a	5,312	12,512	5,813	1.0164	1,740	3,531	4,306
2008	n/a	5,796	12,254	4,507	0.9474	1,648	3,004	4,080
2009	n/a	5,801	12,168	4,278	0.9864	1,626	2,734	4,024
2010	n/a	5,452	12,498	4,199	0.9964	1,620	2,843	4,010
2011	n/a	6,265	12,720	4,085	1.0421	1,688	2,911	4,178
2012	n/a	6,451	13,409	4,123	1.0399	1,756	2,653	4,345
2013	n/a	6,336	12,976	4,283	0.9823	1,725	3,440	4,268
2014	n/a	6,298	13,315	4,481	1.0217	1,762	3,688	4,361
2015	1	6,295	13,310	4,479	0.9996	1,761	3,686	4,359
2016	2	6,293	13,304	4,477	0.9996	1,761	3,685	4,357
2017	3	6,294	13,306	4,478	1.0001	1,761	3,685	4,358
2018	4	6,300	13,319	4,482	1.0010	1,763	3,689	4,362
2019	5	6,317	13,355	4,494	1.0027	1,767	3,699	4,374
2020	6	6,345	13,415	4,515	1.0045	1,775	3,716	4,394
2021	7	6,366	13,458	4,529	1.0032	1,781	3,727	4,408
2022	8	6,394	13,517	4,549	1.0044	1,789	3,744	4,427
2023	9	6,432	13,598	4,576	1.0060	1,800	3,766	4,454
2024	10	6,469	13,677	4,603	1.0058	1,810	3,788	4,479
2025	11	6,528	13,800	4,644	1.0090	1,826	3,822	4,520
2026	12	6,612	13,980	4,705	1.0130	1,850	3,872	4,578
2027	13	6,702	14,170	4,769	1.0136	1,875	3,925	4,641
2028	14	6,795	14,367	4,835	1.0139	1,901	3,979	4,705
2029	15	6,882	14,549	4,896	1.0127	1,925	4,030	4,765
2030	16	6,954	14,702	4,948	1.0105	1,946	4,072	4,815
2031	17	7,021	14,845	4,996	1.0097	1,965	4,112	4,862
2032	18	7,066	14,940	5,028	1.0064	1,977	4,138	4,893
2033	19	7,111	15,036	5,060	1.0064	1,990	4,164	4,924
2034	20	7,157	15,132	5,092	1.0064	2,003	4,191	4,956

NOTES:
1. Data source for years 2006-2014: WSU Institutional Research - Student Data Warehouse and Housing and Bob Tattershall of WSU Housing Services.
2. Data source for years 2006-2014: WSU Institutional Research.

3. Calculated years 2006-2014 for RS + OCS in Fall & Spring Terms; years 2015-2031 based on Washington State Office of Financial Management (OFM) - *Table 1 Public Two- and Four-Year Fall Headcount and FTE Projections years* 2008-2031.



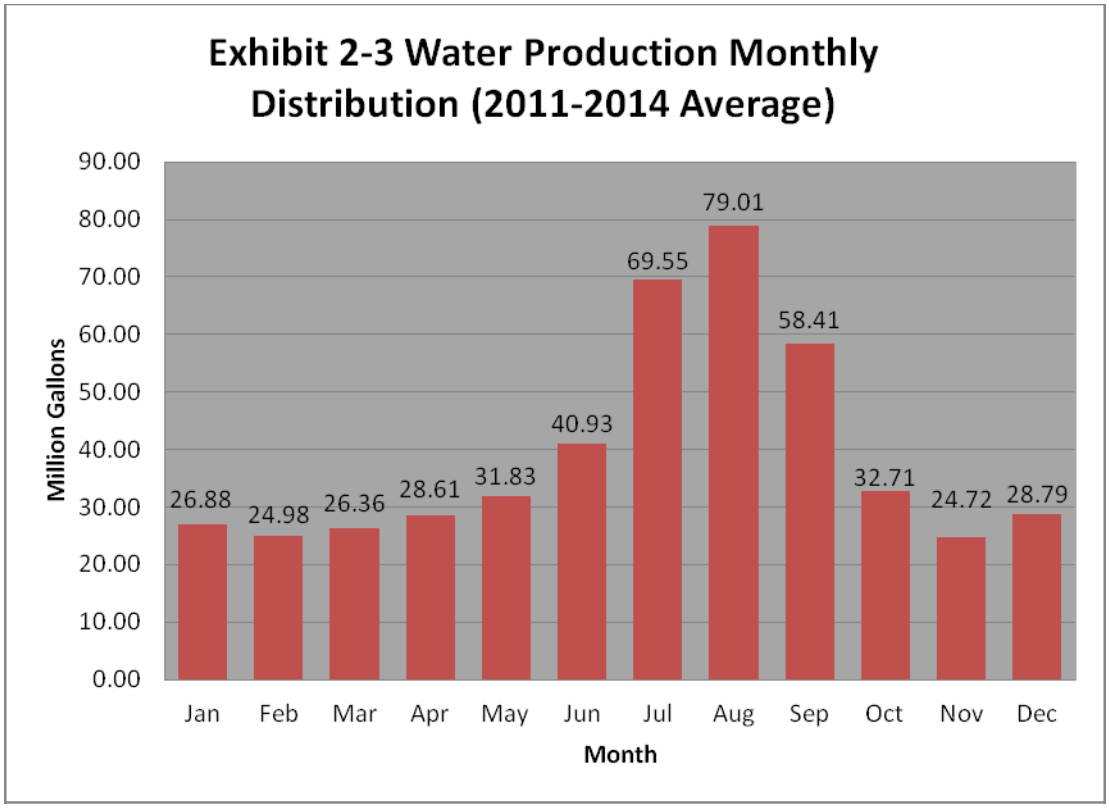
A review of the historical data, the projected student count using linear regression and the OFM student count indicates that the projected student count using linear regression may be overestimated. Over the past five years the statewide enrollment growth had some minor changes with a significant increase between 2010 and 2012. Since 2012, the growth rate has been less pronounced and the projections generated by OFM over the coming five year period are more realistic of the growth patterns in the future. Since this is the only student projection available, these OFM figures are used to generate the water demand forecasts below.

2.2 Current Water Use

WSU currently produces water from four wells; Wells 4, 6, 7 & 8. Table 2-5 shows the average production, by well and by month, over the last three years. The majority of water comes from Wells 7 & 8, with only a small percentage of the total being produced from Wells 4 and 6. As is typical with most water utilities, production peaks in the summer months of June through September. Exhibit 2-3 shows this production information graphically.

Table 2-5 Average Water Production 2011 -2014 (mg)						
Month	Well #4	Well #6	Well #7	Well #8	Total	Percent
Jan	0.64	0.30	12.34	13.59	26.88	5.7%
Feb	0.00	1.66	11.25	12.07	24.98	5.3%
Mar	0.19	0.18	12.01	13.98	26.36	5.6%
Apr	0.14	0.09	13.16	15.22	28.61	6.1%
May	0.26	0.66	10.56	20.35	31.83	6.7%
Jun	0.16	1.54	13.68	25.55	40.93	8.7%
Jul	0.24	1.45	22.99	44.88	69.55	14.7%
Aug	0.13	1.38	27.94	49.55	79.01	16.7%
Sep	0.64	0.56	23.57	33.65	58.41	12.4%
Oct	1.34	0.26	14.53	16.57	32.71	6.9%
Nov	0.23	2.51	12.48	9.50	24.72	5.2%
Dec	0.00	4.02	12.03	12.74	28.79	6.1%
Total	3.98	14.61	186.54	267.65	472.78	
Percent	0.8%	3.1%	39.5%	56.6%		

Data Source: WSU Facility Operations



Data Source: WSU Facility Operations

The annual production data and peaking factors from 2007 to 2014 are shown in Table 2-6. The annual growth rate has ranged from -5.3% to 4.2%. The peaking factor (peak day/average day) has ranged from 3.02 to 4.63, and has averaged 3.61 for the listed period.

Table 2-6
Total Water Production Summary

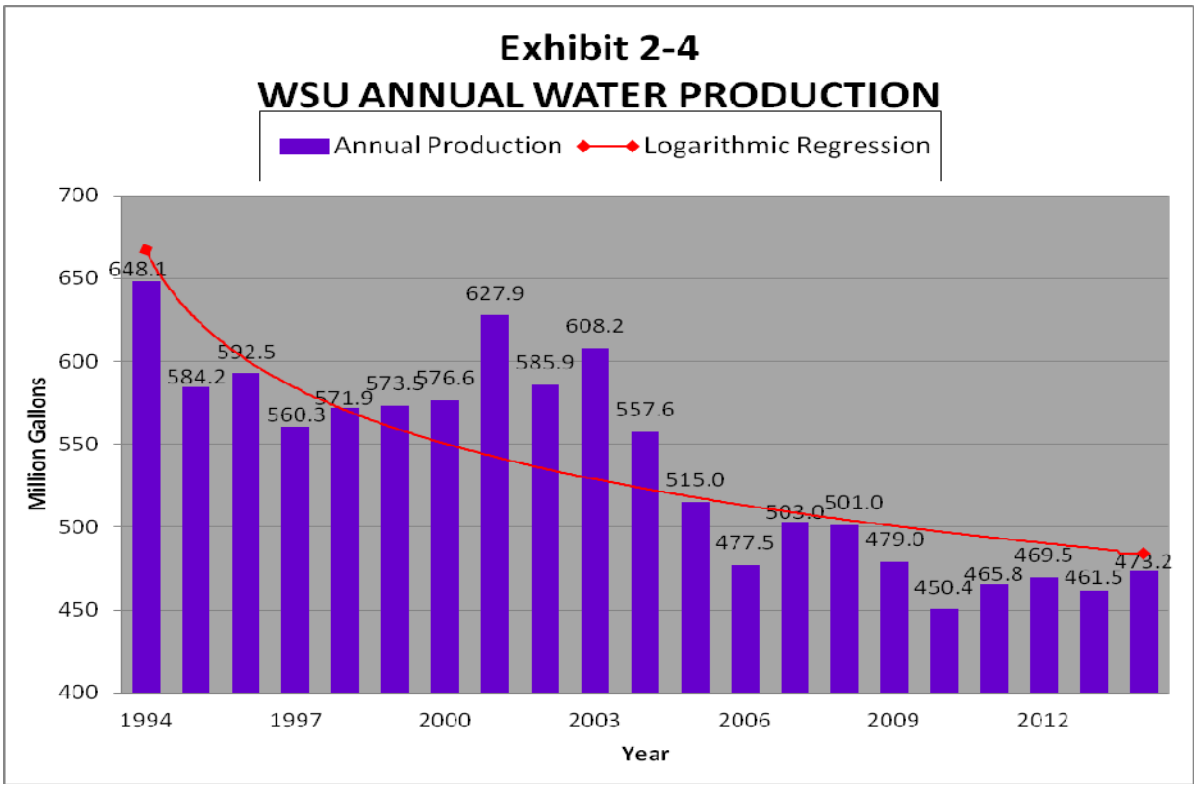
Year	Annual Production (mg)	Annual Student Growth Rate[1]	Average Day Demand (mg)[2]	Peak Day		Peaking Factor
				(mg)	Date	
2007	503	n/a	1.38	4.43	8/3/2007	3.21
2008	501	1.6%	1.37	4.14	9/16/2008	3.02
2009	479	-5.3%	1.31	5.16	8/4/2009	3.93
2010	450	-1.4%	1.23	5.7[3]	6/1/2010	4.63
2011	466	-0.4%	1.28	4.67	8/1/2011	3.66
2012	469	4.2%	1.28	4.39	8/2/2012	3.42
2013	462	4.0%	1.27	5.03	7/27/2013	3.97
2014	473	-1.8%	1.30	3.92	7/31/2014	3.02
2007-2014 Avg	475	0.15%	1.30	4.68	n/a	3.61

Data Source: WSU Facility Operations
1. See Table 2-4
2. Annual Production / 365
3. Second highest peak day used due to unusually high and uncharacteristic peak day of 8.7 mg seen on 10/1/2010. It was assumed that the highest peak day included a manual reading error.

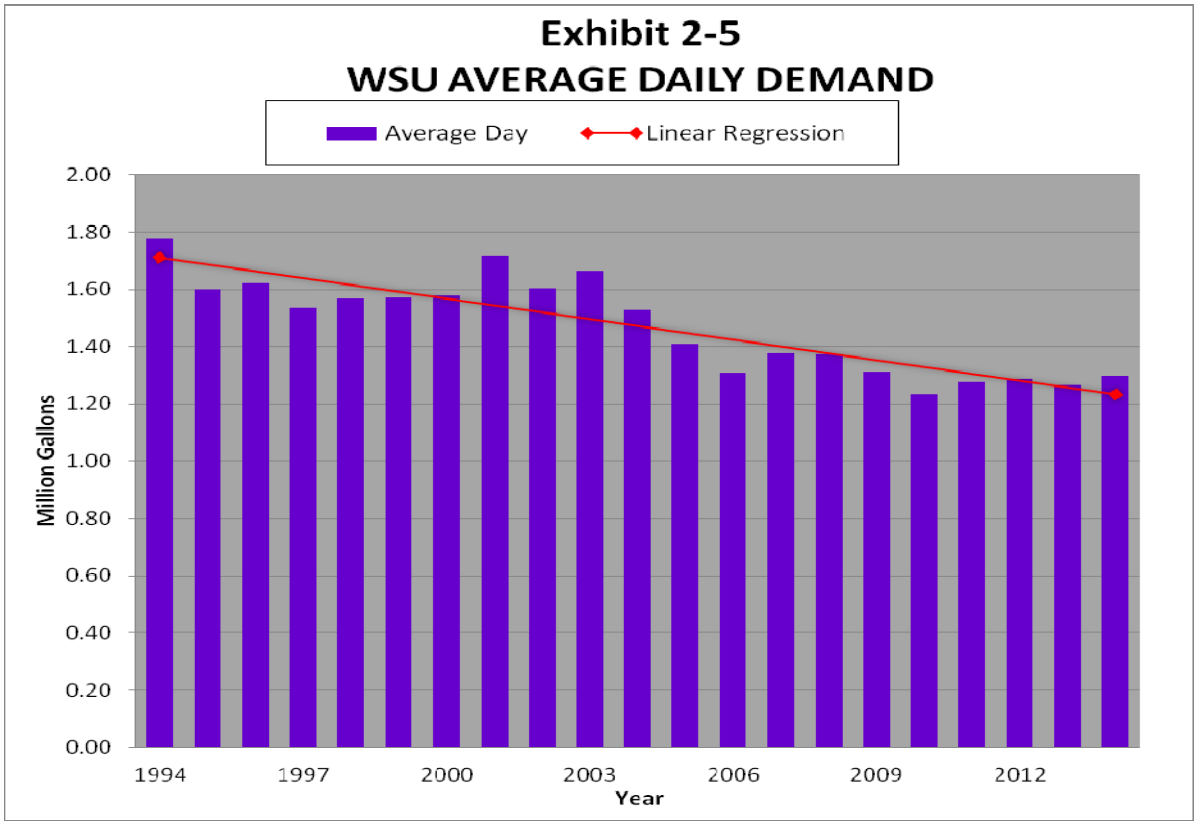
Exhibit 2-4 shows the total annual production from all wells combined from 1994 through 2014. The total water pumped has generally declined during these years from 648.1 mg to 473.2 mg for a total decrease of almost 27%. Additionally, a decline in water usage is seen between the years 2007-2014 with the exception of a few slight increases. This is a net reduction of approximately 6%. Overall, there is a general reduction in water usage, but the rate of that reduction appears to be lessening as seen by the logarithmic regression line in Exhibit 2-4. The water usage decline will level off even if growth and conservation continue to increase.

Furthermore, the overall campus water use has decreased over the last 20 years. Exhibit 2-5 shows the last 20 years of average daily demand with linear regression. The downward slope of the linear regression confirms the overall downward trend of water use at WSU.

See Appendix B-3 for monthly and annual source production totals by source for the years 1987-2014.



Data Source: WSU Facility Operations



Data Source: WSU Facility Operations

2.2.1 Water Balance, Non-Revenue, and Leakage

As stated earlier, the WSU campus is not fully metered yet making water consumption hard to determine. Currently only irrigation is 100% metered, with the remaining campus needing an additional 59 meters. Without accurate metered water use data for the different water uses, it is not possible to generate customer categories for water use or to make projections for any specific categories, such as non-revenue and non-residential water use. A required conservation measure, as listed in Chapter 4, is to have the entire campus metered by the year 2017. A plan has been put together that provides 100% of housing to be metered by the end of 2016, and the remaining 16% of meters to be installed by 2018. This metering plan is included in Appendix D-3. Currently, 101 meters are installed with a total of 160 proposed. The remaining 59 meters will be installed during 2017-2018, as funds are allocated by the legislature. It is estimated that approximately $1 million in additional funding is necessary in order to complete the metering. Since 2008, additional meters have been installed to make the campus 84% metered. Currently, the water meters are not being read on a regular basis as an automated reading system has not been installed. The only way to read the meters at this time is manually. The cost of completing the automated reading system is included in the $1 million dollar estimate above. As such, no meter data are available for this study outside of well metering and some irrigation metering data.

A further challenge posed by the lack of metered data is estimating the amount of water leakage for the system. As noted above, the total water production on campus has decreased from 2007-2014. During this same period, Facilities Operations has repaired numerous services and waterlines as listed in the Water System Repair Log in Appendix B-2. Some of these repairs could account for the decrease in production with an estimated 209,000 gallons being accounted for and numerous unknown quantities. Included in these unknown quantities is the leakage that was occurring at the Observation Hill Reservoir. This reservoir is currently being repaired, but it is unknown what quantity of water had been leaking from the reservoir prior to the repair. Nonetheless, it is still expected that there are water leaks in the system. A conservative amount of 10% is added to the water demand forecast described below.

2.3 Water Demand Forecasting

2.3.1 Demand Forecast

As discussed earlier, 16% of WSU's main campus is not metered and an accurate waterbalance is not possible. Therefore a methodology is required to generate a water demand forecast. The approach widely used and accepted by the Department of Health (DOH) is traditional demographics described in section 2.1.5 above. Water use factors are used from DOH guidelines (see footnotes of Exhibit 2-6). Irrigation, a major water component of the overall campus water use, has been added to the equations. Kappy Brun, the Grounds Supervisor for Facilities, provided the overall irrigated acreage excluding the Palouse Ridge Golf Course as 105 acres. The past year, irrigation totals were 34 mgy prior to all systems being controlled by the Calsense Irrigation controllers to conserve water. Additionally, the overall campus irrigated acres are shown using aerial images and AutoCAD (see Appendix B-1). This calculated area of irrigable green space will decrease in the future as the amount of developable space on campus becomes exhausted.

The Palouse Ridge Golf Course opened in 2008 and uses between 36 and 50 million gallons (average of 45 million gallons) of water a year over 120 acres (300,000 to 417,000 gallons per acre) (per WSU Capital Planning). However, the actual irrigation volume is much less than the

previously thought 56 million gallons. The course utilizes drought resistant grasses and a computerized irrigation system that relies on up-to-date weather information, evaporation rates, and microclimate information to conserve water. Additionally, the course is set up to connect to a water reuse system when that system is constructed and extends to the site (Source: www.palouseridge.com/courseco-management/environmental-approach). Therefore, Palouse Ridge Golf Course is dealt with separately in Exhibit 2-6 from the other landscaping.

Heating and cooling facilities, although a major water user (approx. 30 mgy), are not listed individually but contained within the water use factors for the students and faculty. It should also be noted that the amount of water used for heating and cooling has decreased since the east chilled water facility was upgraded with reverse osmosis at the cooling towers in 2009. In 2008 a retrofit to the deionized water plant was completed which also reduced water quantities. It is estimated that water usage by heating and cooling facilities has decreased by 50% from 65 mgy to approximately 30 mgy.

If the projected campus improvements listed in Table 2-3 are converted directly to increases in water usage based on additional square footage, the amount of new water required should not increase significantly. The campus improvements that have been constructed over the last 10 years have not increased the volume of water pumped especially since the volume of water pumped over the past few years has decreased (see Exhibit 2-4). Therefore, it is clear that increases in usable space do not equate to equivalent percentage increases in water usage.

The actual 2014 total water production of 473.2 mg is used as a target rate for the total water consumption. Using the above described methodology, the calculated total water use for 2014 is 473.2 mgy which is at the actual metered production from the wells. Exhibit 2-6 details the demand forecast in average day demand (ADD), maximum day demand (MDD) and annual totals. MDD is the ADD multiplied by a peaking factor of 3.61 as described in Section 2.2 above.

The ADD is expected to rise from 1,296,103 gallons per day (gpd) to 1,303,507 gallons per day from 2015 to 2020 over the 6-yr planning period and increase to 1,423,865 gpd by the end of the 20-yr planning period in 2034. The MDD is expected to increase from 4,678,931 gpd in 2015 to 4,705,662 gpd by the end of the 6-yr planning period in 2020 and increase to 5,140,152 gpd by the end of the 20-yr planning period in 2034. The annual total is expected to increase from 473,077,486 gallons in 2015 to 475,780,199 gallons by the end of the 6-yr planning period in 2020 and increase to 519,710,618 gallons by the end of the 20-yr planning period in 2034. This is a 9.3% increase in annual demand from the year 2015 to 2034

Table 2-7 summarizes the demand forecast for the 6- and 20- year planning periods 2015-2020 and 2015-2034, including conservation efforts at a 2.5% water savings as discussed in Chapter 4. Exhibits 2-7 & 2-8 show this information graphically, including the actual production data (2007-2014) and forecasted data (2015-2034).

Table 2-7 6 and 20 Year Water Demand Forecast (mg)								
					Conservation Impact[2]			
Year	Student[1] Enrollment	Annual Demand	ADD[3]	MDD[4]	Annual Demand	ADD	MDD	Savings
2015	19,605	473.08	1.30	4.68	467.07	1.26	4.56	0.6%
2016	19,597	472.95	1.30	4.68	463.94	1.25	4.53	1.3%
2017	19,600	473.00	1.30	4.68	460.99	1.25	4.50	1.9%
2018	19,619	473.33	1.30	4.68	458.32	1.26	4.56	2.5%
2019	19,672	474.25	1.30	4.69	456.24	1.27	4.57	2.5%
2020	19,760	475.78	1.30	4.71	463.89	1.27	4.59	2.5%
2021	19,824	476.90	1.31	4.72	464.97	1.27	4.60	2.5%
2022	19,911	478.41	1.31	4.73	466.45	1.28	4.61	2.5%
2023	20,030	480.47	1.32	4.75	468.46	1.28	4.63	2.5%
2024	20,146	482.48	1.32	4.77	470.42	1.29	4.65	2.5%
2025	20,328	485.65	1.33	4.80	473.51	1.30	4.68	2.5%
2026	20,592	490.23	1.34	4.85	477.97	1.31	4.73	2.5%
2027	20,872	495.10	1.36	4.90	482.72	1.32	4.77	2.5%
2028	21,162	500.13	1.37	4.95	487.62	1.34	4.82	2.5%
2029	21,431	504.81	1.38	4.99	492.19	1.35	4.87	2.5%
2030	21,656	508.72	1.39	5.03	496.00	1.36	4.91	2.5%
2031	21,866	512.36	1.40	5.07	499.55	1.37	4.94	2.5%
2032	22,006	514.79	1.41	5.09	501.92	1.41	5.09	2.5%
2033	22,147	517.23	1.42	5.12	504.30	1.42	5.12	2.5%
2034	22,289	519.71	1.42	5.14	506.72	1.42	5.14	2.5%

NOTES:

1. Based on RS (Resident Students) + OCS (Off-Campus Students) in Table 2-4
2. See section 4.3.4
3. Average Day Demand
4. Maximum Day Demand

Exhibit 2-6
WSU Water Demand Forecast 2012 - 2034

Calendar Year	Plan Year	Demographics[1]						Irrigation[2]				Water Use Factors							Demand										
		Fall & Spring Terms (274 days)			Summer Term (91 days)														Average Day Demand (ADD gpd)										
		Headcount of Resident Students (RS)	Off Campus Students Headcount (OCS)	Headcount of Faculty & Staff (FS)	Headcount of Resident Students (RS)	Off Campus Students Headcount (OCS)	Headcount of Faculty & Staff (FS)	Landscape (AC)	Golf Course (AC)[7]	Orchards (AC)	Crop (AC)	Per RS[3] (gpd/Headcount)	Per OCS[4] (gpd/Headcount)	Per FS[5] (gpd/Headcount)	Landscape Irrigation[6] (gpd/AC)	Golf Course Irrigation[7] (gpd/AC)	Orchard Irrigation[8] (gpd/AC)	Crop Irrigation[9] (gpd/AC)	Resident Students[10]	Off Campus Students[11]	Faculty & Staff[12]	Landscape Irrigation[13]	Golf Course Irrigation[14]	Orchard Irrigation[15]	Crop Irrigation[16]	Irrigation Subtotal[17]	Water Loss (10%)[18]	Total[19,23]	Annual Total (gallons)[20,22]	Maximum Day Demand[21] (MDD gallons per day)
2012	n/a	6,451	13,409	4,123	1,756	2,653	4,345	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	520,121	268,184	62,675	93,450	125,000	35,100	76,500	330,050	118,103	1,299,133	474,183,586	4,689,871
2013	n/a	6,336	12,976	4,283	1,725	3,440	4,268	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	510,854	264,963	64,189	93,450	125,000	35,100	76,500	330,050	117,006	1,287,062	469,777,755	4,646,295
2014	n/a	6,298	13,315	4,481	1,762	3,688	4,361	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,963	272,871	66,765	93,450	125,000	35,100	76,500	330,050	117,865	1,296,515	473,227,841	4,680,418
2015	1	6,295	13,310	4,479	1,761	3,686	4,359	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,724	272,765	66,736	93,450	125,000	35,100	76,500	330,050	117,828	1,296,103	473,077,486	4,678,931
2016	2	6,293	13,304	4,477	1,761	3,685	4,357	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,559	272,646	66,707	93,450	125,000	35,100	76,500	330,050	117,796	1,295,758	472,951,791	4,677,688
2017	3	6,294	13,306	4,478	1,761	3,685	4,358	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,637	272,683	66,720	93,450	125,000	35,100	76,500	330,050	117,809	1,295,900	473,003,460	4,678,199
2018	4	6,300	13,319	4,482	1,763	3,689	4,362	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	509,124	272,952	66,781	93,450	125,000	35,100	76,500	330,050	117,891	1,296,799	473,331,542	4,681,443
2019	5	6,317	13,355	4,494	1,767	3,699	4,374	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	510,498	273,690	66,961	93,450	125,000	35,100	76,500	330,050	118,120	1,299,319	474,251,382	4,690,541
2020	6	6,345	13,415	4,515	1,775	3,716	4,394	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	512,764	274,922	67,271	93,450	125,000	35,100	76,500	330,050	118,501	1,303,507	475,780,199	4,705,662
2021	7	6,366	13,458	4,529	1,781	3,727	4,408	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	514,456	275,798	67,481	93,450	125,000	35,100	76,500	330,050	118,778	1,306,563	476,895,597	4,716,693
2022	8	6,394	13,517	4,549	1,789	3,744	4,427	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	516,719	277,011	67,779	93,450	125,000	35,100	76,500	330,050	119,156	1,310,714	478,410,773	4,731,679
2023	9	6,432	13,598	4,576	1,800	3,766	4,454	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	519,792	278,668	68,182	93,450	125,000	35,100	76,500	330,050	119,669	1,316,362	480,472,081	4,752,066
2024	10	6,469	13,677	4,603	1,810	3,788	4,479	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	522,784	280,288	68,583	93,450	125,000	35,100	76,500	330,050	120,171	1,321,876	482,484,620	4,771,971
2025	11	6,528	13,800	4,644	1,826	3,822	4,520	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	527,547	282,808	69,195	93,450	125,000	35,100	76,500	330,050	120,960	1,330,561	485,654,612	4,803,324
2026	12	6,612	13,980	4,705	1,850	3,872	4,578	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	534,341	286,498	70,102	93,450	125,000	35,100	76,500	330,050	122,099	1,343,090	490,227,921	4,848,556
2027	13	6,702	14,170	4,769	1,875	3,925	4,641	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	541,614	290,394	71,055	93,450	125,000	35,100	76,500	330,050	123,311	1,356,425	495,095,039	4,896,693
2028	14	6,795	14,367	4,835	1,901	3,979	4,705	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	549,131	294,428	72,040	93,450	125,000	35,100	76,500	330,050	124,565	1,370,213	500,127,792	4,946,469
2029	15	6,882	14,549	4,896	1,925	4,030	4,765	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	556,157	298,161	72,950	93,450	125,000	35,100	76,500	330,050	125,732	1,383,050	504,813,225	4,992,810
2030	16	6,954	14,702	4,948	1,946	4,072	4,815	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	561,977	301,295	73,723	93,450	125,000	35,100	76,500	330,050	126,704	1,393,749	508,718,270	5,031,433
2031	17	7,021	14,845	4,996	1,965	4,112	4,862	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	567,395	304,228	74,438	93,450	125,000	35,100	76,500	330,050	127,611	1,403,721	512,358,187	5,067,433
2032	18	7,066	14,940	5,028	1,977	4,138	4,893	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	571,031	306,172	74,914	93,450	125,000	35,100	76,500	330,050	128,217	1,410,385	514,790,393	5,091,489
2033	19	7,111	15,036	5,060	1,990	4,164	4,924	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	574,669	308,136	75,392	93,450	125,000	35,100	76,500	330,050	128,825	1,417,072	517,231,227	5,115,629
2034	20	7,157	15,132	5,092	2,003	4,191	4,956	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	578,395	310,106	75,871	93,450	125,000	35,100	76,500	330,050	129,442	1,423,865	519,710,618	5,140,152

NOTES:

1. See Table A-1 for details on how these numbers were generated.
2. Acres provided by Kappy Brun, WSU Grounds Supervisor, and from Aerial photography estimates.
3. The DOH Water System Design Manual's guide for non-residential water demand provides a range of 75-100 gpd per resident student water use.
4. The DOH Water System Design Manual's guide for non-residential water demand provides a range of 15-25 gpd per off campus student water use.
5. The DOH Water System Design Manual's guide for non-residential water demand provides 15 gpd per faculty or staff worker water use.
6. Landscape irrigation water use is based on average of 34 milllion gallons per yer in 2014 (per Kappy Brun - WSU Grounds Supervisor).
7. Golf course irrigation meter averages 45 million gallons per year for 120 acres (WSU Capital Planning).
8. Orchard irrigation is metered at approximately 10 - 12 million gallons per year (per WSU Facilities).
9. Crop irrigation water use is based on an assumed amount of approximately 30 million gallons or approximately 2" per acre per week for 11 weeks.
10. The average daily student count of resident students and their families for the fall/spring and summer terms multiplied by the water use per resident student. The method used is ((# of fall/spring students X # days in fall/spring/365 days per year)+(# of summer students X # days in summer/365 days per year)).
11. The average daily student count of off campus students for the fall/spring and summer terms multiplied by the water use per off campus student. See #10 above for method.
12. The average daily count of faculty and staff workers for the fall/spring and summer terms multiplied by the water use per faculty and staff worker. See #10 above for method.
13. Landscape acreage multiplied by the landscape irrigation water use per acre.
14. Golf course acreage multiplied by the golf course irrigation water use per acre.
15. Orchard acreage multiplied by the orchard irrigation water use per acre.
16. Crop acreage multiplied by the crop irrigation water use per acre.
17. The subtotal of the landscape, golf course, orchard and crop irrigation demands.
18. The amount of overall system water loss is unknown so an estimate of 10% is assumed.
19. The subtotal of the resident students, off campus students, faculty & staff and irrigation daily demands.
20. The average day demand multiplied by 365 days per year.
21. The total average day demand multiplied by a peaking factor of 3.61, which is the 2007-2014 average peaking factor (see section 2.2).
22. Trial & error utilized with whole numbers for the Peaking Factors to best match the 2014 total production of 473.2 mg .

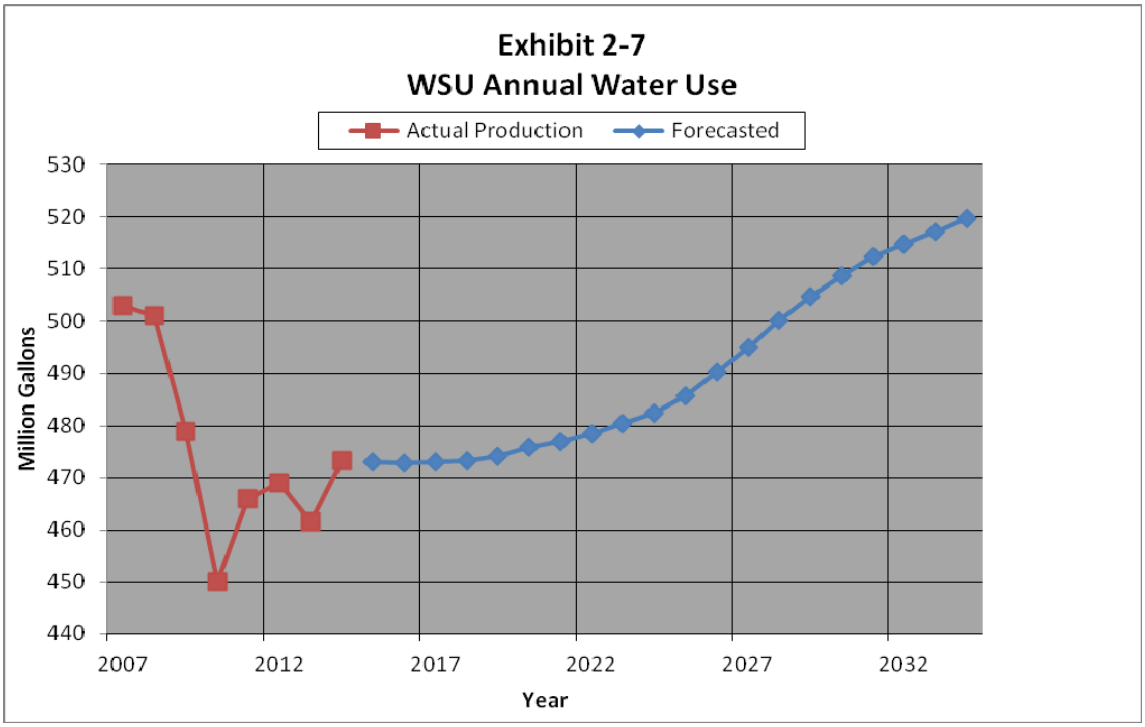


Exhibit 2-7
WSU Annual Water Use
Actual Production
Forecasted
530
520
510
500
490
480
470
460
450
440
Million Gallons
2007
2012
2017
2022
2027
2032
Year

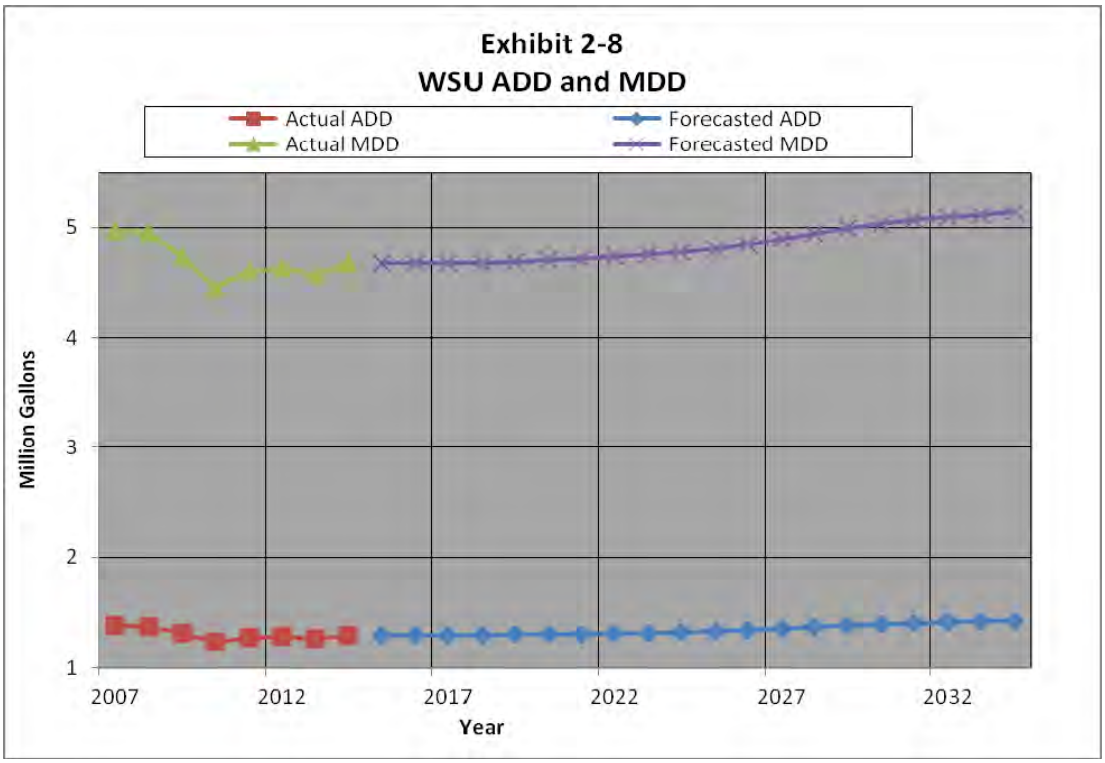


Exhibit 2-8
WSU ADD and MDD
Actual ADD
Forecasted ADD
Actual MDD
Forecasted MDD
5
4
3
2
1
Million Gallons
2007
2012
2017
2022
2027
2032
Year

2.3.2 Peak Hourly Demand

The DOH requires that the 2015 peak hourly demand (PHD) is generated from the data listed above. Since the well meters have no hourly water pumping recorders, the PHD must be estimated based on the formula from section 5.2.2 of the DOH Water System Design Manual as follows:

PHD = (MDD/1440)[(C)(N) + F] + 18

Where: **PHD** = Peak Hourly Demand,(gallons per minute, gpm)
C = *Coefficient Associated with Ranges of ERUs*
N = *Number of Service Connections, ERUs*
F = *Factor Associated with Ranges of ERUs*
MDD = *Maximum Day Demand, (gpd/ERU)*

2015 MDD = 4.679 mg (see Exhibit 2-6)
2015 ERUs = 1.296 mg (ADD) / 152 gpd (see section 2.1.3) = 8,526 ERUs

2020 MDD = 4.706 mg
2020 ERUs = 1.304 mg (ADD) / 152 gpd = 8,579 ERUs

2034 MDD = 5.140 mg
2034 ERUs = 1.424 mg (ADD) / 152 gpd = 9,368 ERUs

Using a 'C' coefficient of 1.6 and 'F' factor of 225 from Table 5-1 of the DOH *Water System Design Manual*, a PHD of **5,303** gpm is calculated for 2015, **5,333** gpm for 2020, and **5,815** gpm for 2034.

2.3.3 Aquifer Impact

Water levels in the Grande Ronde have historically declined at a rate of 0.6 and 1.5 feet per year for 70 or more years (source PBAC 2013 *Palouse Ground Water Basin Water Use Report*, page 4 in Appendix A-3). Due to this historical decline, it is the current ambition of WSU not to substantially increase the volume of ground water used on an annual basis. The goal set for WSU in the 1992 Ground Water Management Plan and as listed in WSU's Action Plan (see Appendix A-5) is to *limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy). At no time shall the accumulated total pumping exceed 125 percent of the 1981 to 1985 average (increase from 702 to 877 mgy)*. As of 2014, WSU's five year moving average of pumping from the Grande Ronde is 464 million gallons per year (mgy). This is approximately 38% less than the target of 745 mgy. Additionally, the estimated total water production of 476 mgy in 2020 and 520 mgy in 2034 are respectively 44% and 41% less than the 877 mgy ceiling in the Action Plan.

Additionally, generalized conclusions of the impact of increased pumping from the Grande Ronde aquifer are difficult to provide. The following are quotes from the 2013 PBAC *Palouse Ground Water Basin Water Use Report* (see Appendix A-3):

> "The 2013 total combined ground water pumpage by the primary pumping entities within the basin was 2.61 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2013 was approximately

> 1% less than in 2012, and 15.5% less than in 1992, the first year the Ground Water Management Plan took effect."
> (page 2 of the PBAC *2013 Palouse Ground Water Basin Water Use Report*)
>
> "In 2013, Pullman and Moscow each pumped approximately 1/3 of the total (34% and 33% respectively), followed by WSU at 18%. Colfax and UI pumped 7% and 6%, respectively, and Palouse pumping accounted for 2% of the combined total."
> (page 5 of the PBAC *2013 Palouse Ground Water Basin Water Use Report*)

Therefore, considering the potential decrease of water usage due to conservation, along with the slight historical decline in ADD (see Exhibit 2-5), the moderate growth in the campus population and the uncertainty of the impact on the aquifer, this water demand forecast will meet the goals established in WSU's 1992 Action Plan through the year 2034.

3.0 System Analysis

3.1 System Design Standards

The standards listed in Table 3-1 are used in specifying and designing new water system components for WSU (see Exhibit 2-6 for the calculation of ADD & MDD and section 2.3.2 for the calculation of PHD).

Table 3-1 Water System Standards	
Water Quality Parameters	Washington State Department of Health (DOH) Federal Safe Drinking Water Act (SDWA)
Average Day Demand (ADD) year 2015	900 gpm
Maximum Daily Demand (MDD) year 2015	3,249 gpm
Peak Hour Demand (PHD) year 2015	5,303 gpm
Storage Requirements	OS (operational storage) + FSS (fire suppression storage) Standby Storage (SB) and Equalizing Storage (ES) are not necessary due to adequate pumping capacity of source wells
Fire Flow Duration and Rate (worst case)	4 hours @ 5000 gpm – low zone 4 hours @ 6000 gpm – high zone
Minimum System Pressure	30 psi – PHD scenario 20 psi – Fire flow with MDD scenario
Minimum Pipe Sizes	8" diameter for new mains
Backup Power Requirements	Controls only
Valve Spacing	DOH *Water System Design Manual* (December 2009)
Hydrant Spacing	International Fire Code (typical 300')

WSU uses AWWA (American Water Works Association) standards, the UPC (Uniform Plumbing Code), the IBC (International Building Code) and the IFC (International Fire Code) for design criteria.

3.2 Water Quality Analysis

The water quality analysis and regulatory compliance review is contained in Chapter 6. Appendix G-1 contains the water quality analysis reports.

3.3 System Description and Analysis

3.3.1 Zone Demands

The high and low zones on WSU's campus consume water at different rates. Since there is no pressure reducing valve between the zones, each zone is evaluated separately. Therefore, it is necessary to analyze the well production data during a period when the transfer pump station is used very little. An appropriate period is November 2013 thru July 2014. The total production during this period for the low and high zones was 125.38 mg and 183.97 mg, respectively. The transfer station pumped 0.53 mg from the low zone to the high zone between June 2013 and July 2014. Therefore, the total high zone use was 184.50 mg or 60% and the total low zone use

was 124.85 mg or 40%. This ratio is used to generate the water demands in each zone as shown in Table 3-2 below:

Table 3-2
Zone Demands

	Year		
Zone	**2015**	**2020**	**2034**
Low (40%)			
ADD (mg)	0.518	0.522	0.570
MDD (mg)	1.872	1.882	2.056
PHD (gpm)	2,121	2,133	2,326
High (60%)			
ADD (mg)	0.778	0.782	0.854
MDD (mg)	2.807	2.824	3.084
PHD (gpm)	3182	3200	3489
Total System Demand			
ADD[1] (mg)	1.296	1.304	1.424
MDD[1] (mg)	4.679	4.706	5.140
PHD[1] (gpm)	5,303	5,333	5,815

NOTES:
1. See section 2.3

3.3.2 Water System Source

A total of eight wells have been drilled for the WSU water system. Logs for these wells are included in Appendix C-2. Currently, water for the WSU campus and the adjacent airport terminal is supplied primarily by four wells; Wells 4, 6, 7 & 8. The remaining wells are emergency wells. Wells 1 and 3 are not useable at this time due to insufficient water levels and the pump in Well 3 has a broken shaft. Well 4 was rebuilt in 2014 and is run monthly. Well No. 5 has not been used since January 1978 and is now used as a monitoring well with the pump removed. There is a buried hazardous waste site near this well. Although tests have not indicated any contamination exceeding accepted standards, this well is not currently used. Table 3-3 and Exhibit 3-1 summarize features of the eight wells. Pump curves for the transfer station pumps and the pumps at Wells 4, 6, 7 & 8 are included in Appendix C-3.

Wells 4, 6, 7 & 8 are currently producing reliable volumes of water with pumps that should not need replacement for up to ten years. The pumps for Wells 4, 6 and 7 were last installed or replaced in 2014, 1997 and 1998, respectively and Well 8 was brought on-line in late 2006. Starting in 2007, Well 6 serves the high zone but is not used frequently due to the start-up of Well 8. Transfer pumps from the low to high zone provide additional water when necessary if Well 8 becomes unavailable.

Table 3-3 Production Well Summary							
Well No.	**Current Status**	**Zone**	**Well Depth**	**Date Drilled**	**Pump Date**	**Pump Data**	**Current Pump Capacity**
1.	Emergency (Electrical malfunction 2000)	Low	247 ft.	1934	1990	Peerless 60 hp, 1800 rpm	417 gpm
2.	Decommissioned	Low	214 ft.	1938			
3.	Emergency (broken shaft)	Low	223 ft.	1946	1968	Peerless 150 hp, 1770 rpm	1100 gpm
4.	Permanent (Active)	Low	275 ft.	1963	1989 Rebuilt 2014	Peerless 225 hp, 1800 rpm	1500 gpm Run monthly
5.	Emergency[1]	High	394 ft.	1964	Pump removed	No Pump	No Pump
6.	Permanent (Active)	High	697 ft. (broken shaft fixed 2014)	1973	1997	Peerless 6 stage, 250 hp, 1770 rpm	1000 gpm
7.	Permanent (Active)	Low	1814 ft.	1987	1998	Peerless 9 stage, 450 hp, 1760 rpm	2500 gpm
8.	Permanent (Active)[2]	High	812 ft.	2003	2006	Flowserve 8 stage, 700 hp, 1780 rpm	2500 gpm

NOTES:
1. Pump was removed to conduct well interference test for PCHB No. 06-099. Presently used for monitoring.
2. Well No. 8 was activated after water rights change applications for well integration were approved.

Source analysis is completed to meet the criteria outlined in the Washington State Department of Health *Water System Design Manual, 2009*. This plan utilizes these guidelines as criteria for determination of reasonable treated water source required in each zone.

The sources must be adequate to meet the MDD for the area being evaluated. The high and low zone analyses each evaluate an individual zone and wells that directly serve the zones are considered to be the sources for the zone. The capacity of any well is calculated based on the firm pumping capacity and the pump operating for 18-hours during a day.

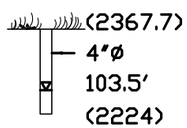
3.3.3 Full System Source Analysis

Table 3-4 shows the source analysis for the full WSU water system. The sources for the system are the four active wells with a current capacity of 7,650 gpm but are restricted to 5,000 gpm due to water rights limitations (see Chapter 5). Based on these limitations, a total of 5.4 mg is produced during the 18-hour pumping period. As shown in the table, there is currently adequate source in the system to meet the projected 2027 ADD of 1.62 mg.

WSU PULLMAN CAMPUS WELLS AND WELL PUMPS

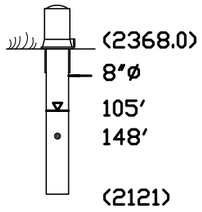
(UPDATED : 06/15 – AJT)

TEST WELL (AQUIFER MONITORING ONLY)



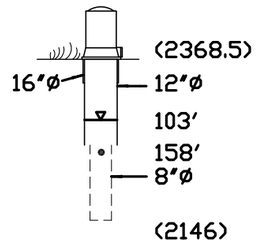
144 FEET
(NO PUMP MONITORING ONLY)

WELL NO. 1 (EMERGENCY)



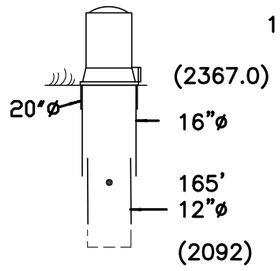
247 FEET
60 H.P.
500 GPM (1)
417 GPM (2)
TAKEN OFFLINE IN 2000 DUE TO ELECTRICAL ISSUES
LOW

WELL NO. 3 (EMERGENCY, BROKEN SHAFT)



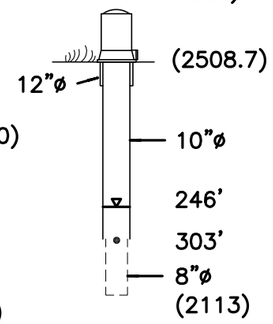
223 FEET
150 H.P.
1,000 GPM (1)
1,100 GPM (2)
LOW

WELL NO. 4 PERMANENT (ACTIVE)



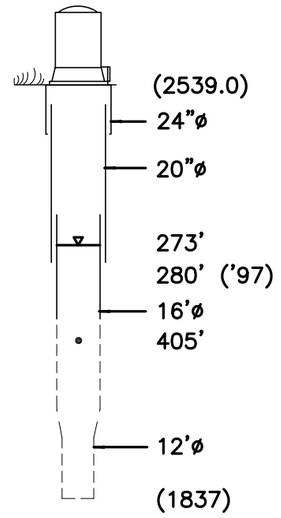
275 FEET
225 H.P.
1500 GPM (1)(2)
LOW

WELL NO. 5 (EMERGENCY, CURRENTLY USED AS MONITORING WELL)



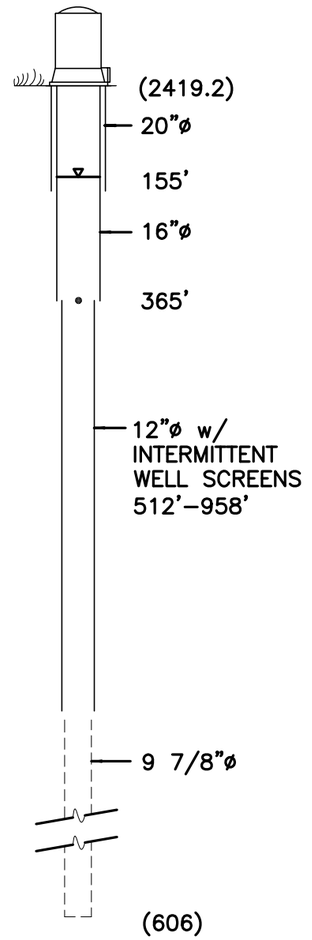
394 FEET
(NO PUMP – MONITORING ONLY)
HIGH

WELL NO. 6 PERMANENT (ACTIVE)



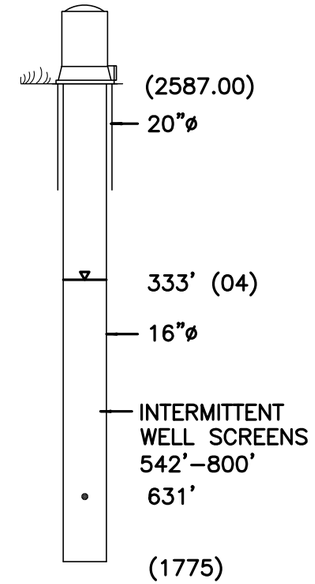
697 FEET
250 H.P.
1,500 GPM (1)
1,000 GPM (2)
HIGH

WELL NO. 7 PERMANENT (ACTIVE)



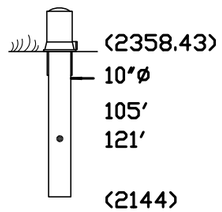
1814 FEET
450 H.P.
2,500 GPM (1)(2)
LOW

WELL NO. 8 PERMANENT (ACTIVE)



812 FEET
700 H.P.
2,500 GPM (1)(2)
HIGH

WELL NO. 2 (DECOMMISSIONED)



214 FEET
50 H.P.
500 GPM (1)
LOW

LEGEND

•	PUMP INTAKE SETTING & FT. FROM SURFACE
	STEEL CASING & DIAMETER
	NO CASING
(2364.16)	ELEV. ABOVE M.S.L.
	GROUND ELEVATION
	STATIC WATER SURFACE FEB. '93 UNLESS OTHERWISE NOTED
(1)	INITIAL PUMPING RATE
(2)	CURRENT PUMPING RATE

2015 WATER SYSTEM PLAN UPDATE

EXHIBIT 3-1
WELL SCHEMATIC

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
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DRAWN BY: AJT

CHECKED BY: RGP

DATE: 6/2015 | LOG NO. 0

Table 3-4 Evaluation of Source Adequacy for Full System			
	Year		
	2015	2020	2034
Projected ERUs and Demand[1]			
Equivalent Residential Units (ERUs)	8,526	8,579	9,368
Projected Demand (mg)			
Average Day	1.296	1.304	1.424
Maximum Day	4.679	4.706	5.140
Available Sources (mgd)[2]			
Well No. 1 (Emergency)	-	-	-
Well No. 2 (Decommisioned)	-	-	-
Well No. 3 (Emergency)	-	-	-
Well No. 4 (1,500 gpm)	1.620	1.620	1.620
Well No. 5 (Emergency)	-	-	-
Well No. 6 (1,000 gpm)	1.080	1.080	1.080
Well No. 7 (2,500 gpm)	2.700	2.700	2.700
Well No. 8 (2,500 gpm)	2.700	2.700	2.700
Total Available Source (mgd)	8.100	8.100	8.100
Water Rights Limitation (mgd)[3]	5.400	5.400	5.400
Source Surplus/(Deficiency)[4] (mgd)	0.721	0.694	0.260

NOTES:
1. Number of ERUs based on 152 gpd per ERU (see section 2.1.3)
2. Capacity of wells based on current pump capacity operating 18 hours per day (see Table 3-3).
3. 5,000 gpm for 18 hours.
4. Water Rights Limitation minus Maximum Day.

3.3.4 Low Zone Source Analysis

Wells 4 and 7 provide source for this zone. These sources are capable of serving the demands of 28,421 ERUs at an 18-hour pump time and they have adequate capacity to meet projected demands for the entire 20-year planning period. Table 3-5 shows the calculation of source adequacy.

Table 3-5 Evaluation of Source Adequacy for Low Zone			
	Year		
	2015	2020	2034
Projected ERUs and Demand[1]			
Equivalent Residential Units (ERUs)	3,410	3,432	3,747
Projected Demand (mg)			
Average Day	0.518	0.522	0.570
Maximum Day	1.872	1.882	2.056
Available Sources (mgd)[2]			
Well No. 4 (1,500 gpm)	1.620	1.620	1.620
Well No. 7 (2,500 gpm)	2.700	2.700	2.700
Total Available Source (mgd)	4.320	4.320	4.320
Water Rights Limitation (mgd)[3]	2.160	2.160	2.160
Source Surplus/(Deficiency)[4] (mgd)	0.288	0.278	0.104

NOTES:
1. See Table 3-2
2. Capacity of wells based on current pump capacity operating 18 hours per day (see Table 3-3).
3. 40% of 5,000 gpm for 18 hours.
4. Water Rights Limitation minus Maximum Day.

3.3.5 High Zone Source Analysis

Wells 6 and 8 provide source for this zone. These sources are capable of serving the demands of 24,868 ERUs at an 18-hour pump time and they have adequate capacity to meet projected demands for the entire 20-year planning period. Table 3-6 shows the calculation of source adequacy.

Table 3-6
Evaluation of Source Adequacy for High Zone

	Year		
	2015	**2020**	**2034**
Projected ERUs and Demand[1]			
Equivalent Residential Units (ERUs)	5,116	5,147	5,621
Projected Demand (mg)			
Average Day	0.778	0.782	0.854
Maximum Day	2.807	2.824	3.084
Available Sources (mgd)[2]			
Well No. 6 (1,000 gpm)	1.080	1.080	1.080
Well No. 8 (2,500 gpm)	2.700	2.700	2.700
Total Available Source (mgd)	3.780	3.780	3.780
Water Rights Limitation (mgd)[3]	3.240	3.240	3.240
Source Surplus/(Deficiency)[3] (mgd)	0.433	0.416	0.156

NOTES:
1. See Table 3-2
2. Capacity of wells based on current pump capacity operating 18 hours per day (see Table 3-3).
3. 60% of 5,000 gpm for 18 hours.
4. Water Rights Limitation minus Maximum Day.

3.3.6 Interties

The only other water source immediately available for the WSU system are the four interies with the City of Pullman. These interties provide emergency connections to both the high and low zones; two on the high and two on the low. The four interties are located: at the intersection of Valley Road and Merman Drive (#1), approximately 800 feet west on Valley Road (#2), at the south end of Duncan Lane (#3), and at the intersection of Oak Street and Reaney Way (#4). The interties are all valved and remain closed under normal circumstances. If opened during static conditions, the water would flow from the WSU system to the Pullman system at valves #1, #2 and #3 and the opposite direction at valve #4 (valves #1 and #2 are on the WSU high zone and #3 and #4 are on the WSU low zone). The calculated static pressures are within 15 psi on either side of all valves and therefore, the flow direction could vary due to reservoir levels, demand, fire flow events, etc. on either system.

In the last 20 years the interties has only been used only a few times, and because of this, the connections are not metered. As indicated earlier, the City of Pullman and WSU have a written agreement for shared water use between the systems (see Appendix A-9). Under the agreement the interties may be used during emergencies only if it does not have a “detrimental

effect" on the system from which it is drawing water. The party drawing the water is charged for its use. Pullman and the University work cooperatively during those rare instances when the intertie is needed.

3.3.7 Water System Treatment

Chlorination is the only treatment on the WSU water system. Gas cylinder mounted vacuum units provide chlorination at each pump house. These units were installed in 1998 and 1999.

WSU terminated all fluoridation in June 2008.

3.3.8 Water System Storage

The University is served by four reservoirs, two for the high zone and two for the low zone. The round-top reservoir, as listed in the 2002 Water System Plan, was removed permanently from service in 2007 for construction of the expanded Golf Course. Table 3-7 summarizes the features of these four reservoirs.

Table 3-7
Reservoir Summary

Reservoir	Volume	Date	Material	Zone	Tank-Full Elevation
Observatory Hill #1 (east)	2.0 MG	1947	Concrete	Low	2651.5
Observatory Hill #2 (west)	2.0 MG	1963	Concrete	Low	2651.5
Elevated @ Observatory Hill	0.1 MG	1947	Steel	High	2711.5
North Fairway	2.0 MG	1975	Steel	High	2711.5

The reservoirs, with the exception of Observatory Hill #2, are in good shape and are not anticipated to need replacement within the next 20 years. Observatory Hill #2 has developed cracks due to differential settlement and in the past has leaked. A liner was installed in 1974 and currently this reservoir does not appear to be leaking. Repair work has been completed in 2003 on the roof structure, which has connection failure as well as support problems due to expansion/contraction and settlement. The future of the west reservoir is dependent on its performance. It is not anticipated that Observatory Hill #2 will be replaced in the next 6 years. Both Observatory Hill reservoirs have been cleaned in the last ten years. Observatory Hills #1, the east reservoir is currently being repaired to stop leakage. The amount of leakage from the east reservoir is unknown, but the repairs will be completed during the Spring of 2016 and have begun.

3.3.9 Storage Analysis

DOH requires public water systems to provide sufficient storage to meet any seasonal or diurnal variations in demand, fire flows, and emergency demands such as during power outages and equipment failures. As with the source analysis, the criteria for storage adequacy are outlined in Chapter 9 of the DOH *Water System Design Manual*.

For a given reservoir design, each of the five storage components listed below must be considered:

- Operational Storage;
- Equalizing Storage;
- Standby Emergency Storage;
- Fire Suppression Storage; and
- Dead Storage, if any.

Only effective storage may be used in determining actual available, or design storage volume. Effective storage is equal to the total volume minus the dead storage built into the reservoir. Total storage volume required has been interpreted as the sum of Equalizing Storage, Fire Storage, and Standby (Emergency) Storage. DOH allows for the nesting of Fire Storage and Standby Storage (using only the larger of the two). For this analysis, total required storage volume will be calculated without nesting. Storage requirements will be developed by zone.

The following is a summary of the four components making up the required total storage volume for the low level zone for the year 2015:

Low Zone

Operational Storage (OS) Low Zone:

The Observatory Hill reservoirs currently incorporate a three-foot variation in elevation from pump-on to pump-off.

OS = Area * Elevation Change
2*(118)^2* 3 * 7.48
= 624,909 gallons

Equalizing Storage (ES) Low Zone:

PHD for the low zone is 2,121 gpm in the year 2015 (see Table 3-2)

ES = (PHD-Qs)*150
Where Qs = total pumping capacity of all installed sources of supply, except emergency sources (Well No. 4 @ 1500 gpm + Well No. 7 @ 2500 gpm = 4,000 gpm)

(2,121 gpm – 4,000)*150
= -281,850 gallons applied; therefore 0 gallons applied

Standby Storage (SB) Low Zone:

ADD for the low zone is 360 gpm in the year 2015 (see Table 3-2)

SB = (2 days)ADD*1440 – 1440*(Qs – QL)
Qs = Total flow capacity of all installed sources of supply, except emergency sources (Well No. 4 @ 1500 gpm + Well No. 7 @ 2500 gpm = 4,000 gpm)

OL = The flow rate of the source that is the largest of all sources available to the system (Well No. 7 @ 2,500 gpm).

2*360*1440 – 1440*(4,000– 2,500)
= -1,123,200 gallons; therefore 0 gallons applied

Fire Suppression Storage (FSS) Low Zone:

The worse-case fire demand for the low zone is for the Physical Education building (#96) at 5,000 gpm for 4 hours.

FSS = Rate * Duration
5,000*4*60
= 1.20 million gallons

The sum of these two components (OS+FSS) equals 1.85 million gallons and is the total low zone storage requirement in the year 2015. This is 46% of the total 4.0 million gallons available from the two Observatory Hill reservoirs.

High Zone

The following is a summary of the four components marking up the required total storage volume for the high level zone in the year 2015:

Operational Storage (OS) High Zone

The Fairway and elevated Observatory Hill reservoir have a three foot variation in elevation from pump on to pump off.

OS = Area * Elevation Change
{[(PI(102)^2 /4 * 3] + [PI(30)^2 / 4 * 3)]}*7.48
= 199,125 gallons

Equalizing Storage (ES) High Zone:

PHD for the high zone is 3,182 gpm in the year 2015 (see Table 3-2)

ES = (PHD-Qs)*150
Where Qs = total pumping capacity of all installed sources of supply, except emergency sources (Well No. 6 @ 1,000 gpm + Well No. 8 @ 2500 gpm = 3,500 gpm)

(3,182 gpm – 3,500)*150
= -47,700 gallons; therefore 0 gallons applied

Standby Storage (SB) High Zone:

ADD for the high zone is 540 gpm in the year 2015 (see Table 3-2)

SB = (2 days) ADD*1440 – 1440*(Qs – QL)
Qs = Total flow capacity of all installed sources of supply, except emergency sources. (Well No. 6 @ 1,000 gpm + Well No. 8 @ 2500 gpm + transfer pump @ 1,000 gpm = 4,500 gpm)

QL = The flow rate of the source that is the largest of all sources available to the system (Well No. 8 @ 2,500 gpm)

2*540*1440 – 1440*(4,500– 2,500)
= -1,324,800 gallons; therefore 0 gallons applied

Fire Suppression Storage (FSS) High Zone:

The worst-case demand for the high zone is the Coliseum (building #806) at 6000 gpm for 4 hours.

FSS = Rate * Duration
6000*4*60
= 1.44 million gallons

The sum of these two components (OS + FSS) equals 1.64 million gallons and is the total high zone storage requirement in the year 2015. This is 78% of the total 2.1 million gallons available from the two high zone reservoirs.

The above calculations along with the calculations for the years 2020 and 2034 are summarized in Table 3-8. This Table also shows that the existing storage is adequate through the 20-year planning period and that Standby Storage (SB) and Equalizing Storage (ES) are not necessary due to adequate pumping capacity of the source wells.

Table 3-8
Summary of Evaluation of Storage Adequacy (mg)

	Year		
	2015	**2019**	**2034**
Storage Requirements Low Zone			
OS	0.62	0.62	0.62
ES	0	0	0
SB	0	0	0
FSS	1.20	1.20	1.20
Total Required Storage Low Zone	1.85	1.85	1.85
Total Existing Storage	4.00	4.00	4.00
Percentage of Existing Storage	**46**	**46**	**46**
Storage Requirements High Zone			
OS	0.20	0.20	0.20
ES	0	0	0
SB	0	0	0
FSS	1.44	1.44	1.44
Total Required Storage High Zone	1.64	1.64	1.64
Total Existing Storage	2.10	2.10	2.10
Percentage of Existing Storage (%)	**78**	**78**	**78**

3.3.10 Distribution

WSU's water distribution system is composed of approximately 27 miles of water mains consisting of two separate zones (low and high) that are connected by closed crossover valves and a transfer pump station. Appendix C-5 contains water system maps of both zones. The system summary of 6" and larger mains is shown in Table 3-9 for the two zones. The water mains are primarily cast iron, although there are some ductile iron, AC, PVC and steel lines. When lines are replaced, they are primarily replaced with PVC C-900 piping materials. Some of the small service lines are galvanized, copper or PVC. The distribution system is mostly looped on the high and low zone which provides redundancy so that any outage due to pipe failure can be isolated to a comparatively small area. There is no cathodic protection provided for the distribution system.

Table 3-9
Piping Network Summary

Zone	Main Size	Approx. Total Length
Low	6 inch	19,214 ft.
	8 inch	17,566 ft.
	10 inch	6,654 ft.
	12 inch	9,022 ft.
	Total Low	**52,456 ft.**
High		
	6 inch	35,203 ft.
	8 inch	43,249 ft.
	10 inch	5,681 ft.
	12 inch	5,318 ft.
	Total High	**89,451 ft.**
	Total High and Low Zones	**141,907 ft.**

The high and low zones are connected at ten locations. The connections are crossover valves that can be opened when additional water is required in the low zone. The valves would only be opened during a major fire situation, to help distribution during a main break or during a pumping problem from one of the wells (see Exhibit 7-4).

The high zone is partially supplied by a transfer pump station located on Observatory Hill near the low zone storage reservoirs. The two transfer pumps, rated at 1000 gpm each, convey water from these low zone reservoirs and deliver it to the high zone distribution grid. The station is automatically controlled by the water level in the high zone North Fairway reservoir. These transfer pumps are operated automatically on an alternating basis. Only one unit is pumping at any give time, unless control is switched to manual mode.

There are several buildings on campus that require booster pumps because of the elevation of the upper floors or the demands within the building. Each deficiency is served with an individual pump for that building. Table 3-10 lists all the buildings on campus with booster pumps. As new buildings are constructed, they are evaluated during the design development process to determine whether the system can provide adequate pressure and flow without booster pumps.

Table 3-10 Buildings With Domestic Water Pumps	
Building Name	**Building Number**
Thompson Hall	1
Fulmer Syntheses	3
White Hall (Honors Hall)	14
McCroskey Hall	19
Kimbrough Music Building	25
New Holland Library	62A
Dodgen Research Facility	74
Johnson Hall	76
Hall Rotunda	80
Streit Hall	81A
Perham Hall	81B
Eastlick Hall	82A
Rogers Hall	83
Orton Hall	87
Johnson Tower	87
Center for Undergraduate Education	95
Fine Arts Building	175
Webster Physical Science	801
Bustad Hall	807
Animal Disease Biotechnology Facility (ADBF)	807A
Owen Science Library	810
Experimental Animal Lab	814
Food Quality	815
Food Science/Human Nutrition	816
Beasley Performing Arts Coliseum	806
Clark Hall	99
Animal Science Laboratory	100
Vet Teaching(VTH)	818
Wilson Hall	40
Fulmer Hall Annex	3A
Murrow Addition	33A

3.3.11 Hydraulic Analysis

The WSU water distribution system was analyzed and modeled using H_20NET water modeling software. This software was selected primarily because the previous model was completed using this software and also because the City of Pullman also uses this software and compatibility was desired. The water system was modeled as two separate zones; the high zone and the low zone. In 2006, an *Interim Water System Plan Update* was prepared by Thomas, Dean & Hoskins, Inc. This report prioritized the installation of a pressure reducing valve between the high and low zone. WSU installed this valve which is an electronically actuated valve that connects the two zones in the vicinity of the observatory hill reservoirs rather than a pressure reducing valve. During normal operation, the valve will be turned off. If an emergency occurs where water from the high zone is needed in the low zone, the valve will be turned on manually. When the valve is on, it will be automatically controlled by the water surface in the low zone reservoirs. The valve will be manually cycled (exercised) once a month

to prevent water in the adjacent piping from becoming stale. Since this valve is a manual valve, modeling the two zones as one system was not performed.

Distribution pipes 6" and larger were incorporated into the modeling network. One 3" pipe was evaluated in the model since it was connected to a node where pressure or flow warranted evaluation. Hazen–Williams roughness coefficients varied in the model. A value of 120 for the low zone and a value of 110 for the high zone were used in the model (note: these C values were used based on the modeling effort in the last WSP update).

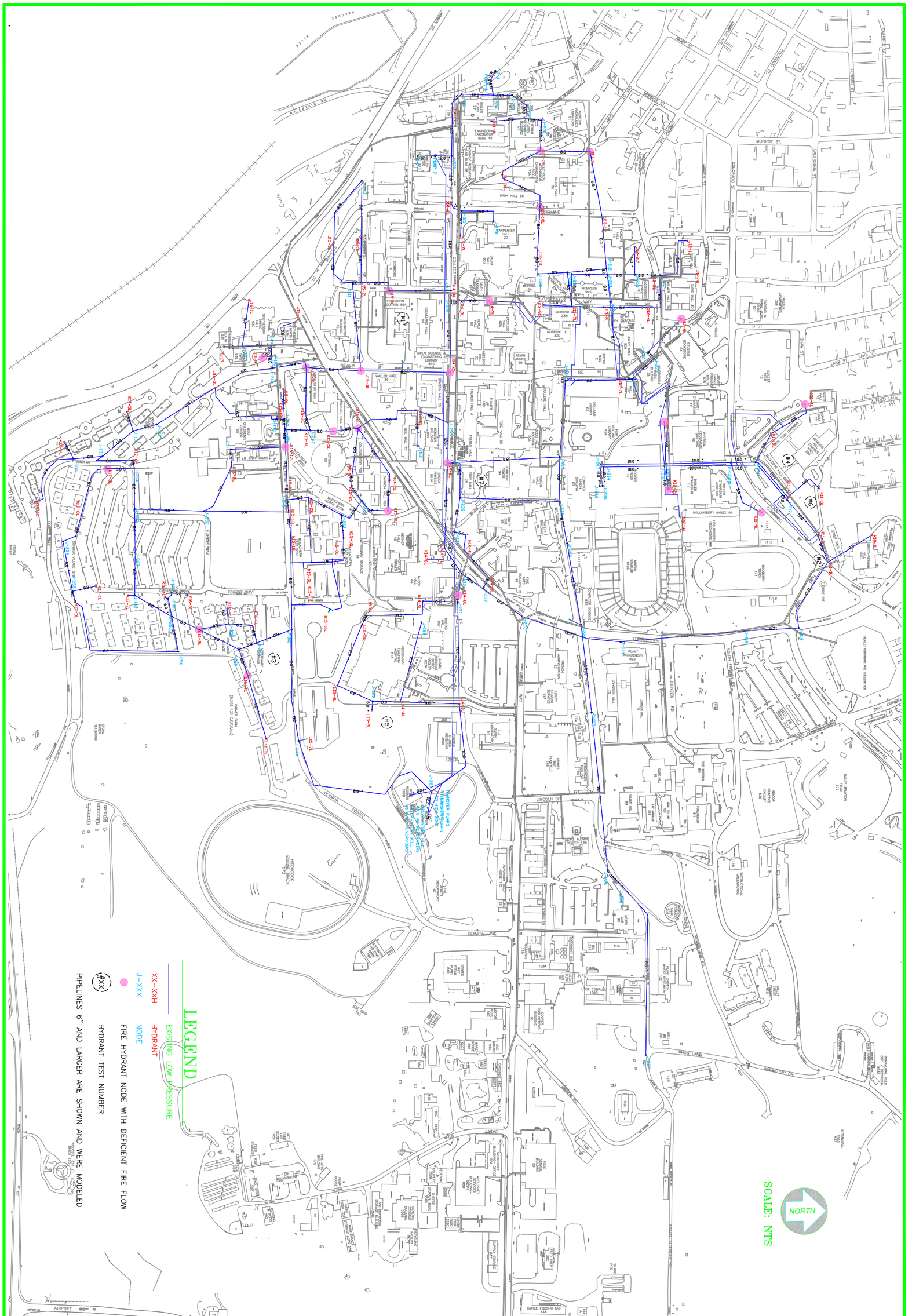
All documented fire hydrant locations for both the high and low zones were included in the model. Reservoirs and well pumps relevant to the zones were also modeled with the appropriate characteristics (pressures, flows, etc.). The low zone is shown on Exhibit 3-2 and the high zone on Exhibit 3-3 (also see Appendix C-5 for full size maps).

Calibration

Field fire hydrant testing was performed during 2012 to 2015 at various locations throughout the high and low zones. The field testing results were compared with values generated by the computer model. Exhibits 3-2, 3-3 and Appendix C-5 contain the hydrant testing locations and Tables 3-11 and 3-12 contain the hydrant test data (see Appendix C-4 for the individual hydrant test reports).

The pressures obtained from the computer model, in general, did not deviate by more than 5% from values measured in the field as allowed by Table 8-1 of the DOH *Water System Design Manual*. All wells were turned off during each field test on both zones.

Some factors possibly affecting the correlation between the field data and hydraulic model are: actual versus modeled elevation data; inaccurate pipe size, material and roughness coefficients; actual versus modeled length; inaccuracy of flow tests; and actual versus modeled daily demands. Considering the results in the tables below, the model is considered calibrated.



2015 WATER SYSTEM PLAN UPDATE

EXISTING LOW ZONE MAP
YEAR 2015

EXHIBIT 3-2

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

DRAWN BY: AJT DESIGN BY: AJT

DATE: 03-2016

LOG NO. 00

NORTH

SCALE: NTS

FAIRWAY RESERVOIR

CHIEF JOSEPH VILLAGE

NEZ PERCE VILLAGE

SEPTIC ABSORBANCE

TERRACE APARTMENTS

KAMIAK APARTMENTS

LEGEND

- EXISTING HIGH PRESSURE
- XX-XXH HYDRANT
- J-XXX NODE
- FIRE HYDRANT NODE WITH DEFICIENT FIRE FLOW
- #XX HYDRANT FLOW TEST GROUP

PIPELINES 6" AND LARGER ARE SHOWN AND WERE MODELED

DRAWN BY: AJT DESIGN BY: AJT

DATE: 03-2016 LOG NO. 00

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

2015 WATER SYSTEM PLAN UPDATE

EXISTING HIGH ZONE MAP YEAR 2015

EXHIBIT 3-3

Table 3-11 Low Zone Computer Model Versus Field Tests						
Date	Hydrant #	Hydrant Elev (ft)	Field Static Pressure (psi)	Model Static Pressure (psi)	Static Pressure Change	Percent difference
7/1/2011	K11-1L	2535.0	50.0	49.7	0.3	0.66%
7/1/2011	K11-2L	2526.0	54.0	52.3	1.7	3.20%
7/1/2011	K11-4L	2518.0	52.0	56.6	-4.6	-8.83%
7/1/2011	K11-3L	2538.0	49.0	47.1	1.9	3.96%
7/1/2011	K11-5L	2512.0	61.0	60.1	0.9	1.54%
5/8/2010	K15-11L	2588.0	28.0	25.6	2.4	8.43%
5/8/2010	K15-16L	2592.5	26.0	24.3	1.7	6.38%
5/8/2010	L16-3L	2544.0	46.0	45.4	0.6	1.41%
2/5/2015	J14-8L	2504.0	64.0	62.5	1.5	2.41%
2/5/2015	J15-4L	2482.0	74.0	71.3	2.7	3.62%
2/5/2015	J15-1L	2480.0	74.0	71.3	2.7	3.62%
2/5/2015	J15-2L	2468.0	80.0	77.8	2.2	2.73%
9/10/2013	K11-5L	2512.2	60.0	60.1	-0.1	-0.10%
9/10/2013	K11-6L	2512.0	58.0	60.1	-2.1	-3.55%
9/10/2013	K11-3L	2518.0	50	46.6	3.4	6.74%
9/10/2013	K11-4L	2538.0	58	56.6	1.4	2.43%

Table 3-12 High Zone Computer Model Versus Field Tests						
Date	Hydrant #	Hydrant Elev (ft)	Field Static Pressure (psi)	Model Static Pressure (psi)	Static Pressure Change	Percent difference
5/29/2014	L13-7H	2552.0	69.0	67.2	1.8	2.67%
5/29/2014	L13-8H	2547.0	68.0	69.3	-1.3	-1.88%
5/29/2014	L13-5H	2554.0	68.0	66.3	1.7	2.56%
5/29/2014	L13-11H	2558.0	67.0	64.9	2.1	3.16%
3/1/2013	M13-1H	2560.0	64.0	64.1	-0.1	-0.14%
11/22/2013	M12-7H	2598.0	50.0	45.9	4.2	8.30%
11/22/2013	M12-8H	2602.0	46.0	45.0	1.0	2.22%
5/13/2015	L13-1H	2555.0	70.0	65.8	4.2	6.06%
5/13/2015	L13-6H	2558.0	66.0	64.5	1.5	2.33%
5/13/2015	L12-4H	2550.0	70.0	68.8	1.2	1.73%
5/13/2015	K12-1H	2528.0	80.0	79.0	1.0	1.26%
4/12/2013	L7-3H	2551.0	64.0	67.6	-3.6	-5.61%
4/12/2013	M6-1H	2556.0	68.0	65.9	2.1	3.15%
4/12/2013	L7-4H	2555.5	68.0	65.9	2.1	3.15%
4/12/2013	M7-1H	2553.5	68	67.2	0.8	1.24%
8/28/2009	L14-2H	2550.0	62	67.3	-5.3[1]	-8.61%
8/28/2009	L13-8H	2548.0	66.0	69.3	-3.3	-4.97%
1/6/2011	M7-1H	2553.0	70.0	67.2	2.8	4.06%
1/6/2011	L7-5H	2570.0	66.0	59.4	6.6[1]	10.06%
10/29/2012	O9-1H	2627.0	37.0	35.0	2.0	5.51%
9/23/2014	N14-1H	2547.0	70.0	68.8	1.2	1.76%
9/23/2014	N13-3H	2546.0	70.0	69.6	0.4	0.51%
9/23/2014	N14-2H	2557.0	66	64.9	1.1	1.73%

1. Denotes PSI DIFF (difference) greater than 5 psi allowed under *Long-Range Planning* of Table 8-1 of the DOH *Water System Design Manual*

Modeling

The Washington Administrative Code 246-290-230(5) and (6) require that water systems be evaluated for the following flow conditions for each zone:

(1) Peak hour demand (PHD) under the condition where all operating and equalizing storage volume has been depleted and assuming that all sources are operating. Under this condition, distribution system shall provide pressures of at least 30 psi.
(2) Highest demand fire suppression flows during maximum day demand (MDD) under the condition where fire suppression storage and equalizing storage has been depleted. The distribution system shall provide pressures of at least 20 psi.

Additionally, pipe velocity in the distribution system should be maintained must be maintained at 8 feet per second (fps) or less under PHD conditions. Maximum velocities of greater than eight fps may occur under fire flow conditions for short sections of mains or for piping within pump and valve station facilities.

Peak Hour Demand (PHD) Analysis

For the PHD scenario, the primary pump from each zone is operational. This is the case for both the low and high zone. The low zone was modeled with Well No. 7 on and the high zone was modeled with Well No. 8 on. The water demands are based on the same distribution used for the storage calculations. The system wide peak hourly demand in 2015 is estimated at 5,303 gpm, which is divided between the high zone (3,182 gpm – 60% of total) and low zone (2,121 gpm – 40% of total) (see section 3.3.1). These water demands are spread uniformly throughout each zone. The pumping capacity for each zone is such that there is no required equalizing storage; therefore, the reservoirs are set at the pump-on elevation approximately 3 feet below shut-off or overflow elevation (i.e. operating storage has been depleted) as shown in Table 3-13 below. Pressures are effectively checked at the service connection elevations in accordance with Washington Administrative Code requirements. As indicated earlier, several buildings incorporate booster pumps to provide adequate pressure at the upper floors.

Table 3-13
PHD Analysis
Reservoir Elevations

Reservoir	Zone	Hydraulic Model Elevation
Observatory Hill #1 (east)	Low	2648.5
Observatory Hill #2 (west	Low	2648.5
Elevated Tank @ Observatory Hill	High	2708.5
North Fairway	High	2708.5

The results of the PHD modeling for the low and high zones are contained in Appendices C-6 and C-8, respectively.

Fire Flow Analysis

This analysis utilizes the same conditions as for the Peak Hour Demand (PHD) analysis above (i.e. Well No. 7 is on in the low zone; Well No. 8 is on in the high zone). DOH requires that the maximum daily demand (MDD) is modeled during fire events; however, WSU has the unique ability to shut off all irrigation demands on the system during a fire flow event. This occurs as follows:

1. 911 call is received by WHITCOM (Whitman County Emergency Communications Service Center) OR a fire lever, smoke detector or fire sprinklers are activated at any campus building. In the later three cases, Facilities Operations Dispatch is automatically notified.
2. WHITCOM or Facilities Operations Dispatch notifies City of Pullman Fire Department OR Facilities Operations Dispatch receives the information (if 911 call).
3. Facilities Operations Dispatch shuts off all irrigation demands at Palouse Ridge Gold Course, campus irrigation, and Tukey Orchard. This is facilitated through CCMS (Central Control Monitoring System) located at Dispatch.

Exhibit 2-6 indicates that the irrigation demand during the ADD is 0.330 mg which translates to 1.191 mg during the MDD (peaking factor applied per Table 2-6). This is 25% of the total MDD of 4.679 mg. Therefore, the total MDD of 3,249 gpm is reduced 25% to 2,437 gpm, which is divided between the high zone (1,462 gpm) and the low zone (975 gpm) as calculated in section 3.3.1 above. These MDDs are spread uniformly throughout each zone, or, in other words, the MDD is divided by the number of nodes in each zone and the resultant demand is placed at each node in the model.

H_2ONET calculates the available fire flow for each hydrant (one node at a time) when the minimum system (zone) pressure is greater than or equal to 20 psi. For WSU, fire flow computations were carried out for steady state simulations. The Required Fire Flow (RFF) for each building as well as the fire hydrant assignments for each building were provided by WSU as shown in Table 3-16. It should be noted that some buildings have a reduced RFF due to indoor fire sprinklers. This reduction is typically 50% (see footnote #2 on Table 3-16).

Three different fire flow analyses were modeled for each zone. These runs were based on the level of the reservoir in each zone at the end of the fire event when the fire suppression storage has been depleted and the only inflow into the reservoir during the fire flow event is the primary pump (lead) pump in each zone (Well No. 7 for the low zone and Well No. 8 for the high zone). For example, the level of the reservoir in the low zone during a mid-range (3 hour)[1] fire flow event is calculated as follows:

Demand: 975 gpm
Available Storage: Observatory Hill Reservoirs @ 2 mg each (118' square each)
Overflow Elevation: 2651.5
Bottom of Operational Storage: 2648.5
Height of water that represents Fire Suppression Storage:

($3,750^2$ gpm X 60 min/hour X 3 hours) / (7.48 gallons per cubic foot of water) / (2 reservoirs X 118' squared)

= 3.24'

Therefore, the elevation of the bottom of fire suppression storage is

2648.5 – 3.24' = 2645.26

Next the volume of water pumped during the 3-hour fire event is added back into the reservoir as follows:

(Well No. 7 @ 2,500 gpm X 60 min/hour X 3 hours) / (7.48 gallons per cubic foot of water) / (2 reservoirs X 118' squared)

= 2.16'

2645.26 + 2.16' = 2647.42

Finally, the volume of the MDD during the 3-hour fire event is subtracted from the reservoir as follows:

(975 gpm X 60 min/hour X 3 hours) / (7.48 gallons per cubic foot of water) / (2 reservoirs X 118' squared)

= 0.84'

2647.42 – 0.84' = 2646.58

Notes for above calculation:
1. Ranges of Required Fire Flow (RFF) as defined in the IFC (International Fire Code) as follows:
   a. 1500-2750 gpm (2-hour event)
   b. 3000-3750 gpm (3-hour event)
   c. 4000-6000 gpm (4-hour event)

2. Highest fire flow demand in each range is used. If RFF falls between the above ranges, the next highest range is used.

This is the elevation at which the reservoir is modeled during the 3-hour fire flow event. This process is repeated for both the 2-hour and 4-hour events in both the low and high zones and the results are listed in Table 3-14 below:

Table 3-14
Fire Flow Analysis
Reservoir Elevations

Fire Flow Event (duration)	Low Zone	High Zone
2-Hour	2647.79	2705.40
3-Hour	2646.58	2701.15
4-Hour[1]	2643.34	2690.56

NOTES:
1. 5,000 gpm (bldg. #12) is the highest RFF used for the low zone (bldg. #57 is scheduled for replacement); 6,000 gpm (bldgs. #76, #806 & #819) is the highest RFF used for the high zone.

The results of the fire flow analysis modeling for all three fire flow events for the low and high zones are contained in Appendices C-7 and C-9, respectively.

3.3.12 Summary of Deficiencies

PHD Analysis

The hydraulic models for both the high and low zones performed well for the PHD scenario with relatively few nodes not meeting the 30 psi minimum pressure. Table 3-15 below contains a summary of the deficiencies in both zones. Most of the deficient nodes are located at relatively high elevations within their respective zone and may also be located along dead-end distribution mains. Additionally, some of the deficient nodes are located in areas that do not serve any buildings or are served by the high zone. The maps contained in Appendix C-5 show the location of these deficient nodes.

Table 3-15
Deficient Nodes in PHD Analysis

Zone	Node	Pressure (psi)	Elevation @ Node (ft)	Comments
L	J-261	8.23	2629.5	Node located next to reservoirs. No services at this location.
L	J-215	28.05	2584.5	The buildings served in the vicinity of this node are Van Doren Hall (bldg. #37) and Kimbrough Music Building (bldg. #25) which has a booster pump (see Table 3-10). Van Doren Hall is an administrative building that will continue to experience PHD pressures just below 30 psi due to its elevation in the low zone (see J-215 in Appendix C-5 and C-6). Construction of larger diameter pipelines will not alleviate the pressure problem for this junction. An option to correct this deficiency is to connect this building to the high zone near node J-340 approx. 100' away (PHD modeling pressure @ J-340 is 57.3 psi).
L	J-221	24.07	2593.5	The buildings served in the vicinity of this node are the Compton Union Building (bldg. #63), College Hall (bldg. #4, Terrell Library (bldg. #62A), Todd Hall Addition (bldg. #55A) and Wilson Hall (bldg. #40). All of these buildings are served by the high zone.
L	J-222	21.86	2598.5	The buildings served in the vicinity of this node are the Compton Union Building (bldg. #63), Safety Building (bldg. #84) and Wilson Hall (bldg. #40). All of these buildings are served by the high zone.

L	J-223	26.36	2588.0	The buildings served in the vicinity of this node are the Compton Union Building (bldg. #63), Safety Building (bldg. #84), Information Technology Building (bldg. #84) and Fine Arts Center (bldg. #97). Buildings 63 and 84 are served by the high zone. The entrances for buildings 84 and 97 are at elevation 2554 and 2580, respectively. The additional hydraulic grades yield PHD pressures over 30 psi.
L	J-244	28.68	2581.5	The buildings served in the vicinity of this node are the Veterinary Teaching Hospital (bldg. #818) and the Carver Farm Buildings (bldg. #120C-H). Building #818 has a booster pump and the elevations for buildings 120C-H are 2550. The additional hydraulic grade yields PHD pressures over 30 psi.
L	J20	27.04	2585.0	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J22	25.17	2589.3	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J24	22.70	2595.0	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J26	25.74	2588.0	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J30	25.81	2588.0	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J28	27.90	2583.0	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs.
L	J-300	27.68	2583.5	Node located at relatively high elevation within zone with no services.
L	K15-8L	25.74	2588.0	The building served in the vicinity of this node is McEachern Residence Center East (bldg. #805E – north building). The elevation for building #805E is 2579. The additional hydraulic grade yields a PHD pressure over 30 psi.
L	K15-9L	27.67	2583.5	The building served in the vicinity of this node is McEachern Residence Center East (bldg. #805E – south building). The elevation for building #805E is 2574. The additional hydraulic grade yields a PHD pressure over 30 psi.
L	K15-16L	24.00	2592.0	The building served in the vicinity of this node is Olympia Student House. The elevation for building is 2588.0. The additional hydraulic grade yields a PHD pressure around 26.4 psi.
L	K15-11L	25.30	2589.0	Node located at relatively high elevation. The building served in the vicinity of this node is Olympia Student House. The elevation for building is 2588.0. The additional hydraulic grade yields a PHD pressure around 26.4 psi.

L	L15-7L	28.48	2582.00	Node located at relatively high elevation not far beneath the Observatory Hill Reservoirs. Global Animal Health is located near this node, but is served by the high zone system.
H	J-183	23.70	2654.5	Node located at relatively high elevation within zone. No services at this location.
H	J-397	27.57	2648.0	Node located at relatively high elevation within zone. The golf course club house is in the vicinity and will be served by a booster pump.

Fire Flow Analysis

The hydraulic model for fire suppression flows generated a number of deficiencies when the Maximum Available Fire Flows (MFF) are compared with the Required Fire Flows (RFF) for major campus buildings as shown on Table 3-16. The Available Fire Flow at Campus Hydrants (AFF) is determined from the modeling results utilizing the results from the respective fire flow event (2-, 3-, or 4-hour event). The MFF is calculated as follows:

1. If a building is served by both high & low zone hydrants, the maximum AFF flow from each zone is summed to calculate the MFF.
2. If the building is served by a single zone, only the maximum AFF flow is used.

For example, as shown in Table 3-16, Bryan Hall is served by a low zone hydrant (2,966 gpm) and two high zone hydrants; 1,165 gpm and 1,277 gpm. The MFF is calculated by adding 2,966+ 1,277 (max. AFF in high zone) = 4,243 gpm.

The Status/Percent Deficient column is calculated by RFF-MFF divided by RFF. Table 3-17 sorts the buildings with fire flow deficiencies by the percent of deficiency. Exhibits 3-2 and 3-3 also indicate hydrant locations where there is a deficient building in the vicinity (see also full size maps in Appendix C-5).

Proposed Improvements

The proposed improvements to correct these MFF deficiencies are more thoroughly addressed in Chapter 9: Capital Improvement Program.

Table 3-16 Required and Available Fire Flows at Major Campus Buildings at WSU
Existing Conditions 2015 (without irrigation and no improvements)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Abelson Hall (32)[2]	H	2,250	1,277 J13-1H	1,280 J13-6H	1,288 J14-1H			1,288	**43%**
Administration Annex (38)	H	2,500	1,277 J13-1H	1,280 J13-6H				1,280	**49%**
Agronomy Seed House (115)	H	3,500	3,686 M13-1H					3,686	OK
Albrook Hydraulics Laboratory (71)	L	3,750	4,691 I13-1L	4,780 I13-2L				4,780	OK
Albrook-Hydra Model Lab (355)	L	1,500	5,044 I13-2L					5,044	OK
Animal Disease Biotechnology Facility (807A)[2]	L	2,250	6,517 L14-3L					6,517	OK
Avery Hall (809)[2]	B	1,250	996 J12-5H	2,966 J12-7L	1,165 J13-3H			3,962	OK
Beasley Performing Arts Coliseum (806)	H	6,000	3,694 K10-2H	3,712 L10-1H	3,699 L10-2H	3,569 L10-6H	3,650 L10-7H	3,712	**38%**
Beef Cattle Breeding Barn (146)	H	2,250	923 O12-1H					923	**59%**
Biotech / Life Sciences ()[2]	H	2,000	4,225 L11-6H	4,473 L12-4H				4,473	OK
Bohler Gymnasium (11A)[2]	L	2,625	1,889 K12-2L	2,869 K12-4L				2,869	OK
Boiler Plant Bulk Storage Building (321)	L	1,500	5,090 I14-1L	5,115 I14-2L				5,115	OK
Bookstore (64)	B	3,250	2,878 J12-7L	970 J12-5H	897 J12-8H			3,848	OK
Bryan Hall (2)[2]	B	1,625	2,966 J12-7L	1,165 J13-3H	1,277 J13-4H			4,243	OK
Bustad (807)[2]	L	2,750	5,168 K14-8L	3,632 K14-9L				5,168	OK
Carpenter Hall (20)[2]	L	1,875	4,732 J13-11L	3,343 J14-7L				4,732	OK
Carver Farm Agriculture Storage Building (120C)	L	2,500	837 L16-3L	1,109 L16-4L				1,109	**56%**
Cattle Feeding Lab (144)	H	3,500	1,296 O13-1H					1,296	**63%**
Central Receiving (358A)	H	1,500	1,482 N14-2H					1,482	**1%**
Central Stores Receiving (360A)[2]	B	1,500	1,591 L14-2H	6,517 L14-3L				8,107	OK
Chief Joseph Village (676)	H	3,750	2,555 L7-3H	2,599 L7-4H	2,513 L7-5H	2,846 M6-1H	2,708 M7-1H	2,846	**24%**
Chilled Water Plant (813)	L	1,500	4,861 J14-6L					4,861	OK
Chinook Village (679)	L	3,250	1,511 K17-1L	1,560 K17-2L	1,537 K17-3L	1,188 K16-4L		1,560	**52%**
Clark Hall (99)[2]	H	2,375	3,221 L12-8H	2,922 M12-5H				3,221	OK
Clean Tech [2]	h	1,625	4,008 L13-12H	4,535 L13-11H				4,535	OK
Cleveland Hall (86)[2]	B	2,000	1,288 J14-1H	4,156 J14-3L				5,444	OK
College Hall(4)	H	3,250	1,216 J13-5H	1,219 J13-6H				1,219	**62%**
College Avenue Steam Plant (27)	L	2,500	5,090 I14-1L	5,115 I14-2L	5,044 I13-2L			5,115	OK
Columbia Village (678)	L	1,750	1,128 L16-1L	1,179 L16-2L	1,157 K16-3L			1,179	**33%**

Table 3-16 Required and Available Fire Flows at Major Campus Buildings at WSU
Existing Conditions 2015 (without irrigation and no improvements)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Coman Hall (72)	L	2,750	2,005 K11-6L					2,005	**27%**
Commons (5)	L	4,000	2,850 J15-1L	2,422 J15-2L	2,387 J15-3L			2,850	**29%**
Community Hall (6)[2]	L	1,625	1,201 J12-1L	1,876 J12-2L	1,631 J12-3L			1,876	OK
Compton Union Building (63)[2]	H	3,000	1,383 K13-2H	1,177 K13-4H				1,383	**54%**
Cooper Publications Building (91)[2]	H	1,375	3,937 N13-1H	3,417 M13-2H				3,937	OK
Daggy Hall (803)[2]	L	2,250	4,732 J13-11L	4,156 J14-3L	3,343 J14-7L			4,732	OK
Dana Hall (56)	L	4,250	3,872 I14-3L	3,704 J14-6L				3,872	**9%**
Dodgen Research Facility (74)	H	2,250	971 O10-1H					971	**57%**
Duncan Dunn Hall (7)[2]	L	1,250	1,201 J12-1L	1,876 J12-2L	1,631 J12-3L			1,876	OK
Eastlick Hall (82A)[2]	B	2,375	1,277 J13-1H	4,156 J14-3L	4,260 J14-5L			5,537	OK
Education Addition (86A) [2]	L	1,250	3,887 J15-1L	3,312 J15-2L				3,887	OK
EH&S Building (90)	H	1,750	1,133 P13-1H					1,133	**35%**
Electrical/Mechanical Engineering Bldg (78A)[2]	L	2,250	4,991 J13-10L	5,044 I13-2L				5,044	OK
Engineering Teaching/Research Lab Bldg. (58)[2]	L	2,500	5,090 I14-1L	5,115 I14-2L	4,861 J14-6L	5,018 I14-3L		5,115	OK
Ensminger Pavilion (150)	H	2,500	3,080 L13-3H	2,896 L13-4H	3,339 L13-5H			3,339	OK
Farms Services-Shop (103A)	H	1,500	1,147 R9-1H					1,147	**24%**
Feed Storage Building (839)	H	1,500	1,336 O13-2H					1,336	**11%**
Fine Arts Building (175)	B	3,500	1,183 K13-1H	3,438 K14-3L				4,621	OK
Food Science/Human Nutrition Bldg. (816)[2]	H	2,500	3,870 L12-3H	4,221 L12-7H				4,221	OK
Food Service Building (89)[2]	H	2,000	1,710 N13-3H					1,710	**15%**
Football Operations Building [2]	L	1,750	2,869 K12-4L	1,889 K12-2L				2,869	OK
French Admistration Building (92)	H	3,500	2,886 L13-9H	1,397 L13-10H	2,764 L13-1H	2,300 L13-2H		2,886	**18%**
Fulmer Hall (3)	B	3,500	1,227 J14-1H	3,486 J14-2L	3,760 K14-2L			4,987	OK
Fulmer Hall Annex (3A)[2]	B	2,125	1,288 J14-1H	3,728 J14-2L	4,022 K14-2L			5,310	OK
Fulmer Hall Synthesis Unit (3B)[2]	B	1,750	1,288 J14-1H	3,728 J14-2L	4,022 K14-2L			5,310	OK
Fulmer Hall Vibration Free Unit(3C)[2]	B	1,000	1,288 J14-1H	1,280 J13-6H	3,728 J14-2L	4,022 K14-2L		5,310	OK
Gannon-Goldsworthy Hall (79)[2]	L	2,500	1,998 K14-5L	1,966 K15-1L	1,963 K15-3L	2,083 K15-6L		2,083	**17%**
General Storage Bldg. (358B)[2]	H	1,875	1,482 N14-2H					1,482	**21%**
Global Animal Health[2]	B	1,375	2,159 L14-3H	1,368 L15-7L				2,159	OK

Table 3-16 Required and Available Fire Flows at Major Campus Buildings at WSU
Existing Conditions 2015 (without irrigation and no improvements)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Grimes Way Steam Plant (840)[2]	H	1,000	3,417 M13-2H	2,460 M14-1H	2,628 M14-2H	2,540 M14-3H		3,417	OK
Grounds Shop (66D)	H	1,500	3,937 N13-1H					3,937	OK
Heald Hall (82)	L	4,250	3,029 J14-3L	3,011 J14-4L	3,101 J14-5L			3,101	**27%**
Holland Library (62)[2]	B	3,000	2,878 J12-7L	1,216 J13-5H				4,095	OK
Hollingbery Field House (09)	L	3,500	1,870 K12-2L	2,643 K11-9L	4,118 K11-2L			4,118	OK
Honors Hall (14)[2]	L	1,750	4,634 J13-12L	1,876 J12-2L				4,634	OK
Hulbert Hall (808)	H	3,500	2,765 L13-4H					2,765	**21%**
Incinerator (60)[2]	H	1,500	1,173 N15-1H	1,332 N15-3H				1,332	**11%**
Indoor Practice Facility (835)[3]	H	2,635	1,538 L11-4H	2,189 L11-5H	2,621 M11-6H			2,621	**1%**
Information Technology Building (812)	H	4,500	1,247 K13-2H	2,082 L13-2H				2,082	**54%**
Johnson Hall (76)	H	6,000	3,916 L12-4H	2,665 L13-3H	2,452 L13-6H			3,916	**35%**
Johnson Tower (94)[2]	H	2,000	1,266 K13-3H	1,316 K14-1H				1,316	**34%**
Kamiak Apartments (660)	H	2,750	1,643 L7-1H	1,248 L7-2H	1,847 K7-3H			1,847	**33%**
Kimbrough Music Building (25)[2]	L	2,125	2,966 J12-7L					2,966	OK
Kruegel-McAllister Hall (69)	L	4,250	1,364 K15-5L	1,441 K15-6L	1,371 K15-7L	1,484 J15-8L		1,484	**65%**
L.J. Smith Hall (54)	B	3,500	6,098 L14-3L	1,555 L14-2H				7,653	OK
Lewis Alumni Centre (138)[2]	H	1,500	2,896 L13-4H	2,804 M13-3H				2,896	OK
Lighty Student Services (92A)[2]	H	2,250	3,022 L13-9H	1,425 L13-10H	2,894 L13-1H	2,412 L13-2H		3,022	OK
Math Learning Center (16)	L	1,500	4,156 J14-3L	4,260 J14-5L				4,260	OK
McCluskey Service Bldg-Office (85A)	H	1,500	1,740 N14-1H					1,740	OK
McCluskey Services - Shop Annex (837)	H	3,000	1,497 N14-3H	1,296 O13-1H				1,497	**50%**
McCoy Hall (44)	B	4,750	1,073 K14-6H	3,436 K14-7L	3,939 K14-8L	3,397 K14-9L		3,939	**17%**
McCroskey Hall (19)[2]	L	1,250	1,631 J12-3L	1,011 J12-4L				1,631	OK
McEachern Residence Center Service Bldg (805X)[2]	L	2,125	1,944 K15-2L	1,178 K15-9L	1,317 K15-10L	1,332 K15-12L	1,467 K15-13L	1,944	**9%**
Meats Laboratory (98)	H	1,750	1,701 M12-2H					1,701	**3%**
Morrill Hall (24)	L	2,250	4,732 J13-11L	4,260 J14-5L				4,732	OK
Motor Pool & Storage (66C)	H	1,500	3,937 N13-1H					3,937	OK
Murrow Communications Center E & W (33E/33W)	B	4,000	3,278 J13-7L	1,094 J13-4H	1,064 J13-3H	856 J13-8L		4,371	OK
Neill Hall (70)[2]	L	1,500	2,824 K14-10L					2,824	OK

Table 3-16 Required and Available Fire Flows at Major Campus Buildings at WSU
Existing Conditions 2015 (without irrigation and no improvements)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Nez Perce Village Buildings (677A)	H	2,000	3,764 L8-1H	2,627 M7-2H	2,026 M8-1H			3,764	OK
Northside Residence [2]	L	1,750	4,242 K11-2L	4,082 K11-4L				4,242	OK
Northside Residence II [2]	L	1,750	3,553 K11-5L	3,768 K11-10L	3,964 K11-11L			3,964	OK
Old Golf Clubhouse (365)	H	1,500	1,126 L10-8H					1,126	**25%**
Olympia Avenue Student Housing [2]	L	1,500	960 K15-16L	1,117 K15-11L	1,178 K15-9L	1,129 K15-8L		1,178	**21%**
Orton Hall (87)[2]	L	2,375	1,707 K15-17L	1,636 K16-2L				1,707	**28%**
Owen Science & Engineering Library (810)	B	5,000	1,103 J14-1H	2,815 J14-2L				3,918	**22%**
Physical Education Building (96)[2]	L	2,375	1,889 K12-2L	1,513 K12-3L				1,889	**20%**
Plant Growth Center (122)[2]	H	1,500	3,339 L13-5H					3,339	OK
President's Residence (31)	L	2,250	4,903 I13-1L					4,903	OK
Regents Hill Stearn Hall (65A)[2]	L	2,625	4,082 K11-4L	3,553 K11-5L	2,005 K11-6L			4,082	OK
Residence Inn[2]	H	2,250	3,847 M8-2H	3,789 M8-3H	4,704 M8-4H	4,536 M8-5H		4,704	OK
Rogers Hall (83)[2]	L	2,375	1,980 J16-3L					1,980	**17%**
Rotunda (80)[2]	L	1,375	1,966 K15-1L	1,938 K15-4L	1,977 K15-5L	2,083 K15-6L		2,083	OK
Safety Building (84)	H	1,500	1,452 K13-2H					1,452	**3%**
School of Communication Addition (33A) [2]	L	1,250	4,330 J13-7L	3,507 J13-9L	4,732 J13-11L			4,732	OK
Scott Hall (73)[2]	L	1,375	2,005 K11-6L					2,005	OK
Sloan Hall (78)	L	4,750	3,766 I13-1L	3,823 J13-10L				3,823	**20%**
Smith Center for Undergraduate Education (95)[2]	B	3,000	1,218 K13-3H	1,253 K14-1H	3,438 K14-3L	1,896 K14-4L		4,691	OK
Smith Gymnasium (12)	L	4,250	1,454 K12-3L					1,454	**66%**
Steffen Center (180)	H	2,250	1,196 P13-2H					1,196	**47%**
Stephenson Center Dining Hall (93C)	L	3,500	677 J15-7L	1,902 J16-1L	1,902 J16-4L			1,902	**46%**
Stephenson East (93E)[2]	L	2,000	2,053 J16-2L	2,053 J16-4L				2,053	OK
Stephenson North (93N)[2]	L	2,000	680 J15-7L	2,053 J16-4L				2,053	OK
Stephenson South (93S)[2]	L	1,875	2,053 J16-2L	2,053 J16-4L				2,053	OK
Steptoe Village (665)	H	3,000	2,455 J7-2H	2,073 K7-1H	2,583 K7-2H	1,797 K7-3H	2,113 K7-5H	2,583	**14%**
Stevens Hall (34)[2]	B	1,250	1,011 J12-4L	996 J12-5H	1,165 J13-3H	890 J13-8L		2,055	OK
Stimson Hall (35)[2]	B	1,625	1,288 J14-1H	3,728 J14-2L	2,824 K14-10L			5,016	OK
Storage (143A)	H	2,250	1,400 N13-2H					1,400	**38%**

Table 3-16 Required and Available Fire Flows at Major Campus Buildings at WSU
Existing Conditions 2015 (without irrigation and no improvements)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Streit-Perham Hall (81C)[2]	L	2,875	1,111 K10-1L	4,109 K11-1L				4,109	OK
Student Recreation Center (819)[2]	H	2,875	3,570 L9-1H	2,741 M9-1H	1,094 L10-8H			3,570	OK
Terrace Apartment Complex (650)	H	2,500	2,647 J7-1H	1,847 K7-3H	2,904 K7-4H	2,167 K7-5H	2,014 K7-8H	2,904	OK
Terrell Library (62A)[2]	B	3,000	1,497 K12-3L	1,177 K13-4H				2,673	**11%**
Thermal Fluids Research Building (57)	L	2,500	5,044 I13-2L	5,090 I14-1L				5,090	OK
Thompson Hall (1)[2]	L	1,375	4,330 J13-7L	890 J13-8L				4,330	OK
Todd Hall (55)[2]	H	3,000	1,219 J13-6H					1,219	**59%**
Troy Hall (36)	B	2,750	1,316 K14-1H	4,022 K14-2L				5,338	OK
Valley Crest Village (675)	H	3,500	4,069 M11-1H	3,151 M11-2H	3,519 M12-4H			4,069	OK
Van Doren Hall (37)	L	2,500	2,966 J12-7L					2,966	OK
Vet Quarantine Endoparasite Farm (197L)	H	1,500	1,173 Q10-1H	1,102 Q10-2H				1,173	**22%**
Veterinary Medical Research Building (818)[2]	H	2,000	3,786 L12-6H	4,221 L12-7H	3,221 L12-8H	4,225 L11-6H		4,225	OK
Veterinary Teaching Hospital (818)[2]	L	2,625	2,026 L15-3L	2,523 L15-4L	2,653 L15-5L			2,653	OK
Vogel Plant Biosciences Building (826)[2]	H	2,250	4,473 L12-4H	2,894 L13-1H	2,833 L13-6H			4,473	OK
Waller Hall (39)	L	3,000	2,586 J15-4L					2,586	**14%**
Washington Building (15)[2]	L	2,125	3,312 J15-2L	2,776 J15-4L				3,312	OK
Webster Physical Science Building (801)[2]	L	2,250	3,728 J14-2L	4,022 K14-2L	2,824 K14-10L			4,022	OK
Wegner Hall (45)	B	4,500	1,073 K14-6H	1,345 K15-3L				1,345	**70%**
Wilmer-Davis Hall (30)[2]	B	2,125	1,201 J12-1L	1,631 J12-3L	1,011 J12-4L	996 J12-5H		2,627	OK
Wilson Hall (40)	H	4,000	1,120 K13-3H	1,058 K13-4H				1,120	**72%**
WSU Children's Center (88)[2]	L	1,500	1,707 K15-17L	1,636 K16-2L				1,707	OK
Yakama Village Apts. (680)[2]	L	1,500	1,487 K18-1L	1,793 K17-4L	1,698 K17-2L	1,722 K17-6L	1,843 K17-5L	1,843	OK

NOTES:

1. Both High & Low Zone hydrants included if building is served by both zones or maximum hydrant If served by one zone only.

2. Building is fully sprinkled. Required Fire Flow shown has been reduced appropriately, typically 50%.

3. This is classified as a temporary nonconforming structure per Rod Holmes, WSU Fire Marshall and a listing of a required fire flow is not necessary. For this Table, the available fire flow is listed as the required fire flow.

Table 3-17 Required and Available Fire Flows at Major Campus Buildings at WSU Existing Conditions 2015 (without irrigation and no improvements)				
Sorted on Percent Deficient				
Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
Wilson Hall (40)	**H**	**4000**	**1119.7**	**72%**
Wegner Hall (45)	**B**	**4500**	**1345.3**	**70%**
Smith Gymnasium (12)	**L**	**4250**	**1453.5**	**66%**
Kruegel-McAllister Hall (69)	**L**	**4250**	**1484.2**	**65%**
Cattle Feeding Lab (144)	**H**	**3500**	**1295.9**	**63%**
College Hall(4)	**H**	**3250**	**1218.8**	**62%**
Todd Hall (55)2	**H**	**3000**	**1218.8**	**59%**
Beef Cattle Breeding Barn (146)	**H**	**2250**	**922.6**	**59%**
Dodgen Research Facility (74)	**H**	**2250**	**971.2**	**57%**
Carver Farm Agriculture Storage Building (120C)	**L**	**2500**	**1108.5**	**56%**
Compton Union Building (63)2	**H**	**3000**	**1383.4**	**54%**
Information Technology Building (812)	**H**	**4500**	**2082.0**	**54%**
Chinook Village (679)	**L**	**3250**	**1559.5**	**52%**
McCluskey Services - Shop Annex (837)	**H**	**3000**	**1497.1**	**50%**
Administration Annex (38)	**H**	**2500**	**1279.6**	**49%**
Steffen Center (180)	**H**	**2250**	**1195.7**	**47%**
Stephenson Center Dining Hall (93C)	**L**	**3500**	**1902.1**	**46%**
Abelson Hall (32)2	**H**	**2250**	**1287.8**	**43%**
Beasley Performing Arts Coliseum (806)	**H**	**6000**	**3712.4**	**38%**
Storage (143A)	**H**	**2250**	**1400.5**	**38%**
EH&S Building (90)	**H**	**1750**	**1133.3**	**35%**
Johnson Hall (76)	**H**	**6000**	**3915.8**	**35%**
Johnson Tower (94)2	**H**	**2000**	**1315.7**	**34%**
Kamiak Apartments (660)	**H**	**2750**	**1846.5**	**33%**
Columbia Village (678)	**L**	**1750**	**1179.1**	**33%**

Table 3-17 Required and Available Fire Flows at Major Campus Buildings at WSU Existing Conditions 2015 (without irrigation and no improvements)				
Sorted on Percent Deficient				
Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
Commons (5)	**L**	**4000**	**2850.2**	**29%**
Orton Hall (87)2	**L**	**2375**	**1706.9**	**28%**
Coman Hall (72)	**L**	**2750**	**2005.0**	**27%**
Heald Hall (82)	**L**	**4250**	**3101.4**	**27%**
Old Golf Clubhouse (365)	**H**	**1500**	**1126.5**	**25%**
Chief Joseph Village (676)	**H**	**3750**	**2846.1**	**24%**
Farms Services-Shop (103A)	**H**	**1500**	**1146.9**	**24%**
Vet Quarantine Endoparasite Farm (197L)	**H**	**1500**	**1172.6**	**22%**
Owen Science & Engineering Library (810)	**B**	**5000**	**3917.6**	**22%**
Olympia Avenue Student Housing 2	**L**	**1500**	**1178.1**	**21%**
Hulbert Hall (808)	**H**	**3500**	**2764.9**	**21%**
General Storage Bldg. (358B)2	**H**	**1875**	**1481.9**	**21%**
Physical Education Building (96)2	**L**	**2375**	**1889.3**	**20%**
Sloan Hall (78)	**L**	**4750**	**3823.2**	**20%**
French Admistration Building (92)	**H**	**3500**	**2886.1**	**18%**
McCoy Hall (44)	**B**	**4750**	**3938.6**	**17%**
Gannon-Goldsworthy Hall (79)2	**L**	**2500**	**2082.9**	**17%**
Rogers Hall (83)2	**L**	**2375**	**1980.5**	**17%**
Food Service Building (89)2	**H**	**2000**	**1709.9**	**15%**
Steptoe Village (665)	**H**	**3000**	**2583.0**	**14%**
Waller Hall (39)	**L**	**3000**	**2586.2**	**14%**
Incinerator (60)2	**H**	**1500**	**1331.9**	**11%**
Feed Storage Building (839)	**H**	**1500**	**1335.6**	**11%**
Terrell Library (62A)2	**B**	**3000**	**2673.2**	**11%**
Dana Hall (56)	**L**	**4250**	**3871.6**	**9%**

Table 3-17 Required and Available Fire Flows at Major Campus Buildings at WSU Existing Conditions 2015 (without irrigation and no improvements)				
Sorted on Percent Deficient				
Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
McEachern Residence Center Service Bldg (805X)2	**L**	**2125**	**1944.3**	**9%**
Safety Building (84)	**H**	**1500**	**1451.6**	**3%**
Meats Laboratory (98)	**H**	**1750**	**1700.6**	**3%**
Central Receiving (358A)	**H**	**1500**	**1481.9**	**1%**
Indoor Practice Facility (835)3	**H**	**2635**	**2620.9**	**1%**

4.0 Conservation Program

This chapter has three purposes: 1) review WSU's compliance with conservation planning requirements, 2) describe WSU's existing conservation program, and 3) describe the conservation program that WSU will implement from 2015 through 2020. WSU has had a long standing commitment to water conservation. The University is increasing its conservation efforts due to growing concerns regarding the declining aquifer and to meet new state mandated conservation requirements.

4.1. Conservation Requirements and Compliance Summary

The conservation planning requirements that must be addressed in water system plans (WSPs) are contained in the following Washington State Department of Health (DOH) documents and State law:

- Water Use Efficiency Rule (January 2007)
- Municipal Water Law: Interim Planning Guidance For Water System Plan / Small System Management Program Approvals (March 2004)
- Water System Planning Handbook (December 2009)
- Water Use Efficiency Guidebook (January 2011)

The State of Washington has revised water conservation planning requirements as a result of the 2003 Municipal Water Law. An outgrowth of that law is the Water Use Efficiency Rule (Rule), which was finalized in January 2007. The Rule has several requirements and corresponding compliance dates. Some of the requirements are associated with water system plans, while other requirements are independent of the six year water system planning cycle.

Table 4-1 lists the requirements of the Rule and shows that WSU is either currently in compliance or is on track to be in compliance for activities where compliance will be determined at a future date.

There are seven main categories of requirements: 1) meters, 2) data collection, 3) distribution system leakage, 4) goals, 5) efficiency program, 6) demand forecast, and 7) performance reports.

Table 4-1 WSU Compliance with New Requirements of the Water Use Efficiency Rule				
Category	**WAC Section**	**Compliance Date**	**New Requirement**	**WSU Compliance**
1. Meters	246-290-496	Fully metered by January 22, 2017.	1. Meter all **sources.**	Yes, all wells are metered.
			2. Meter all **service connections**.	All new facilities are metered and existing facilities are metered as funding is available based on estimated usage. See Appendix D-4 for projected timeline.
			3. For systems **not fully metered**: Create meter installation plan, perform activities to minimize leakage until fully metered, and report annually on installation and leak minimization actions.	WSU has developed a draft meter installation plan and is in the process of installing meters, as funding becomes available. Additionally, leaks and water services are repaired on an ongoing basis.
2. Data Collection	246-290-100	WSPs submitted after January 22, 2008.	1. Provide monthly and annual **production/purchase** numbers for each source.	Yes, provided in section 2.2
			2. Provide annual **consumption** by customer class.	Currently, this information is unavailable since WSU is not fully metered. However, this information will be provided in future WSPs once WSU is fully metered. It is anticipated the customer classes would be categories such as residential, landscape irrigation, agricultural activities, research and academic, student owned services, commercial, and support services.
			3. Provide "**seasonal variations**" consumption by customer class.	Currently, this information is unavailable since WSU is not fully metered. However, this information will be provided in future WSPs once WSU is fully metered.
			4. Provide annual quantity **supplied to other public water systems**.	N/A, since WSU does not wholesale water.
			5. Evaluate **reclaimed water** opportunities.	Yes, provided in 5.3.3. WSU has put forth resources, and has requested funds from the State legislature, to evaluate reclaimed water use in their service area, such as at major green spaces, the steam plant, cooling towers, etc.

Table 4-1

WSU Compliance with New Requirements of the Water Use Efficiency Rule

Category	WAC Section	Compliance Date	New Requirement	WSU Compliance
			6. Consider water use efficiency **rate structure**.	N/A, since WSU does not charge for most of its water as it provides water primarily to itself. There are three exceptions. First, WSU charges the airport using the City of Pullman's commercial rates, featuring seasonal rates, which is considered a conservation rate structure. Second, WSU charges Housing and Dining Services based on square footage. It has been proposed that the expanded golf course is charged for water via water use efficiency rates (to be developed).
3. Distribution System Leakage	246-290-820	First report completed by July 1, 2008. First compliance determination made by July 1, 2010.	1. **Calculate** annual volume and percent using formula defined in the Rule.	Systems that are not fully metered are not required to report distribution system leakage until they are fully metered. WSU will calculate and report leakage information once the University is fully metered, which is required by January 22, 2017. However, WSU will need to report annually on its meter installation progress and leak minimization activities.
			2. **Report** annually: annual leakage volume, annual leakage percent, and, for systems not fully metered, meter installation progress and leak minimization activities.	
			3. Develop water loss control **action plan** (if leakage is over 10% for 3 year average).	
4. Goals	246-290-830	Goals established by January 22, 2008.	1. **Establish** measurable (in terms of water production or usage) conservation goals and re-establish every 6 yrs. Provide schedule for achieving goals.	Yes, measurable goals were established via a public process. Provided in Section 4.3.1.
			2. Use a **public process** to establish the goals.	
			3. **Report** annually on progress.	WSU will determine an appropriate reporting vehicle and will report the progress towards reaching the goals annually.
5. Efficiency Program	246-290-810	WSPs submitted after January 22, 2008.	1. **Describe existing** conservation program.	Yes, provided in Section 4.2.1.
			2. **Estimate water saved** over last 6 years due to conservation program.	Yes, provided in Section 4.2.2.
			3. Describe conservation **goals**.	Yes, provided in Section 4.3.1.
			4. Implement or evaluate **1-12 measures**, depending on size.	Yes. WSU is required to implement or evaluate a minimum of 6 measures, based on 4,346 connections. WSU's conservation program for 2015-2020 meets that minimum requirement. See Section 4.3 for details.
			5. Describe conservation **programs for next 6 years** including schedule, budget, and funding mechanism.	Yes, provided in Section 4.3.

Table 4-1 WSU Compliance with New Requirements of the Water Use Efficiency Rule				
Category	**WAC Section**	**Compliance Date**	**New Requirement**	**WSU Compliance**
			6. Describe how customers will be **educated** on efficiency practices.	Yes, provided in Section 4.3.
			7. Estimate **projected water savings** from selected measures.	
			8. Describe how efficiency program will be **evaluated** for effectiveness.	
			9. Estimated **leakage from transmission lines** (if not included in distribution system leakage).	N/A, WSU does not have a transmission system.
6. Demand Forecast	246-290-100	WSPs submitted after January 22, 2008.	1. Provide demand forecast reflecting **no additional conservation**.	Yes, provided in section 2.3.1
			2. Provide demand forecast reflecting **savings from efficiency program**.	
			3. Provide demand forecast reflecting **all "cost effective" evaluated measures**.	N/A, since WSU is implementing the required minimum number of measures (6), this forecast is not relevant.
7. Performance Reports	246-290-840	First report completed by July 1, 2008.	1. **Develop** annual report including: goals and progress towards meeting them, total annual production, annual leakage volume and percent, and, for systems not fully metered, status of meter installation and actions taken to minimize leakage.	WSU will determine an appropriate reporting vehicle. The report will not include the leakage information until WSU is fully metered.
			2. **Submit annually** by July 1 to DOH and customers and make available to the public.	

4.2. Existing Conservation Program

4.2.1. Measures

WSU's existing conservation program consists of nine conservation measures. A summary of the conservation measures which WSU has implemented in the last six years is shown in Table 4-2. The details of each measure are discussed below.

Table 4-2
Existing Conservation Program

Measure	2009	2010	2011	2012	2013	2014
1. Source Meters	x	x	x	x	x	x
2. Service Meters*	x	x	x	x	x	x
3. System Leak Repair	x	x	x	x	x	x
4. Technical Studies	x	x	x	x	x	x
5. Landscape Management	x	x	x	x	x	x
6. Agricultural Management	x	x	x	x	x	x
7. Upgrades to Plumbing Fixtures	x	x	x	x	x	x
8. Reduction/Elimination of Cooling Water	x	x	x	x	x	x
9. Clotheswashers/toilets/showers	x	x	x	x	x	x

* WSU is partially metered.

Source Meters

Source meters are a critical conservation tool because accurate water production data provide information used in developing conservation priorities, goals, and programs. WSU has source meters on all wells. Meters are tested and calibrated when wells are taken offline temporarily for major overhauls.

Service Meters

Similarly, service meters are a key component in conservation planning because they provide accurate use information. Although WSU has not historically metered connections, a few facilities were metered prior to 1996. Since then, when new construction is started or if there are major renovations, service meters are included. Additionally, the University completed installation of 44 meters in 2015 and will continue to add meters. There are a total of 101 metered facilities making the campus 84% covered. An additional 59 meters will have to be installed for the campus to be completely metered. WSU will continue to install meters on all new development and will be adding meters to existing facilities as funding is allocated from the legislature (see Appendix D-4 for current metering data). The deadline for full metering is January 2017, but it is unclear whether enough funding will be made available to make this full metering a reality by that date. It is WSUs intention, though, to comply with the deadline and to

complete metering. For residential uses, clusters of apartment units will be served by a single meter to ease the transition to full metering.

System Leak Repair

Detecting and repairing water system leaks is a vital aspect of any water conservation program. WSU uses a visual method of leak detection. Leaks from buried pipes often become apparent due to wet or icy spots on the ground and greener spots on lawn areas. When these indicators are present, the areas are investigated for possible leaks. Found leaks are promptly repaired. In addition to repairing the actual leak, a portion of the surrounding piping is replaced as a proactive measure to prevent future water loss in the same area. Since 2002, more than 130 leaks have been repaired (see Appendix B-2). A review of Appendix B-2 suggests that new leak detection efforts should focus on service lines, especially those with leak histories.

In January 2016, WSU invested in an infrared flyover to identify leaks and is awaiting those results. These types of detections will facilitate WSUs efforts in keeping leaks in check and identify where repairs are necessary. As mentioned previously, the east Observatory Hill Reservoir is currently being repaired to address leaking. This repair will be complete Spring 2016.

Technical Studies

WSU has been an active participant in commissioning and funding studies to better understand regional water resource issues. The water supply and conservation issues facing WSU are shared by communities throughout the Palouse Basin which draw water from the regional aquifer. These studies provide information about the water system's characteristics as required under the Rule.

WSU is a board member of the Palouse Basin Aquifer Committee (PBAC), whose mission is to ensure long-term, quality water supply for the Palouse Basin region. PBAC is a voluntary, cooperative, multi-jurisdictional organization comprising seven stakeholders in Washington and Idaho. The members are WSU; the Cities of Pullman and Moscow; the University of Idaho (UI); Whitman County; and Latah County. WSU has historically funded PBAC with annual contributions of $40,000 for research and operational costs.

PBAC has funded hydrogeology research related to the aquifer, as reported in PBAC's *2002-2005, 2007, and 2013 Palouse Ground Water Basin Water Use Report* (see Appendix A-3 for the 2013 report). Details regarding the studies can be found in those reports. Further information about PBAC's current and ongoing research can be found on their website, webpages.uidaho.edu/pbac.

WSU provides various in kind donations for PBAC and non-PBAC research such as performing pump tests and allowing access to wells for groundwater level and water quality monitoring.

Education

WSU, along with PBAC and other partners, began hosting an annual water summit which brings local, regional, and national experts on Palouse Basin related water resource issues, as well as the public, together to share information and work toward solutions. The first Palouse Basin Water Summit was held in 2005 and had a structure similar to a technical conference. The water summit continues to be held each year and includes technical presentations and community involvement. WSU contributes $2,000 each year toward funding the Summit.

Landscape Management

WSU has implemented a wide array of actions to reduce the impact of landscaping practices on its water production. Additionally, all landscaping is metered.

The primary focus of this measure has been upgrading irrigation systems. WSU has been replacing older sprinkler nozzles with more modern designs that deliver water with greater efficiency. The entire network of irrigated landscaping is now on Calsense controllers and irrigation needs have been reduced from 78 million gallons in 2008 to 34 million gallons in 2014 (per WSU Facilities). This is a greater than 50% water use reduction over the past 6 years. Additionally, with the new system fully online the end of 2014, additional savings in water use may be seen for 2015. Additionally, Mooberry Track and the WSU Colorado Street soccer fields have Toro Sentinel Control irrigation systems which use ET sensors that automatically prevent irrigation during rainy weather and coordinates irrigation needs to local weather conditions, soil moisture. They also have a flow meter to automatically shut down the system in the event of a line break.

WSU has also focused on reducing the amount of landscaping that needs irrigation. This is accomplished by either reducing the landscaping footprint or switching to plant materials that do not require irrigation. Valley Road Playfields, the Grimes Way Soccer Field, the Rogers football practice field and the Bailey-Brayton baseball field have been converted to artificial turf and thus no longer require irrigation. The University's Housing and Dining Department has eliminated watering specific areas under its jurisdiction and has made a policy to water only during evening or early morning hours, except where hand watering is required. WSU's Facilities Operations Department abandoned irrigation at nine low priority irrigation systems, resulting in 100% savings of the water traditionally used at those sites. The sites are: the Animal Science Laboratory, Chilled Water Storage Facility, the Incinerator, the Observatory, the Albrook/Reaney Park entry, the Columbia Street parking lot, Owen Science, College Avenue steam plant, and the Safety building.

Drought-tolerant native plants have been installed in new landscaped planting beds and the use of drought tolerant grass seed has been increased.

Maintenance practices that foster water conservation also have been employed. Grassy areas managed by the Facilities Operation Grounds Department are mowed higher (to 2.5 inches), which increases root mass and depth, making turf more tolerant to surface drying and lowering water requirements. Fall fertilizer is applied to improve root health. Outdoor surfaces such as the running track, tennis courts, and stadium are no longer cleaned by use of a flush truck. Maintenance crews survey the irrigation system for components that have been damaged or vandalized such that they are wasting water, including sprinkler nozzles that have been re-directed to water hardscape in addition to landscaping.

Agricultural Management

WSU also has focused on upgrading irrigation systems in agricultural operations. Tukey Orchard began using drip irrigation in portions of the facility in 1983. In the past six years, additional portions of the orchard have been converted to dripline irrigation or microsprinklers.

Upgrades to Plumbing Fixtures

WSU has periodically retrofitted facilities with more efficient plumbing fixtures including showerheads, faucets, toilets, and urinals. The retrofits have been aimed at bringing pre-code fixtures up to code, and in the case of showerhead replacements, accelerating code savings by performing upgrades prior to expiration of the fixture lifespan. WSU has not tracked all retrofits; however it is known that all showerheads have been replaced in all apartment complexes and residential halls (1,500 showerheads), while faucets, toilets, and urinals have been replaced during major renovations. Additionally, the newly constructed Clean Technology Building will have a gray water reclamation system for toilets, urinals, and landscaping.

WSU also has proactively sought water efficiency in new construction and major renovations. All of the new and currently completed construction such as the Veterinary and Biomedical Research building, Northside Residence Phase 1 and 2, Global Animal Health and Olympia Avenue Residence Hall have included water conservation from plumbing fixtures.

Reduction/Elimination of Cooling Water

WSU has actively sought opportunities to reduce or eliminate cooling water used for various purposes. This has been achieved primarily either by reconfiguring single pass cooling systems to re-circulating systems or by replacing water cooled equipment, such as refrigerators, with air cooled models.

Upgrades at the Chiller Water East in 2009 included a reverse osmosis system that reduces the amount of water to approximately 1/6 of the previous needs due to recirculation. WSU is currently looking into a similar reverse osmosis upgrade at the West Chiller plant at Clark Hall. Additionally, the Deionized Water Regeneration Facility upgrade included an improvement in 2008 water that has reduced the water used there.

Significant water savings were achieved by using modern efficient boilers, enhanced water treatment, and not having leaks.

Clothes Washers

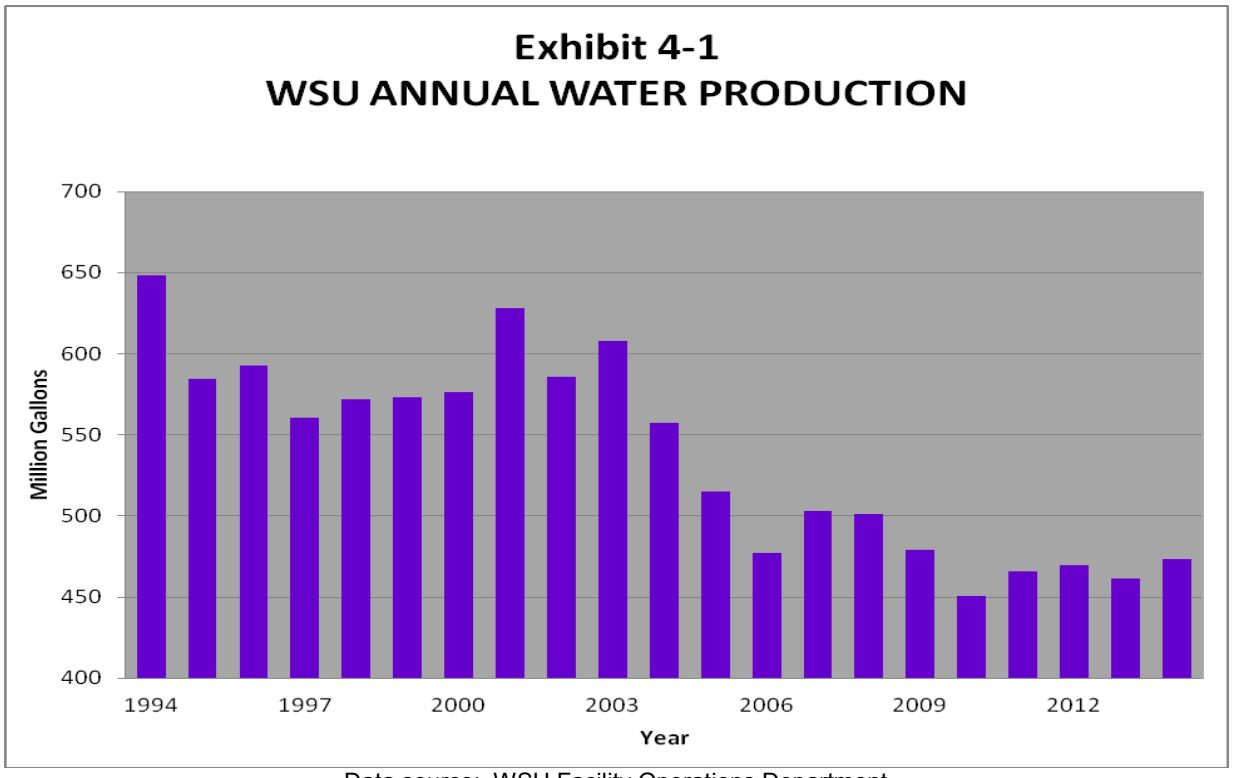
In 2001, WSU began replacing older clothes washers with more efficient front loading models. As of today, only 40 washers remain that are to be replaced with efficient models. Based on the 2008 Water System Plan, it was estimated that approximately 8.7 million gallons per year could be conserved with the use of efficient washing washings for all clothes washers. By completing this installation it is assumed that approximately 374 washers are efficient and only 40 are inefficient. The remaining 40 washers are to be replaced as funding is available.

4.2.2. Estimated Savings

WSU's commitment to conservation has resulted in significant water savings. Water production is at its lowest level since 1961 in spite of an increase of nearly 10,000 students during that

period. It is estimated that water usage has decreased from 173 gpd/student in 1961 to 99 gpd/student in 2014. Significant water savings have occurred in just the past six years; in 2006 the annual water usage was down approimately 150 million gallons from 2001 as shown in Exhibit 4-1. A portion of this savings is attributable to the conservation program. Some of the specific conservation measures taken in the last six years have led to the water savings listed below as quantified by WSU staff:

- Construction of the Grimes Way steam plant reverse osmosis system – 25 mg/year
- Broken line & leak repair – 0.2 mg/year
- Elimination of water wasting equipment - more than 10 mg/year



Data source: WSU Facility Operations Department

4.3. Conservation Program for 2015-2020

4.3.1. Goals

The goals of a conservation program should reflect the drivers of why a utility is pursuing conservation. Conservation drivers can include meeting regulatory requirements, minimizing impacts on water resources, decreasing operating costs, deferring capital improvements, and extending available supply. The conservation driver(s) applicable to any one utility depend on that utility's specific supply situation and cost structures.

WSU's conservation program is driven primarily by the desire to minimize impacts on water resources, namely the regional aquifer, and to meet regulatory requirements. The official goal is to save 18 million gallons per year at full implementation by the end of the planning period of

2015-2020. This goal was established using a public process that included conducting a public meeting at the Commons Building (Bldg. 5), room 110Q, on June 22, 2015. The draft goal and conservation chapter were discussed in this meeting. Appendix D-1 contains the affidavit of publication, and Appendix D-2 contains the Water Board's Approval Letter of this Water System Plan Update.

As a result of these comments, WSU is incorporating or considering implementation of the following:

1. Additional educational opportunities about water conservation
2. Continued efforts to pursue a water reclamation facility

Measures

WSU's conservation program for 2015-2020 will consist of the 11 measures listed below. Descriptions of each measure are discussed below. This program reflects a desire to continue WSU's current program, as well as intensify the implementation of some of the measures.

1. Source Meters
2. Service Meters
3. System Leak Detection and Repair
4. Technical Studies
5. Landscape Management
6. Agricultural Management
7. Upgrades to Plumbing Fixtures
8. Reduction/Elimination of Cooling Water
9. Education
10. Clothes Washers
11. Reclaimed Water

It should be noted that WSU is in a unique funding position for a utility in that they do not have control of their funding. Traditional utilities generate revenue by customer rates and bonds. In contrast, WSU relies on the state for funding. Therefore, it must be recognized that WSU's ability to implement this conservation program, and achieve its conservation goal, is dependent on receiving sufficient state appropriations to implement the program.

Source Meters

This measure is a continuation of WSU's current policy to meter all sources. Source meters are all electromagnetic type meters with no moving mechanical parts. The electronics of each meter will be checked and tested for accuracy every two years.

Service Meters

This measure is a continuation of WSU's recent efforts to begin installing meters on all service connections, which will become a requirement by January 22, 2017 as per the Rule. The meters will provide accurate water use data that will help WSU identify areas where conservation measures may be effective. WSU plans to meter most buildings and facilities and cluster others, as allowed per the Rule. The clustering provision or zone metering will not be allowed after January 22, 2017. WSU has identified the type of meters, which are auto-read

models. The exact funding source has not been determined at this time; however WSU plans to meter the entire campus per Rule requirements.

WSU's preliminary budget estimate for the metering project is $ million. By the end of 2015, $1.2 million was used to install 44 meters to bring the total campus served by meters to 101 or 84% of the total needed. A total of 160 meters are required on campus, leaving 59 meters yet to be installed. Metering of the remaining areas will include metering assumed high-use buildings and facilities first in order to better understand those important elements as soon as possible.

Originally, a metering schedule was provided to DOH on July 16, 2012 (Appendix D-3) that stated that 25 meters will be installed in 2015, 60 in 2016, and 78 in 2017 for a total of 183. Since then, the realignment of the airport runway will removed 25 facilities permanently from service and only 160 meters will be needed. At the end of 2015 and the period since the last plan update of 2008, 44 additional meters have been installed. By May 2016, 101 meters will be installed, leaving just 59 meters to be installed. However, due to biennium funding, funding isn't currently secured for these remaining meters yet. A revised metering schedule is seen in Appendix D-4 that shows the remaining meters being installed by 2018. This does not follow the mandate set by DOH of full metering by January 2017, but this deficiency will be presented to the legislature as necessary to facilitate the metering funding. This schedule allocates $1 million for 59 meters by 2018.

The maintenance schedule for service meters will be as follows:

- 1 - 1/2 "and smaller will be replaced every 15 years.
- 2" and larger will be replaced every 10 years.

Limits of flow accuracy will be kept to within those stated in the most current addition of AWWA C700, AWWA C701 and AWWA C701.

System Leak Detection and Repair

WSU will continue its leak repair efforts described in Section 4.2.1. By surveying pipes regularly with detection equipment, monitoring for possible and visible leaks, WSU will be even more proactive in preventing water loss. Once the system is fully metered, the detection of leaks will be easier to accomplish.

Technical Studies

WSU will continue to fund technical studies through its role in PBAC, as described in Section 4.2.1. As previously noted, technical studies provide information about the University's water system characteristics as required under the Rule.

Landscape Management

WSU will continue their landscape management conservation efforts described in Section 4.2.1.

Currently, all of the irrigation systems are being controlled by Calsense controllers that use an ET-based system with flow meters and wind sensors. The water usage of irrigation has gone from approximately 78 million gallons to 34 million gallons in the past two years as a result of these controllers, efficient landscape plants, and conversion of grass to artificial turf in some key

areas. Currently, the Valley Road Playfield, Grimes Way Playfield, and the Rogers-Orton Playfield have been converted to artificial turf. This equates to approximately 50% savings in irrigation water usage for the entire campus.

Increased water efficiency has also extended to the expanded 18-hole golf course, which has been shown to be approximately 51% more efficiently than the former 9-hole golf course. The old golf course used roughly 25 million gallons of water a year over 33 acres (760,000 gallons per acre). The Palouse Ridge Golf Course opened in 2008 and uses between 36 and 50 million gallons (average of 45 million gallons) of water a year over 120 acres (300,000 to 417,000 gallons per acre) (per WSU Capital Planning). However, the actual irrigation volume is much less than the previously thought 56 million gallons presented in the 2008 Water System Plan Update. The course utilizes drought-resistant grasses and a computerized irrigation system that relies on up-to-date weather information evaporation rates and microclimate information to conserve water. Additionally, the course is set up to connect to a water reuse system when that system is constructed and extends to the site (Source: www.palouseridge.com/courseco-management/environmental-approach). It should be noted that while the irrigation efficiency of the expanded golf course has been greatly improved, the overall water consumption is larger since the footprint of the expanded golf course is larger. A water use efficiency rate structure has been proposed for the expanded golf course.

WSU would ideally like to irrigate the golf course with reclaimed water. There are currently two irrigation ponds on the golf course that will utilize reclaimed water when it becomes available. More information on reclaimed water can be found in section 5.3.3.

Efforts to reduce the amount of landscaping that needs irrigation will continue including incorporation of drought tolerant plants and xeriscapes in capital projects. Finally, WSU will continue water efficient landscape maintenance practices.

Agricultural Management

Additional irrigation system improvements include a continued focus on upgrading sprinkler nozzles and converting to drip irrigation or microsprinklers where feasible. At Tukey Orchard, WSU plans to install additional drip irrigation or microsprinklers at existing plots and use drip irrigation or microsprinklers for any future plots. Conservation measures at WSU's other agricultural systems may be evaluated in future plan updates. At the beginning of the 2008 Water System Plan publishing, Tukey Orchard was using approximately 27.5 million gallons a year. Currently, it is using an average of 10.2 million gallons. This is a 63% reduction in water usage from the previous estimates for irrigation. It should also be noted, that Tukey Orchard was not metered for water usage prior to 2012. Therefore, the estimated 27.5 million gallons was based on acreage and average water usage per acre.

Upgrades to Plumbing Fixtures

In the short term, WSU will continue its efforts to periodically upgrade plumbing fixtures including faucets, toilets, and urinals. Moving forward, WSU will evaluate a potential plumbing fixture retrofit program. Depending on the evaluation results, a potential program may be an across-the-board retrofit of all non-code plumbing fixtures, or it may be a policy that any non-code fixture must be replaced during building modifications of any scale. The program will bring fixtures up to code at a minimum and may go beyond code in certain cases.

Reduction/Elimination of Cooling Water

WSU will continue seeking opportunities to reduce or eliminate cooling water to achieve water conservation. Moving forward, WSU will continue to eliminate single pass water cooled equipment or convert to air cooled equipment when possible. The reverse osmosis upgrades to the chilled water system and deionized water improvements have resulted in up to 6 passes of water through the system before it is flushed. Additional reverse osmosis upgrades to chilled water systems are being looked at to save additional water. The timing, funding, and amount of water to be saved is yet to be determine for these upgrades.

Education

The University also intends to contribute to the annual Palouse Basin Water Summit, as it has done in past years.

WSU will implement an education program to encourage water conservation among its students, faculty, and staff. WSU publishes an annual WSU Announcement and also posts the Water Use Efficiency Performance Report describing the goals and progress in conserving water on campus. In addition, informative signs in the Student Recreation Center and around campus remind people about the usage of water, consequence of conservation, and reminders about the resource. Figures 4-1, 4-2, 4-3 and 4-4 are examples of signage educating the patrons about conservation.

Figure 4-1 Student Recreation Center Signage

Figure 4-2 Student Recreation Center Signage

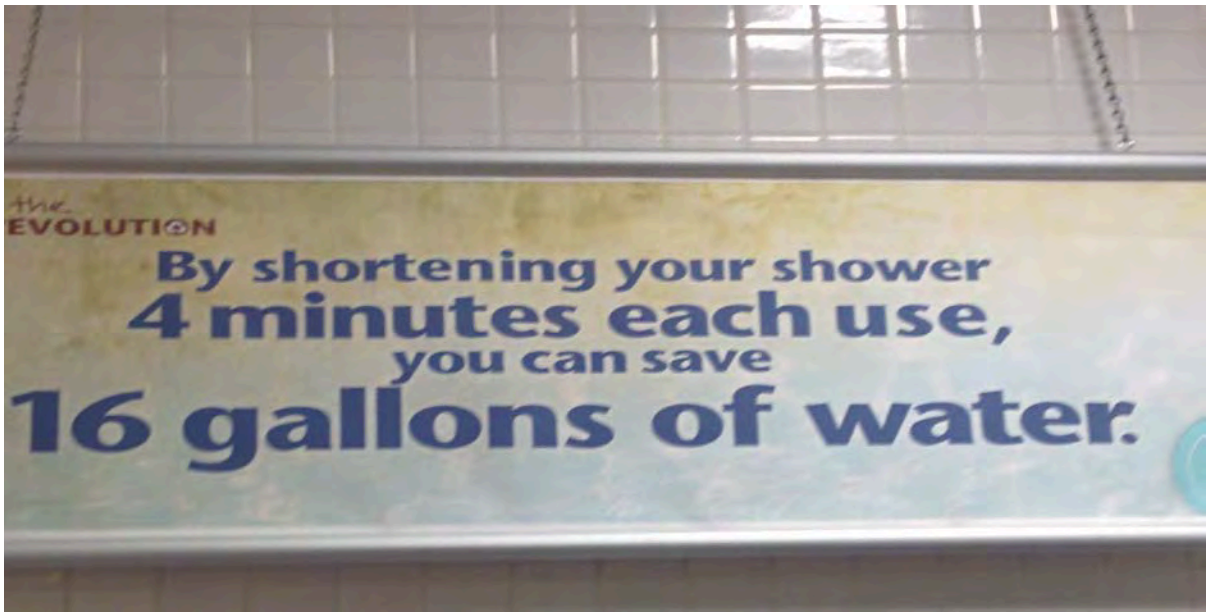


Figure 4-3 Student Recreation Center Signage

Figure 4-4 Sloan Hall signage

Clothes Washers

WSU will continue efforts to replace all clothes washers with more efficient front loading models. Currently, housing and dining has 33 washers to replace with efficient units and approximately 6 older units remain from other WSU entities. A total of 40 washers will be replaced, bringing the campus to full service by efficient clothes washers. These 40 washers are estimated to save an additional 0.7 million gallons per year.

Reclaimed Water

WSU is eager to implement a reclaimed water initiative to use reclaimed wastewater to irrigate major green spaces and potentially for process water in the Grimes Way steam plant and other industrial operations. It is estimated that such an effort would take approximately 2-4 years to become operational; however funding has not yet been secured. As mentioned in the Landscape Management section, WSU would like to irrigate the golf course with reclaimed water and has built a detention pond on the course for this purpose.

Although there has not been strong capital funding by the State Legislature in the past, in July of 2007 the legislature passed Bill E2SSB 6117 to support the use of reclaimed water in Washington. The legislation calls for the State to expand both direct financial support and financial incentives for capital investments in reclaimed water. WSU, in the most recent biennium, promoted the reclaimed water project as a high priority. The City of Pullman and WSU are still in negotiations about how to proceed with promoting the reclaimed water project and get funding for the project. That being said, reclaimed water is a future aspiration, but isn't a reality yet.

4.3.2. Estimated Savings and Budget

The estimated savings and direct costs of the conservation program are shown in Table 4-3. At full program implementation at the end of 2020, the program is estimated to save 18 million gallons per year. The proposed program has a total cost over the six year planning period of $3.0 million, which is an average annual cost of approximately $500,000. The program will be funded primarily through WSU's capital and operating budget, depending upon appropriations by the State Legislature. Funding for Housing and Dining Services is dependant upon student enrollment. Additional budget and implementation detail is provided in Chapter 9. The savings achieved by the program, and the corresponding progress towards reaching WSU's goal of saving 18 million gallons per year by the end of 2020, will be estimated by tracking the metered usage for agricultural irrigation, the number of clothes washers replaced, and by tracking the acreage of area served by efficient irrigation equipment or converted to artificial turf.

Table 4-3
Estimated Savings and Direct Costs of the Conservation Program

Program	Savings (at full implementation)		Capital Costs[1]		
	Gallons per Year	% of Total	Total Over Plan Period	Avg. Annual	% of Total
1. Source Meters	Not Quantified		$0	$0	0%
2. Service Meters	Not Quantified		$2,200,000(2)	$1,100,000(2)	94%
3. System Leak Detection and Repair	Not Quantified		N/A(3)		
4. Technical Studies	Not Quantified		$252,000(4)	$42,000(4)	4%
5. Landscape Management	Not Quantified		$0	$0	0%
6. Agricultural Management	17,309,100(5)	96%	N/A6		
7. Upgrades to Plumbing Fixtures	Not Quantified		N/A6		
8. Reduction/ Elimination of Water Cooled Equipment	Not Quantified		N/A6		
9. Education	Not Quantified		N/A7		
10. Clotheswashers	705,851(8)	4%	$29,200(9)	$29,200(9)	2%
11. Reclaimed Water	Not Quantified		N/A10		
Total	18,014,951	100%	$2,481,200	$1,171,200	100.00%

1. These are estimates of the capital costs. They do not include Operation and Maintenance costs. The implementation of the proposed conservation program is dependent upon funding.

2. These are preliminary numbers. WSU estimates cost of $2.2 million over 2 years. However, the deadline for full meter installation is in January 2017.

3. WSU continues to monitor and fix leaks, as they are identified. However, an average annual cost is not available for estimating purposes.

4. Based on anticipated annual contributions of $40,000 to PBAC and $2,000 to the Palouse Basin Water Summit.

5. Savings based on water usage estimates from 2008 of 27,533,100 gallons per year at Tukey Orchard, as provided by WSU on 6/13/2007 and actual metered usage averages from 2012 to 2014 of 10,224,000 gallons per year as provided by WSU on 4/21/2015. Drip irrigation or microsprinklers will continue to be installed as new plots are expanded and old systems are replaced.

6. WSU will incur costs for these measures; however the costs have not yet been determined.

7. Certain components of the Technical Studies measure also serve an educational function. However, none of the costs are assigned to Education since those components are a small portion of the Technical Studies activities.

8. Based on 5.2 gallons per person per day savings if campus-wide washers are water efficient, 40 machines left to be replaced, 6,298 people living in residence halls/single student housing/family housing during the school year and 1,760 people in the summer. With 8% of the total number of campus washers left to replace this equates to approximately 8% of the savings calculated in the 2008 Water System Plan update of 8,705,500 gallons.

9. Based on $730 per clothes washer (WSU's recent actual replacement cost) and replacing the remaining 40 inefficient clothes washers the year of 2015.

10. Numbers have not been included here because although the savings potential and costs are very large, the certainty of whether reclaimed water will come to fruition during this six year planning period is low. The cost of completing the proposed reclaimed water project is currently estimated at approximately $20 million. There has not been strong capital funding by the State Legislature at the time of writing, however Bill E2SSB 6117 was passed in July 2007 requiring the State to expand direct financial support and financial incentives for capital investments in reclaimed water. The City of Pullman and WSU are currently deciding the direction they will go on this prospect.

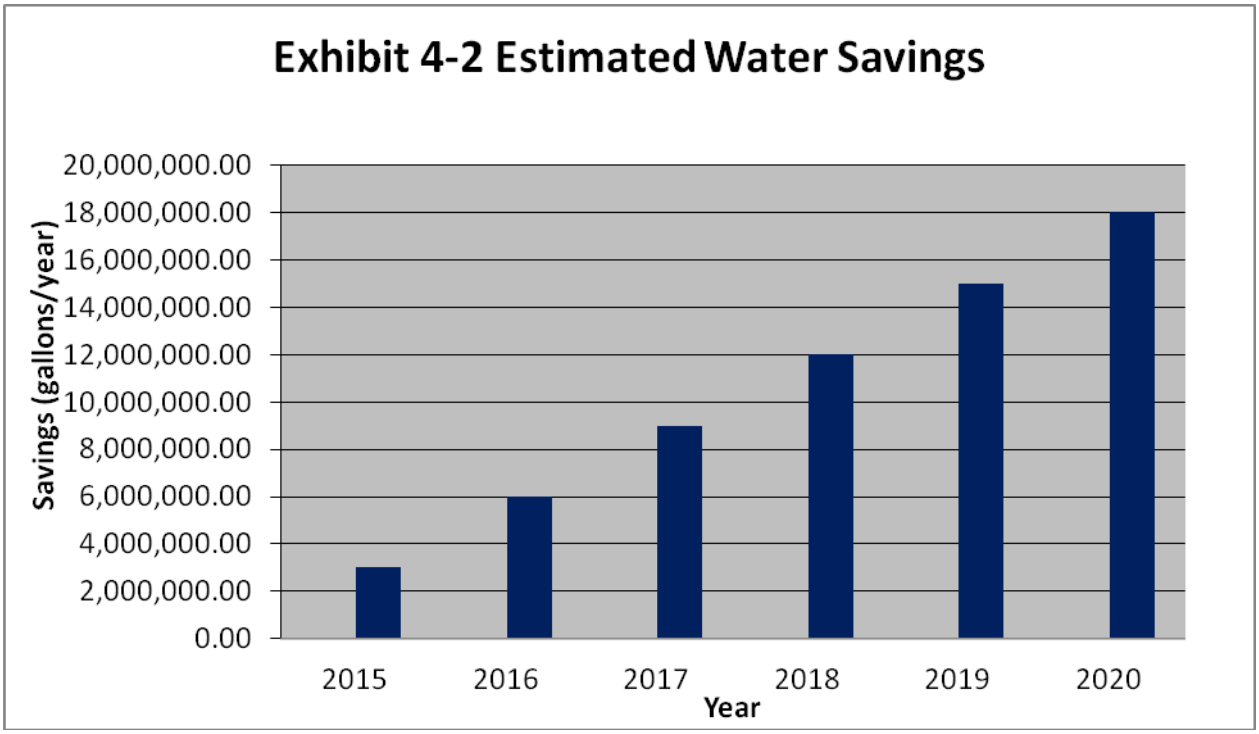
4.3.3. Impact on Demand Forecast

The conservation program is anticipated to be implemented over the six year planning period, meaning that one-sixth of the total savings can be added each year. The estimated annual savings are provided in Table 4-4 and are shown graphically in Exhibit 4-2.

Table 4-4
Savings Schedule and Impact on Demand

Year	Projected Water Demand without Conservation (gallons/year)	Projected Water Demand with Conservation (gallons/year)	Estimated Annual Savings (gallons/year)	Savings as % of Demand
2015	473,077,486	470,074,994	3,002,492	0.6%
2016	472,951,791	466,946,807	6,004,984	1.3%
2017	473,003,460	463,995,985	9,007,475	1.9%
2018	473,331,542	461,321,575	12,009,967	2.5%
2019	474,251,382	459,238,923	15,012,459	2.5%*
2020	475,780,199	457,765,248	18,014,951	2.5%*

*Savings was not increased beyond 2.5%. 2.5% was set as a realistic goal by WSU in 2007.



WSU's demand will be reduced by the expected savings from the conservation program. The demand forecast presented in section 2.3.1 includes two forecasts: one without additional conservation and one reflecting the savings from the conservation program. For the conservation-adjusted forecast, the estimated savings for years 2015-2020 have been subtracted from the demand forecast.

While the conservation program outlined above is only for the next six years, it is anticipated that WSU will continue to implement a conservation program in the future. Therefore, continued conservation savings are applied to the conservation-adjusted demand forecast. The demand for years 2021-2034 has been reduced by 2.5 % rounded to the nearest percent. This was the previously agreed upon conservation percentage that was deemed attainable for continued growth within the university.

4.4. Consumer Input

As required by WAC 246-290-100(8), a consumer input process must be provided to allow the water users to review and provide comment of the Water System Plan. To facilitate this process, a public notice was sent via email to all WSU consumers in the WSU News and WSU Announcements bulletins. This notice included an invitation to a public meeting that was held on February 2, 2016 at 10 am. This notice was sent on January 27-28, 2016 and February 1, 2016. Additionally, a full, draft pdf copy was put on the WSU Environmental Health and Safety website (http://ehs.wsu.edu/PH/DrinkingWaterQuality.html) for review by interested parties. Comments were requested by February 5, 2016 at 5 pm.

After concern over the short timeframe for consumer input by the attendees of the consumer meeting, a time extension was requested and granted by DOH. A second public notice was sent out on February 4, 2016 and the week of February 19, 2016 that notified consumers that the

comment deadline had been extended to February 19, 2016 at 5 pm. This announcement was sent to all consumer meeting attendees and via WSU News email outreach. As a result of this extended comment period, additional written public responses were received.

WSU is appreciative of the comments received and thanks the participants for their valuable input in the process. The WSU Water Board held a meeting to discuss each comment received and the Water System Plan has been adjusted accordingly per some of these comments.

5.0 Water Rights and Future Supply Options

5.1 Water Rights Evaluation

5.1.1 Existing Water Rights

WSU currently has water rights for municipal supply issued by the Washington State Department of Ecology (Ecology) for a total instantaneous quantity (Qi) of 5,000 gallons per minute (gpm) and a total annual quantity (Qa) of 5,300 acre-feet per year (AF/yr), as shown in Table 5-1. These amounts are based on the primary water rights issued for Wells No. 1, 2, 4, 5, 6, 7, and 8.

In October 2004, WSU filed applications for change to add points of withdrawal for their existing municipal water rights. The application was submitted to integrate all of WSU's water rights, thus allowing the University to use any of their wells to draw from their existing water rights, with the total aggregate withdrawal to be limited to their total water rights of 5,000 gpm and 5,300 AF/yr. All applications were approved by Ecology by Reports of Examination dated September 18, 2006, except for Claim 098524, which was denied based on the date of first use of water from this well occurring in 1946, which was after the adoption of the State Ground Water Code in 1945. This integration allowed WSU to proceed with the completion and use of Well 8, which was constructed as an additional point of withdrawal under Certificate G3-22065C. A group of interveners appealed Ecology's approved change applications to the Pollution Control Hearings Board (PCHB); however the outcome favored WSU in February 2015 and the Supreme Court of Washington's ruling is included in appendix E-6. Copies of WSU's Reports of Examination for the water rights integrations are included in Appendix E-1. Water rights, Certificates, Permits and Claims are in Appendix E-2. The memorandum from WSU that outlines the proposal for Well No. 8 is in Appendix E-3. The Washington State Department of Ecology Water Rights Review Letter is in Appendix E-4.

A summary of WSU's municipal water rights is presented in Table 5-1. As shown in the table, WSU's water rights are typically categorized as either primary water rights or supplemental water rights. Primary water rights are additive, but supplemental water rights are not additive to primary water rights; instead, supplemental water rights can be used in place of quantities shown as primary water rights.

An analysis of WSU's existing water rights, existing consumption, and the current excess in water rights is shown in Table 5-2. The DOH Capacity Table is in Appendix E-5.

5.1.2 Comparison of Water Rights to Demand Forecast

Six and 20 year water rights status forecasts for WSU are presented in Tables 5-3 and 5-4, respectively. According to the forecast, WSU has adequate water rights at the end of the 20 year planning period.

The maximum number of equivalent residential units (ERUs) that WSU's current water rights can serve is 31,118 based on annual quantities of 5,300 acre-feet per year (calculated using 152 gpd/ERU [ADD]) and 13,121 based on instantaneous flows of 5,000 gpm (calculated using 548.7 gpd/ERU [MDD]) (MDD calculation is ADD by peaking factor of 3.61 as calculated in section 2.2). The calculated 2015 and 2034 ERUs for WSU are 8,526 and 9,368 respectively (see section 2.3.2). Based on these ERU calculations, the water rights held by WSU are adequate.

Table 5-1 Water Rights Summary					
Well No.	Water Right	Priority Date	Type	Max. Instantaneous Withdrawal (Qi) (gpm)	Max. Annual Volume (Qa) (AF/yr)
1	Claim 098522	1934	Primary	500	720
2[2]	Claim 098523	1938	Primary	500	720
3	Claim 098524	1946	Not Valid	(1,000)	(1,440)
4	Cert. 5070-A	08/01/62	Primary	1,500	2,260
5	Cert. 5072-A	05/27/63	Primary	500	720
6, 8	Cert. G3-22065C	11/12/73	Primary	1,500	1,600
7[1]	Permit G3-28278P	01/28/87	Supplemental	2,500[1]	2,260
Total				5,000 gpm	5,300 AF/yr

1. Permit issued with a provision. Total combined quantity for permit G3-282278P (Well No. 7), claim 98522 (Well No. 1), claim 098524 (Well No. 3) and claim 5070-A (Well No. 4) shall not exceed 2,500 gallons per minute, 2,260 acre-feet per year.
2. Well No. 2 has been decommissioned.

5.2 Interties

The only other water source immediately available for the WSU system are the four interies with the City of Pullman. These interties provide emergency connections to both the high and low zones; two on the high and two on the low. The four interties are located: at the intersection of Valley Road and Merman Drive (#1), approximately 800 feet west on Valley Road (#2), at the south end of Duncan Lane (#3), and at the intersection of Oak Street and Reaney Way (#4) (valves #1 and #2 are on the WSU high zone and #3 and #4 are on the WSU low zone). The interties are all valved and remain closed under normal circumstances. If opened during static conditions, the water would flow from the WSU system to the Pullman system at valves #1, #2 and #3 and the opposite direction at valve #4. The calculated static pressures are within 15 psi on either side of all valves and therefore, the flow direction could vary due to reservoir levels, demand, fire flow events, etc. on either system. Graphs for each intertie depicting 48- hour pressure readings are contained in Appendix C-10.

In the last 20 years the interties have been used only a few times, and because of this, the connections are not metered. As indicated earlier, the City of Pullman and WSU have a written agreement for shared water use between the systems (see Appendix A-9). Under the agreement the interties may be used during emergencies only if it does not have a “detrimental effect” on the system from which it is drawing water. The party drawing the water is charged for its use. Pullman and the University work cooperatively during those rare instances when the intertie is needed.

Table 5-2 Existing Water Rights Status										
					Existing Water Rights		**Existing Consumption**		**Current Water Right Status (Excess/Deficiency)**	
Permit, Certificate or Claim #	**Name of Right-holder or Claimant**	**Priority Date**	**Source Name/ Number**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate(Qi) gpm/cfs**	**Maximum Annual Volume(Qa) AF/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) Af/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) AF/yr**
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 AF/yr	3,250 gpm[1]	1,454 AF/yr[1]	1,750 gpm	3,846 AF/yr

				Existing Limits on Intertie Water Use		**Existing Consumption through Intertie**		**Current Intertie Supply Status (Excess/Deficiency)**	
Intertie Name/Identifier		**Name of Purveyor Providing Water**		**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**
1. WSU		Emergency Use Only		N/A	N/A	N/A	N/A	N/A	N/A
Total									

Pending Water Right Applications	**Name on Application**	**Date Submitted**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate (Qi) Requested**	**Maximum Annual Volume (Qa) Requested**
None	N/A	N/A	N/A	N/A	N/A

1. Existing consumption based on projected Average Day Demand of 1,296,515 gpd and a Maximum Day Demand of 4,680,418 gpd in 2014. See Chapter 2 for the water demand forecast.

Table 5-3
Forecasted Water Rights Status (2020)

Permit, Certificate or Claim #	Name of Right-holder or Claimant	Priority Date	Source Name/ Number	Primary or Supplemental	Existing Water Rights		Forecasted Water Use From Sources (6 Year Demand)		Forecasted Water Rights Status (Excess/Deficiency – 6 Year Demand in Water Right)	
					Maximum Instantaneous Flow Rate(Qi) gpm/cfs	Maximum Annual Volume(Qa) AF/yr	Maximum Instantaneous Flow Rate (Qi) gpm/cfs	Maximum Annual Volume (Qa) Af/yr	Maximum Instantaneous Flow Rate (Qi) gpm/cfs	Maximum Annual Volume (Qa) AF/yr
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 Af/yr	3,268 gpm	1,462 AF/yr	1,732 gpm	3,838 AF/yr

Intertie Name/Identifier		Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Existing Consumption through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
			Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. WSU		Emergency Use Only	N/A	N/A	N/A	N/A	N/A	N/A
Total								

Pending Water Right Applications	Name on Application	Date Submitted	Primary or Supplemental	Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
None	N/A	N/A	N/A	N/A	N/A

Table 5-4 Forecasted Water Rights Status (2034)										
					Existing Water Rights		**Forecasted Water Use from Sources (20 Year Demand)**		**Forecasted Water Rights Status (Excess/Deficiency – 20 Year Demand in Water Right)**	
Permit, Certificate or Claim #	**Name of Right-holder or Claimant**	**Priority Date**	**Source Name/ Number**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate(Qi) gpm/cfs**	**Maximum Annual Volume(Qa) AF/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) Af/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) AF/yr**
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 Af/yr	3,569 gpm	1,596 AF/yr	1,431 gpm	3,704 AF/yr

				Existing Limits on Intertie Water Use		**Existing Consumption through Intertie**		**Current Intertie Supply Status (Excess/Deficiency)**	
Intertie Name/Identifier		**Name of Purveyor Providing Water**		**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**
1. WSU		Emergency Use Only		N/A	N/A	N/A	N/A	N/A	N/A
Total									

Pending Water Right Applications	**Name on Application**	**Date Submitted**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate (Qi) Requested**	**Maximum Annual Volume (Qa) Requested**
None	N/A	N/A	N/A	N/A	N/A

5.3 Future Supply Options

Previous studies indicate that the local aquifer (the Grande Ronde) serving WSU is declining at rates of 1-2 feet per year in some areas (Hashmi, 1995). With declining groundwater levels and the forecasted demands with and without conservation, WSU is considering several different options for their future water supply needs. These include conservation measures, use of reclaimed water, and Aquifer Storage and Recovery (ASR). Over the next six years WSU will:

- Implement the conservation program described in Chapter 4. The savings estimated from conservation measures is estimated at 2.5%, or approximately 13 MG, in 2034.
- Continue efforts to secure funding for the Pullman/WSU reclaimed water project. The current determination is that WSU can reuse approximately 845,995 gpd during the May 1 through October 30 irrigation season for a total of 154,817,085 gallons, or about 30% of the demand in 2034.
- Evaluate ASR feasibility in coordination with Pullman and other regional partners. It is estimated that ASR could increase available water to meet demand by 325 MG/year[1]. This would account for 63% of the projected 2034 demand.

Successful implementation of each of these measures could contribute to meet WSU's existing and future water supply needs. Exhibit 5-1 compares these measures with WSU's projected demand. Each of these measures is described in greater detail below.

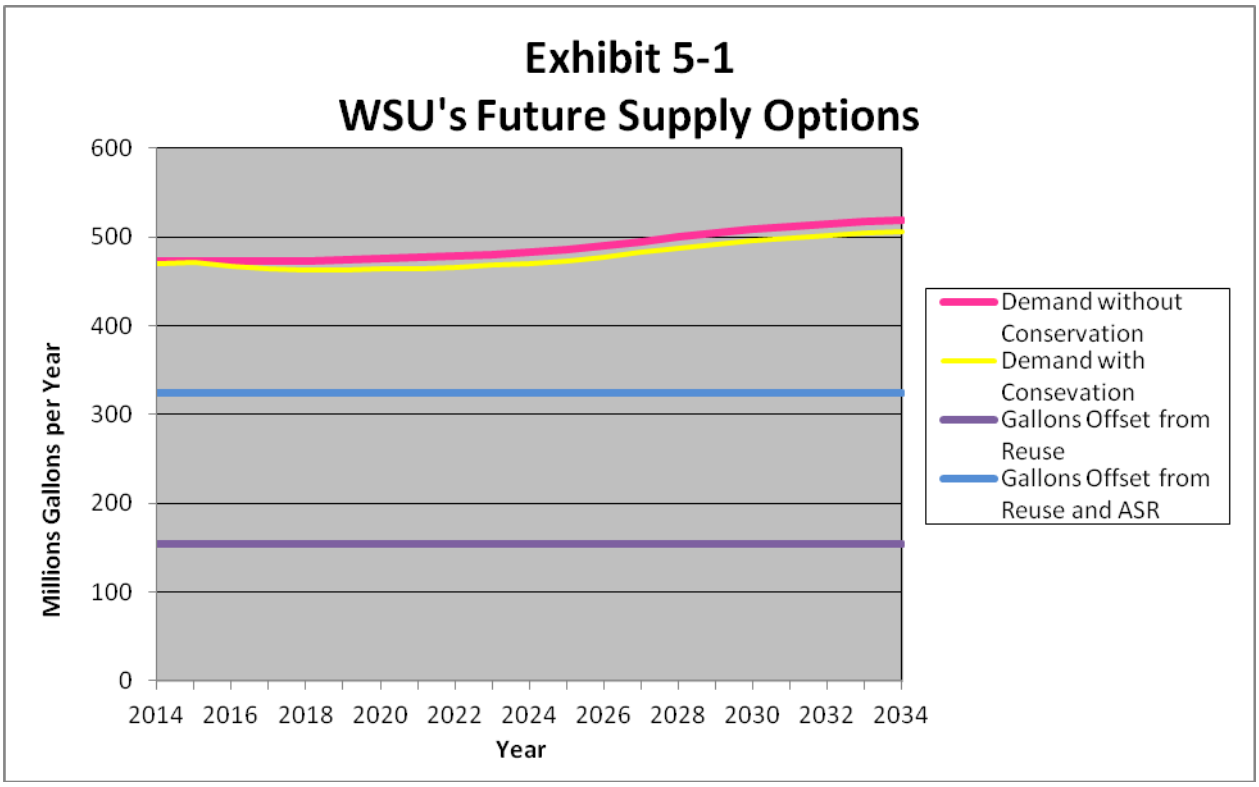
5.3.1 Conservation Program

WSU's existing conservation program includes: source and service meters (WSU is partially metered), a system leak repair program, upgrades to plumbing fixtures in University buildings, efficient landscape management practices, the reduction and/or elimination of cooling water, replacement of older clotheswashers with more efficient models, and funding technical studies about regional water resources. WSU's conservation program for the next six years will implement the following additional measures to reduce water consumption: installation of more service meters, improvements to irrigation systems, continuation of an education program, and replacement of remaining clotheswashers. A detailed description of WSU's existing and future conservation plan is provided in Chapter 4. Additional conservation measures are also assumed for 2020 and beyond, resulting in a projected 2.5% reduction in demand.

5.3.2 Aquifer Storage and Recovery

WSU intends to participate in and or support an ASR project in the region in coordination with Pullman and other regional partners. ASR involves the appropriation and storage of water when supply exceeds demand, and recovering that water during peak demand periods. The water is recharged to an aquifer using wells, and typically, the stored water can be recovered from the aquifer with little change in water quality. The draft WRIA 34 Storage Assessment Report prepared for the Palouse Basin suggests that excess winter water is available from the South Fork of the Palouse River at Pullman, which could be used to meet a portion of WSU's future demand and perhaps offset declining groundwater levels. The amount of water available from ASR and the number of wells used needs to be confirmed, however for planning purposes it was assumed that WSU would conduct ASR with one well sometime in the next 20 year period.

[1] ASR calculations assumed recharge at 1,500 gallons/minute for 5 months into a single ASR well.



Notes on Exhibit 5-1:
1. Conservation program was estimated to save 2.5% per year. See Chapter 4 for conservation calculations.
2. Water reuse (reclaimed water) was calculated by adding together the estimated peak daily use at the 26 sites where WSU intends to reuse water (Steptoe Housing [B-Clock, F-Clock, and R-Clock], Kamiak Housing [F-Clock and C-Clock], Terrace Housing [300-Clock, 400-Clock, and 700-Clock], Chief Joseph Housing [A-Clock, Sprinkler Room Clock, and E-Clock], Nez Perce Housing, Reactor Intramural, Valley Crest Housing [Upper Clock and Lower Clock], Women's Soccer Field, Mooberry Track, Columbia Housing, Chinook Housing [Upper Clock and Lower Clock], Yakama Housing [A-Clock, B-Clock, C-Clock, and D-Clock]) and the golf course. This total of 936,995 gpd was multiplied by 183 days to reflect the irrigation season (May 1 through October 30).
3. ASR calculations assumed recharge at 1,500 gallons/minute for 5 months into 1 well.

ASR System Development and Expansion Approach

Development of an ASR system would involve an evaluation of Pullman's and potentially WSU's existing infrastructure to determine where ASR facilities can feasibly be developed and also provide the most benefit to WSU's water supply system. In conjunction with this evaluation, strategic locations within the distribution system where an ASR facility may be able to provide surplus capacity, boost system pressure, or boost chlorine residuals would be determined.

A review of wells would also consider available information regarding well yield, performance, construction, groundwater quality, and existing pump and wellhead equipment. This will help assess candidate wells for ASR conversion and the degree of retrofit required.

Permitting

There are several permitting steps to meet the requirements for developing ASR systems in the State of Washington. Permitting requirements for ASR projects generally consist of the following components:

- Demonstration of water rights for the ASR source water and ultimate beneficial use.
- Submittal of an application to Ecology for an ASR Permit (A.K.A. Reservoir Permit).
- Registration of ASR wells with the Ecology Underground Injection Control (UIC) Program.
- Demonstration of land use compatibility.
- Obtain well site approval and establish the Sanitary Control Area (sanitary setbacks) for all newly drilled and constructed wells (ASR and River-Bank-Filtration wells).
- NPDES permit for potential discharge of backflush waste during ASR well operation.

Source Water

It is anticipated that source water for the ASR project will be supplied by winter flows of the South Fork of the Palouse River when excess water is available. Because winter flows are typically turbid, some level of pre-treatment will be necessary to reduce turbidity prior to aquifer recharge. It appears that riverbank filtration, using either wells or infiltration galleries, will likely provide the most efficient and cost-effective approach for pre-treatment of raw water.

Water Quality Characterization

- Average water quality in the South Fork Palouse River is a suitable source of raw water for an ASR system.
- Existing data should be leveraged to demonstrate typical water quality and variability during anticipated times when water will be diverted for ASR operations.
- Water quality samples may be necessary to assess raw water quality in the South Fork Palouse River and to assess the pre-treated water during the feasibility study to demonstrate the treatment capacity of the natural system.
- Potential water intake sites for the ASR project should be sited along the South Fork upstream of WSU and upstream of Paradise Creek, which includes wastewater effluent from the City of Moscow.

Water Quality Projection and Impact Analysis

- Riverbank filtration could potentially provide adequate treatment to meet the water quality standards for ASR systems in Washington.
- Under the right conditions, river bank filtration can provide between one and two filtration credits and a significant level of pre-treatment to minimize water treatment plant design and construction costs.
- Adverse impacts to ambient groundwater quality are not expected to result from ASR operations.

Environmental Assessment

Applications for ASR projects must include an environmental assessment (EA) and analysis of potential impacts that may arise from the project. If a significant impact is not likely, a determination of non-significance (DNS) will be made, and no further environmental review is necessary. If it is determined that significant impact is likely, an environmental impact statement (EIS) will be required according to SEPA regulations (RCW 43.21C).

Mitigation Plan

If significant impacts that are likely to occur are identified in the environmental assessment, a mitigation plan must be prepared that outlines the actions to be taken that will mitigate these adverse impacts and the approach to evaluating the effectiveness of the mitigation activities.

Hydrogeologic Characterization Report

A hydrogeologic characterization report will be necessary to meet the requirements of the ASR application process and to help define the physical setting in which WSU's ASR system will be developed. This report will present a conceptual model of the subsurface conditions and the aquifer system that will be used to understand how the ASR system will be developed, operated, and monitored, and what potential impacts to the environment may occur as a result.

Operation Plan

A project operation plan is required to describe how the proposed ASR project will be operated during pilot testing and operational phases. The plan will include information regarding timing and rates of recharge, water treatment, water discharge, and more.

Monitoring Plan

A project monitoring plan is required to describe how the proposed ASR project will be monitored to evaluate efficacy and feasibility of the project and to verify conceptual model assumptions.

Pilot Testing

A pilot testing program would be conducted, including water level and water quality monitoring, model validation, and a year one operational data report.

Schedule and Cost

No specific schedule for implementing ASR has been determined. WSU will participate in and support Pullman's feasibility efforts as appropriate, and if ASR is determined to be feasible, a more detailed schedule will be developed.

5.3.3 Water Reclamation

This section describes the potential for reclaimed water to be used as a source of supply to meet projected demands and improve total water service reliability (this is also refereed to as water reuse). Previous studies used to prepare this section include the following:

- General Sewer Plan, City of Pullman, Parametrix, Inc., Kimball Engineering, PA., Esvelt Environmental Engineering, June 1998.
- Design Development Document, Washington State University Water Reclamation Project, Parametrix Inc., October 2002.

Pursuant to their NPDES permit, the City of Pullman Waste Water Treatment Plant (WWTP) currently discharges all of its treated wastewater (2.92 mgd annual average, 2001) to the South Fork of the Palouse River. WSU, along with the City of Pullman, plans to use some of this water for irrigation and potentially industrial activities in order to lessen withdrawal from the aquifer. The WWTP has a permitted design capacity of 4.30 mgd.

Potential Reclaimed Water Demands

Currently, WSU planned irrigation sites are located north and east of the South Fork of the Palouse River. The 2002 Parametrix report estimates peak day reclaimed water use for the sites where WSU intends to use reclaimed water (Table 5-5). The total estimated peak day use for these sites totals approximately 937,000 gpd. Irrigation sites would be supplied water between the months of May and October. Ecology has made an initial recommendation that the City can use a maximum of 1.05 mgd without hindering downstream water rights in a drought year and 1.35 mgd most years.

Table 5-5 Estimates of WSU Peak Day Reclaimed Water Use from the 2002 Parametrix Design Development Document[1]	
Irrigation Site	**Estimated Peak Daily Use (gpd)**
Steptoe Housing, B-Clock	37,080
Steptoe Housing, F-Clock	22,380
Steptoe Housing, R-Clock	62,790
Kamiak Housing, F-Clock	6,160
Kamiak Housing, C-Clock	5,850
Terrace Housing, 300-Clock	4,950
Terrace Housing, 400-Clock	9,930
Terrace Housing, 700-Clock	15,660
Chief Joseph Housing, A-Clock	9,480
Chief Joseph Housing, Sprinkler Room Clock	2,430
Chief Joseph Housing, E-Clock	15,405
Nez Perce Housing	78,075
Golf Course	343,596
Reactor Intramural	22,000
Valley Crest Housing, Upper Clock	14,280
Valley Crest Housing, Lower Clock	3,540
Women's Soccer Field	9,072
Mooberry Track	12,000
Orton Field	24,750
Columbia Housing	26,910
Chinook Housing, Upper Clock	41,535
Chinook Housing, Lower Clock	30,600
Yakama Housing, A-Clock	14,766
Yakama Housing, B-Clock	9,894
Yakama Housing, C-Clock	11,112
Yakama Housing, D-Clock	11,750
Total gpd	**845,995**
Gallons offset from Reuse for 183 days (gallons/year) from May 1 through October 30	**154,817,085**

1. The Parametrix report also listed Bailey Baseball Fields, Valley Road Playfields, Grimes Rugby Field, and the football practice field, however these sites have been converted to artificial turf and were therefore not included. The expanded golf course water use was also updated. The ADD for the golf course presented in the demand forecast was multiplied by a peaking factor of 2.28 to estimate a peak day use. Four Pullman sites were not included. The steam plant was also not included.

Facility Elements & Design Criteria

Necessary facilities to produce and deliver reclaimed water include modifications to the WWTP, as well as new off-site infrastructure. Necessary WWTP improvements to produce up to 1.36 mgd of Class A reclaimed water include those listed in Table 5-6, although Ecology made an initial determination that WSU can use a maximum of 1.05 mgd without hindering downstream water rights in a drought year and 1.35 mgd most years.

Table 5-6
Necessary WWTP Improvements to Produce Class A Reclaimed Water

Facility Element	Description
Chemical Feed	Two metering pumps paced off of flow. 1,200 gallon storage tank. Assume alum dose is 10-15 mg/L. Needs to be confirmed by pilot testing.
Mixing/Flocculation	Static mixer, coagulation in piping to filter. Detention time is approximately 20 seconds in piping.
Flow Meters	Magmeter at filter influent in a 12" pipe. Magmeter at 12" diameter plant effluent for accounting.
Filter Feed Pumps	Two vertical turbine pumps: 700 gpm, 26 feet of head, 1,760 rpm, 15 hp, 10 inch discharge, and variable speed drive.
Filter	Cloth media disk filter. Six disks with 322 sf of area. Loaded at 3.2 gpm/sf at 1.5 mgd and 4.2 gpm/sf at 2.0 mgd. Future six disk filter for flows over 2.0 mgd. Assumptions to be confirmed by pilot testing.
Chlorine Disinfection	On-site hypochlorite generation needed to achieve less than 2.2 per 100 ml weekly average total coliform. 2,800 lb brine tank; 1,100 gallon hypochlorite tank; two 63 gph metering pumps. Assume dosage at 5 mg/L for 1.5 mgd = 62 ppd. For 2 mgd = 83 ppd. Provide 100 ppd generation capacity.
Reclaimed Water Pumps	Two vertical turbine pumps: 700 gpm, 415 feet of head, 1,200 rpm, 100 hp, 10 inch discharge, and variable speed drive.
Instrumentation & Alarms	Continuous turbidity and chlorine residual monitoring. Three chlorine residual analyzers; one at plant and two in distribution system. Shut down filter feed and reclamation pumps upon high turbidity, low chlorine residual; power failure; filter, chemical feed, disinfection system failure; or upstream secondary treatment failure.

Necessary pumping and conveyance facilities include those listed in Table 5-7.

Table 5-7
Pumping and Conveyance Facilities to Produce and Deliver Reclaimed Water

Facility Element	Description
Military Hill Booster Pump Station	Single horizontal centrifugal pump in vault to boost distribution pressure for Military Hill Park and Pullman High School.
Terre View Potable Contingency Pump & Reservoir	Single horizontal centrifugal pump in vault for contingency filling of Terre View Reservoir with potable water. Used when potable reservoir levels and/or potable system pressures are below head in reservoir. Welded steel reservoir south of Terre View, near WSU golf course (elevation 2677 – Plan G-2 shows 2678). 70' diameter, height 32'; nominal capacity 921,000 gallons.
Conveyance Pipeline from WWTP to Terre View Reservoir & Military Hill BPS	16" diameter, Q = 1 to 2 mgd, C900 and C905 purple PVC, 200 psi. Isolation valves: resilient seated wedge gates spaced at every mile. Air release valves: at high points. Blowoff valves/drains: at low points.
Distribution System to Customer Sites	4 to 6" diameter, Q varies based upon customer demand, C900 and C905 purple PVC, minimum pressure 40 psi. Reduced pressure principle backflow prevention devices or approved air gap separations at City of Pullman irrigation sites where the potable water system connects to an irrigation system that is also served by the reclaimed water system. Cover surface features with purple paint.

Permitting Considerations

A State of Washington Department of Ecology (Ecology) Reclaimed Water Permit must be issued for Pullman/WSU to make beneficial reuse of treated wastewater (reclaimed water). Issuance of the permit by Ecology is dependent upon the acceptance of a number of technical criteria established by Ecology and the Washington Department of Health (DOH). Guidance references for the technical reports that are required can be found at the following website: http://www.ecy.wa.gov/programs/wq/reclaim. Many of the criteria were addressed by WSU's consultant as part of the October 2002 Design Development Document.

Water Rights

RCW 90.46.120 gives the owner of a WWTP exclusive right to any water generated by the WWTP, and exempts the use and distribution of the reclaimed water by the owner from permit requirements associated with appropriations (RCW 90.03.250) and groundwater withdrawals (RCW 90.44.060). However, RWC 90.46.130 states that a facility that reclaims water shall not impair any existing water right downstream from its discharge. During low precipitation periods, the stream flow below the City of Pullman's WWTP outfall is substantially composed of treated wastewater. A formal determination of water rights impacts by Ecology was requested by the consultant in June 2002, and indicated that a near term reduction in streamflow contributed by Pullman's WWTP would be a maximum 1.05 mgd during a drought year and 1.35 mgd in a typical year corresponding to estimated demands by potential customers north of the South Fork of the Palouse River (WSU & Pullman sites, May 1st through October 30th).

SEPA Environmental Checklist

None of the currently proposed facilities will require a Conditional Use Permit (CUP) for the joint project from the City of Pullman Planning Department because, other than pipelines, all facilities will be on the existing WWTP site or at WSU. CUPs normally require a State Environmental Policy Act (SEPA) checklist to be submitted. Even though a CUP is not required, Ecology will require a SEPA checklist to be completed for the project, including the pipeline alignment(s) and on-site facilities. The SEPA checklist requires up-to-date impact evaluations of earth, air, water, plants, animals, energy, natural resources, environmental health, noise, aesthetics, cultural and historical resources, transportation, public services, and utilities.

6.0 Water Quality Review, Regulatory Compliance and Source Water Protection

WSU has historically provided high quality water to its residents and is currently in compliance with all water quality monitoring requirements. WSU often monitors more comprehensively than required by current state and federal requirements in order to ensure WSU water users receive the highest quality water. WSU also encourages public participation in its water utility and annually publishes a Consumer Confidence Report (CCR) describing WSU's water quality parameters (see Appendix G-10).

This section provides a review of current WAC 246-290 and federal drinking water regulations pursuant to the Safe Drinking Water Act (SDWA) and an assessment of WSU's compliance for the period between 2008 and 2014 (see Appendix G-1 for water quality analysis reports). Also identified are possible future regulations and their implications for WSU.

6.1 Safe Drinking Water Act & Washington Administrative Code

The SDWA of 1974, amended in 1986 and 1996, established specific roles for federal and state governments and for public water suppliers. The United State Environmental Protection Agency (EPA) is authorized to develop national drinking water regulations and oversee the implementation of the act. State governments are expected to adopt the federal law and accept primary responsibility for administration and enforcement. Public water suppliers are assigned the day-to-day responsibility of meeting the regulations by incorporating monitoring, recording, and sampling procedures into their Operation and Maintenance (O&M) programs.

Washington State law incorporates the SDWA and its amendments as WAC 246-290. DOH administrates and enforces these WAC codes. According to WAC 246-290, a Group A community public water system is defined as serving 15 or more year round residential connections or 25 or more year-round residents (for 180 or more days / year). As a Group A community public water system, WSU is required to meet drinking water quality regulations and conform to monitoring and reporting requirements as described by the WAC 246-290.

6.2 Summary of Effective Source Water Quality Regulations

As a 100% groundwater system that does not purchase water from another purveyor, WSU is responsible for complying with the following effective regulations pertaining to groundwater sources.

- Phase I (Inorganic Compounds)
- Phase II (Synthetic Organic Compounds)
- Phase V (Volatile Organic Compounds)
- Radionuclides Rule
- Source Water Protection Programs
- Groundwater Rule
- Total Coliform Rule
- Lead & Copper Rule
- Consumer Confidence Reports and Public Notification Rule
- Stage 2 Disinfectant/Disinfection Byproducts Rule

This subsection focuses on presenting and discussing the analytical results of water quality testing from the last WSP update (2008) to the most recent testing conducted in 2014. All testing performed by WSU for the period of 2008 through 2014 meets the DOH requirements regarding sampling frequency and number of samples. Section 6.6 describes the sampling frequency and number of samples required for each of the programs described in this subsection.

6.2.1 Phase I, II and V Regulations

Phase I, II, and V of the federal Primary Drinking Water Regulations set maximum contaminant levels (MCLs) for inorganic compounds (IOCs), synthetic organic compounds (SOCs), and volatile organic compounds (VOCs). The WAC 246-290-300 and 246-290-310 defer to the federal rules and require testing based on a "vulnerability of occurrence" assessment. WAC 246-290-300 defines monitoring requirements for public drinking water systems and further stipulates that regulated IOCs, VOCs, and SOCs are to be monitored on 12 to 36 month sampling cycles depending on the contaminant. The primary drinking water regulations apply to all the sources that are not classified as emergency sources. The WSU wells are in compliance with SOC, IOCs, and VOC MCLs (see Appendix G-1). The SMCL provided for sodium is a recommended level and for monitoring purposes only; therefore Wells 6, 7, and 8 are in compliance even though the sodium concentration is above the recommended amount.

6.2.2 Radionuclides

The Radionuclides Rule became effective in 2003 and is part of the Primary Drinking Water Regulations. The radionuclide MCLs include limits for radium-226, radium-228, adjusted gross alpha emitters, gross beta and photon emitters, and uranium. Combined radium, gross alpha, and gross beta sampling is required once every 3, 6, or 9 years, depending on a system's average contaminant levels. As shown in the analyses, gross beta is less than 50 pCi/L, and therefore, no further analysis was required (If the average annual concentration of gross beta activity is less than 50 pCi/L and if the average annual concentrations of tritium and strontium 90 are less than 20,000 pCi/L and 8 pCi/L, respectively, no further analyses are required. If the gross beta activity exceeds 50 pCi/L, the major radioactive contaminants must be identified and organ and whole body doses calculated; the combined doses cannot exceed 4 millirem/year). All wells met the MCLs (see Appendix G-1). Testing for uranium has not been conducted during the 2008 to 2015 period because all source waters are exempt.

6.2.3 Secondary Drinking Water Standards

In addition to the parameters listed above, WSU monitors its sources for levels of several compounds that can impact the aesthetic quality of water. These SMCLs are not enforceable in terms of providing safe drinking water; rather, the SMCLs address aesthetic characteristics.

The water quality analysis reports in Appendix G-1 show that Well 6 and Well 7 exceeded the SMCL for iron (0.3 mg/L). Well 6 and Well 8 exceeded the SMCL for manganese while Well 7 had a concentration of manganese equal to the SMCL (0.05 mg/L). WSU also voluntarily monitors selected sources for aluminum and total dissolved solids (WAC 246-290-300 requires total dissolved solids monitoring only if specific conductivity exceeds 700.00 µmhos/cm).

6.2.4 Source Water Protection

The SDWA (Section 1428) established a Wellhead Protection Program (WHPP) to protect groundwaters that contribute to public water systems. DOH has expanded those Federal source protection regulations to include all Group A community and non-community water systems, including groundwater, GUI (groundwater under the influence), and filtered and non-filtered surface water sources. Accordingly, DOH has developed regulations that require all

Group A water systems that maintain and operate their own sources to implement a WHPP (WAC 246-290-135(3)). WSU's Wellhead Protection Program is contained in Appendix F-1.

Source water protection programs are planning tools to be used by water utilities to identify potential sources of water contamination, and to protect existing and future drinking water supplies. WSU has prepared and implemented a WHPP for its groundwater sources. The objective is to minimize risk of accidental releases of contaminants in areas contributing water to the public water supply system. The three basic elements of a source water protection plan are:

- Definition of the area, either a Wellhead Protection Area (WHPA) or a watershed, that directly contributes to a water supply. A WHPA is defined as an area contributing to a source within a specified amount of time.
- Inventory of land uses to identify potential sources of contamination within the WHPA or watershed.
- Management strategies including emergency spill response and contingency plans to minimize or eliminate the possibility of potential contamination of the water supply.

The depth and structure of the aquifers from which WSU draws its water present more issues of water quantity and sustainable pumping than quality. However, wellhead protection is not only required by law, but also an important step in assuring the continued quality of water at WSU.

WSU will be conducting the following activities during the next 6-year period for updating and maintaining the Wellhead Protection Plan:

- Update the Contaminant Inventory every 2-years.
- Updating the Inventory of Potential Contamination Sources.
- Continuing education of the public through targeted communications such as postings on WSU's website.
- Updating contingency plans for providing potable water in the event that contamination results in the temporary or permanent loss of any of the principle source of supply.

6.2.5 Total Coliform

WAC 246-290-300 coliform monitoring requirements are in conformance with the federal Total Coliform Rule (TCR) and are based upon a presence or absence of coliforms in a given distribution system sample. The rule was revised in February 2013 to provide greater health protection and WSU is in conformance with the revised rule. The population served determines the total monthly monitoring requirements for coliforms. WSU performs coliform monitoring as outlined in its Coliform Monitoring Plan, presented in Appendix G-2. In the past five years WSU has not had any confirmed coliform samples.

6.2.6 Lead and Copper

WSUs Lead and Copper monitoring plan, consumer notifications and results of testing are included in Appendix G-14. WSU is required to take 30 samples every 3 years as part of this monitoring plan. The action level for lead is 15 ppb and copper is 1,300 ppb. The maximum contaminant level goal for lead is zero.

The Lead and Copper Rule (LCR) requires that public water systems conduct lead and copper monitoring to determine if appropriate corrosion control treatment is implemented as measured by lead and copper levels at customer taps. The LCR monitoring determines corrosion control based on an action level for lead (0.015 mg/L) and copper (1.3 mg/L) as measured at the 90th

percentile. The LCR sets out required actions for systems exceeding the 90th percentile action limits. WSU meets the action levels for lead and copper.

The EPA initiated a review of the LCR (Lead & Copper Rule) implementation across the nation in 2004. This effort was focused on determining if national lead levels are increasing in the US. As a result of this effort, the EPA identified a series of areas in which changing the regulation would be beneficial. In 2007, the EPA adopted the revised the LCR to enhance monitoring, treatment, customer awareness, lead service line replacement, and compliance with the rule. Table 6-1 lists the areas that were revised, according to the EPA in October 2007.

Table 6-1
Areas of LCR Revision

Activity	Proposed Rule Revision	Revision Objective
Monitoring	Clarify language that speaks to the number of samples required.	To address confusion about sample collection.
	Clarify language regarding the number of locations from which samples should be collected.	To address confusion about sample collection.
	Modify definitions for a monitoring period and compliance period.	To address inconsistencies between guidance and regulations.
	Modify language to make it clear that all samples must be taken within the same calendar year.	To ensure that samples collected reflect effectiveness of corrosion control.
	Modify language to reconsider allowing large systems above the action level to reduce tap monitoring based solely on the results of their water quality parameter monitoring.	To ensure that systems over the action level maintain a sense of the degree of exposure in the community.
Treatment	Modify language to require that a public water system to provide advance notification and gain approval for treatment changes rather than 60 days after a change.	To allow states an opportunity to approve the utility's decision or required additional monitoring prior to a change in treatment that could affect corrosion control.
Public Relations	Add language to require that utilities provide occupant notification of the results of monitoring.	To increase awareness for homeowners who participate in tap monitoring programs and parents, students, and staff at schools that are required to monitor for lead in drinking water.
Lead Service Line Replacement	Revise language to require that any line previously deemed to be replaced through testing be reevaluated in the event that a subsequent treatment change causes the system to exceed the action level.	To ensure that service lines that test below the action level are not considered permanently "replaced" and removed from the utility's inventory, but are instead retested after any major changes to treatment which could affect corrosion control.

Source: USEPA 2015.

6.2.7 Consumer Confidence Report (CCR) & Public Notification Rule (PNR)

Under the CCR Rule promulgated in 1998, community water systems are required to provide an annual CCR on the quality of their drinking water and levels of detected contaminants, if any. The annual report must be supplied to all customers and must include:

- Information on the source of drinking water
- A brief definition of terms
- If regulated contaminants are detected, the maximum contaminant level goal (MCLG) the MCL, and the level detected
- If an MCL is violated, information on health effects
- If EPA requires it, information on levels of unregulated contaminants

While the CCR addresses annual "state-of-the-water" reports, the Public Notification Rule (PNR) directs utilities in notifying customers of acute violations when they occur.

The PNR was revised in May 2000 and outlines public notification requirements for violations of MCLs, treatment techniques, testing procedures, monitoring requirements, and violations of a variance or exemption. If violations have the potential for "serious adverse effect," consumers and the State must be notified within 24 hours of the violation. The notice must explain the violation, potential health effects, corrective actions, and whether consumers need to use an alternate water source. Notice must be made by appropriate media or posted door-to-door. Less serious violations must be reported to consumers within 30 days, in an annual report, or by mail or direct delivery service within 1 year depending on the severity of the violation. The 2000 revisions also provide the rule Administrator the option of requiring public notification of unregulated contaminants.

WSU is in compliance with the CCR Rule. Annual CCRs have been published as required. Additionally, the 2014 Annual Drinking Water Quality Report can be found at:

http://ehs.wsu.edu/PH/documents/2014%20Report.pdf.

6.2.8 Stage 2 Disinfection/Disinfectant Byproduct Rule

The final Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR) was promulgated on January 4, 2006. The Stage 2 DBPR has been developed by the EPA to further reduce exposure to DBPs that have been linked to bladder, rectal, and colon cancers. This Rule applies to community water and non-transient, non-community water systems that serve drinking water treated with a primary or secondary disinfectant (other than UV).

Stage 1 DBPR was promulgated in December 1998 and revised in January 2001. The Stage 1 DBPR became effective in January 2002 and replaced the former Trihalomethane Rule. The Stage 1 DBPR sets Maximum Contaminant Levels (MCLs) for disinfection byproducts including Total Trihalomethane Potential (TTHMs), the sum of five haloacetic acids (HAA5), chlorite and bromate and maximum residual disinfectant levels (MRDLs) for disinfectants including chlorine, chloramine, and chlorine dioxide. It also includes monitoring, reporting and public notification requirements for these compounds and sets several Maximum Contaminant Level Goals (MCLGs) for specific DBP species.

Stage 1 monitoring completed prior to 2001 were below the MCLs. Stage 1 monitoring completed in 2006 showed levels of Total HAA5 and TTHM below the respective 60 and 80 µg/L MCLs. Monitoring in 2004 and 2005 established that WSU met the 40/30 rule regarding future monitoring and began monitoring in October 2013.

6.2.9 Groundwater Rule

EPA promulgated the groundwater rule in 2006. This rule sets disinfection requirements for all public water systems. The goal of the Groundwater Rule (GWR) is to set disinfection requirements for groundwater sources "as necessary," when the source is not under the influence of surface water. The GWR contains five regulatory elements:

- Sanitary surveys
- Hydrogeologic Sensitivity Assessments for non-disinfected systems
- Source water monitoring for sensitive, non-disinfected sources
- Corrective action or disinfection for unacceptable microbial levels, providing 4-log or 99.99 percent inactivation or removal of viruses from all groundwater systems
- Compliance monitoring to ensure treatment reliability

Washington DOH has not implemented provisions of the federal rulemaking at this time. Currently WSU is disinfecting each of their source wells and is subject to daily residual chlorine sampling at two sites as shown in Table 6-2.

Table 6-2
Daily Chlorine Testing Sites

Initial Treatment Zone (Site)	Primary Sampling Site
Low Zone	Bohler Gym
High Zone	Steffen Center

6.3 Laboratory Certification

Table 6-3 summarizes the pertinent information regarding the certified laboratories that WSU currently uses for its analytical testing.

Table 6-3
Certified Laboratories Used for Analytical Testing

Name	Street	City	State	Zip	Contact Name	Phone	Fax	Active
Washington State Public Health Laboratory	1610 NE 150th St.	Shoreline	WA	98155	X	(206) 361-2896	(206) 361-2899	Yes
Anatek Labs Inc.	1282 Alturas	Moscow	ID	83834	John Coddington	(208) 883-2839	(208) 882-2946	Yes
Center for Laboratory Sciences	2710 North 20th Avenue	Pasco	WA	99301	Melanie Myers	(509) 545-4989	(509) 544-6010	Yes

6.4 Summary of Regulatory Status by Source

Review of water quality data from 2008 through 2014 indicates that WSU has been in compliance with all effective federal and State drinking water regulations. Table 6-4 summarizes applicable regulations and WSU's compliance status.

Table 6-4
Summary of Applicable Regulations and Compliance Status

Regulation	Requirements	Status	Compliance Status
Phase I, Phase II, Phase V Regulations	• Written Plan • Monitoring • Waivers granted for asbestos, herbicides, insecticides, inorganics, and VOCs	• Monitoring conducted per DOH directed monitoring plan and waivers • Meets MCLs	Yes
Radionuclides	• Monitoring	• Monitors • Meets MCLs	Yes
Source Water Protection Program	• Wellhead Protection Plan	• Approved plan	Yes
Groundwater Rule	• Sanitary Survey • Monitoring and Corrective Action	• Sanitary Survey • Meets monitoring requirements	Yes
Total Coliform Rule	• Written Plan • Monitoring	• Monitors throughout distribution system • Meets monitoring requirements • Approved plan	Yes
Stage 2 Disinfection/Disinfectant Byproducts	• IDSE Report • Increased Monitoring	• Approved IDSE • Meets monitoring requirements	Yes
Lead and Copper Rule	• Monitoring	• Monitors	Yes
CCR and Public Notification Rules	• Annual Reports • Reporting as needed	• Consumer Confidence Reports published annually	Yes

6.5 Summary of Monitoring Requirements and Plans

Currently, WSU is required to conduct source water monitoring at all the wells. The table following this page provides the water quality source monitoring requirements for WSU. The table includes the parameters to be monitored, sampling location, and frequency. The table is intended to be a guide; detailed requirements are available in WAC 246-290 and by contacting DOH.

Table 6-5 Monitoring Requirements			
Test	Frequency	Last Sample	Next Sample
Bacteriological	25 monthly (except June/ July – 10)	Monthly	Monthly
Chlorine Residuals	Daily – 2 locations Monthly – 25 Locations except June/July – 10)	Daily	Daily
Nitrates	Yearly	2015	2016
Inorganic Chemical (IOC)	Each well, 3 years	2015	2016
Disinfection Byproducts Phase II	Annual	2015	2016
Asbestos	9 years	Waiver	
Volatile Organic Chemical (VOC)	Each well, 3 years	2014	2016
Lead Copper	30 every 3 year cycle	2015	2018
Synthetic Organic Chemical (SOC)	Each well, 3 years	2012	2016
UCMR 3		2015	
Radionuclides		2015	2020

Washington State Department of Health
Environmental Public Health
Office of Drinking Water

Water Quality Monitoring Schedule

System: WASHINGTON STATE UNIVERSITY
Contact: Gregory M Streva

PWS ID: 93200 Q
Group: A - Comm

Region: EASTERN
County: WHITMAN

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016
Coliform Monitoring Population	21879	21879	13981	13981	22906	22906	22906	22906	22906	21879	21879	21879
Number of Routine Samples Required	25	25	15	15	25	25	25	25	25	25	25	25

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- Collect no less than 5 routine samples in the month following one or more unsatisfactory samples, in accordance with your system's Coliform Monitoring Plan.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Lead and Copper	30	Jan 2013 - Dec 2015	standard - 3 year	08/08/2012	***Aug 2015***
Total Trihalomethane (THM)	2	Jan 2015 - Dec 2015	reduced - 1 year	08/01/2014	***Jul 2015***
Halo-Acetic Acids (HAA5)	2	Jan 2015 - Dec 2015	reduced - 1 year	08/01/2014	***Jul 2015***

Notes on Distribution System Chemical Monitoring

For *Lead and Copper:*
- Collect samples from indoor faucets after the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours.
- Flush sample faucets with cold water the evening prior to collecting the sample.
- If your sampling frequency is annual or once every 3 years, collect samples between June 1 and September 30.

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels or analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- If "R&C" is listed in a monitoring requirement's frequency, the requirements are based on detections which are reliably and consistently below the health standard.

Source S04 — Power Plant Well #4 - AEH240 — Well — Use - Permanent — Susceptility - Moderate

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2015 - Dec 2015	standard - 1 year	10/31/2014	***Oct 2015***
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	05/12/2009	May 2018
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	10/31/2014	
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	05/12/2009	May 2018
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	05/12/2009	
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year	08/19/1998	
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	10/13/2009	***Oct 2015***
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	10/13/2009	***Oct 2015***

Source S06 — Coliseum Well #6 - AGG329 — Well — Use - Permanent — Susceptility - Low

Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2015 - Dec 2015	standard - 1 year	10/31/2014	***Oct 2015***
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	05/03/2007	May 2016
Iron	1	Jan 2014 - Dec 2016	standard - 3 year	06/03/2010	***May 2015***
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	05/24/2012	May 2018
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	05/12/2009	May 2018
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	05/12/2009	
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year	08/04/2000	
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	05/12/2009	***May 2015***

Source S06	Coliseum Well #6 - AGG329	Well	Use - Permanent	Susceptility - Low	
Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/24/2012	**May 2015**

Source S08	Well #7 - AGG328	Well	Use - Permanent	Susceptility - Low	
Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2015 - Dec 2015	standard - 1 year	10/31/2014	**Oct 2015**
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	05/24/2012	
Iron	1	Jan 2014 - Dec 2016	standard - 3 year	05/24/2012	**May 2015**
Manganese	1	Jan 2014 - Dec 2016	standard - 3 year	05/24/2012	**May 2015**
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	05/24/2012	May 2018
Herbicides	1	Jan 2014 - Dec 2022	waiver - 9 year	05/12/2009	May 2018
Pesticides	0	Jan 2014 - Dec 2016	waiver - 3 year	05/12/2009	
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year	07/23/2002	
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	05/12/2009	**May 2015**
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/12/2009	**May 2015**

Source S09	Well #8	Well	Use - Permanent	Susceptility - Low	
Test Panel/Analyte	# Samples Required	Compliance Period	Frequency	Last Sample Date	Next Sample Due
Nitrate	1	Jan 2015 - Dec 2015	standard - 1 year	10/31/2014	**Oct 2015**
Complete Inorganic (IOC)	1	Jan 2011 - Dec 2019	waiver - 9 year	06/02/2009	Jun 2018
Volatile Organics (VOC)	1	Jan 2014 - Dec 2019	waiver - 6 year	06/03/2010	Jun 2016
Herbicides	1	Jan 2014 - Dec 2016	standard - 3 year	05/24/2012	Mar 2016
Herbicides	1	Jan 2014 - Dec 2016	standard - 3 year	05/24/2012	Jun 2017
Pesticides	1	Jan 2014 - Dec 2016	standard - 3 year	08/14/2003	Mar 2016
Pesticides	1	Jan 2014 - Dec 2016	standard - 3 year	08/14/2003	Jun 2017
Soil Fumigants	0	Jan 2014 - Dec 2016	waiver - 3 year	08/14/2003	
Gross alpha	1	Jan 2014 - Dec 2019	standard - 6 year	07/28/2009	**Jul 2015**
Radium 228	1	Jan 2014 - Dec 2019	standard - 6 year	05/24/2012	**Jul 2015**

Other Information

Other Reporting Schedules	Due Date
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2015
Submit CCR certification form to ODW (Community systems only):	10/01/2015
Submit Water Use Efficiency report online to ODW (Community and other municipal water systems only):	07/01/2015
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after end of monitoring period

Special Notes

None

Eastern Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Stan Hoffman: (509) 329-2132: or Stan.Hoffman@doh.wa.gov
For questions regarding DBPs:	Russell Mau, p.e.: (509) 329-2116 or russell.mau@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Mark Steward: (509) 329-2134 or Mark.Steward@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

7.0 Operation and Maintenance Program

7.1 Water System Management and Personnel

Management, operation and maintenance of the WSU water system are controlled at several levels throughout the different departments. The Water Board, comprised of staff from Facilities Operations, Environmental Health and Safety (EH&S), Housing and Dining Services, Capital Planning and Development, and Regional Campus and Research Unit (RCRU) representatives, has the ultimate authority and responsibility for all WSU water systems and facilities located around the state to meet all applicable regulations. The Water Board is also responsible for planning, constructing and repairing, operating, sampling, maintaining, and protecting WSU's public drinking water systems and water supply connections throughout the state to meet the requirements in WAC 246-290 through WAC 246-296, WAC 173-160 and WAC 51-56. Gene Patterson of Environmental Health and Safety is the primary point of contact and has central responsibility of all aspects of environmental health issues relating to the water system. Facilities Operations is the department responsible for general management of the system. The water system facilities are the responsibility of Facilities Operations Utilities Services Manager Steve Potratz. Mr. Potratz directly supervises operation and maintenance of the system. See Exhibits 7-1 through 7-3 and Appendix G-11 for organizational charts showing the different departments that contribute to the administration of the water system. Table 7-1 summarizes the responsible individuals and their respective duties.

7.2 Operator Certification

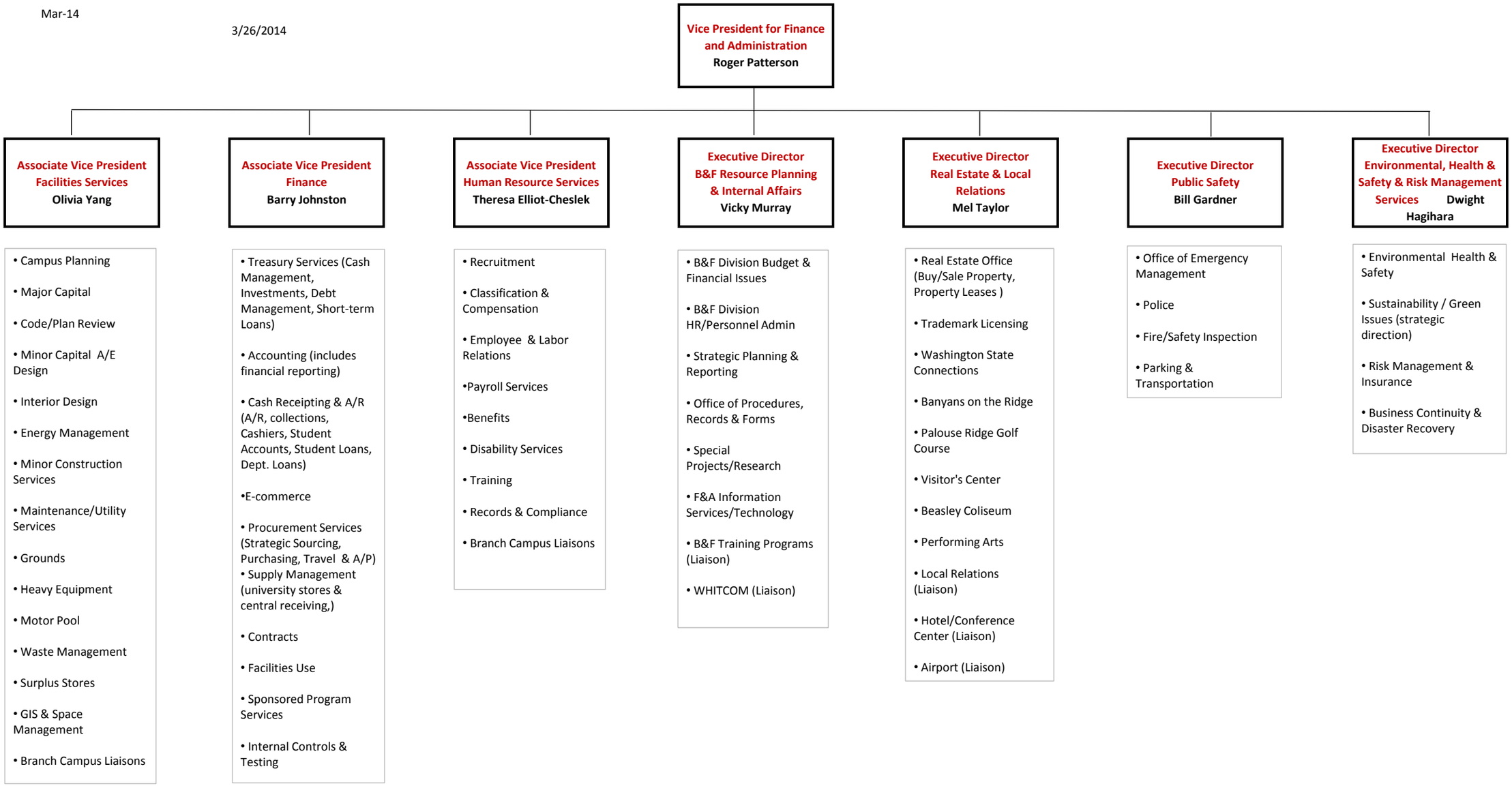
In compliance with WAC 246-292-050, WSU retains one certified Water Distribution Manager on site. There are also two BAT certified individuals dedicated for backflow device testing in conformance with the University's cross-connection control program and one cross connection control specialist. These individuals obtain certification renewal by attending education seminars sponsored by AWWA and DOH and by completing professional growth examinations as required by the WAC. See Table 7-1 for a listing of these personnel.

7.3 System Operation and Control

The telemetry system was brought online in the fall of 2001. This system operates the pumping and subsequent distribution of water in both the high and low pressure zones. A schematic of the water distribution system is illustrated in Exhibit 7-4.

Mar-14

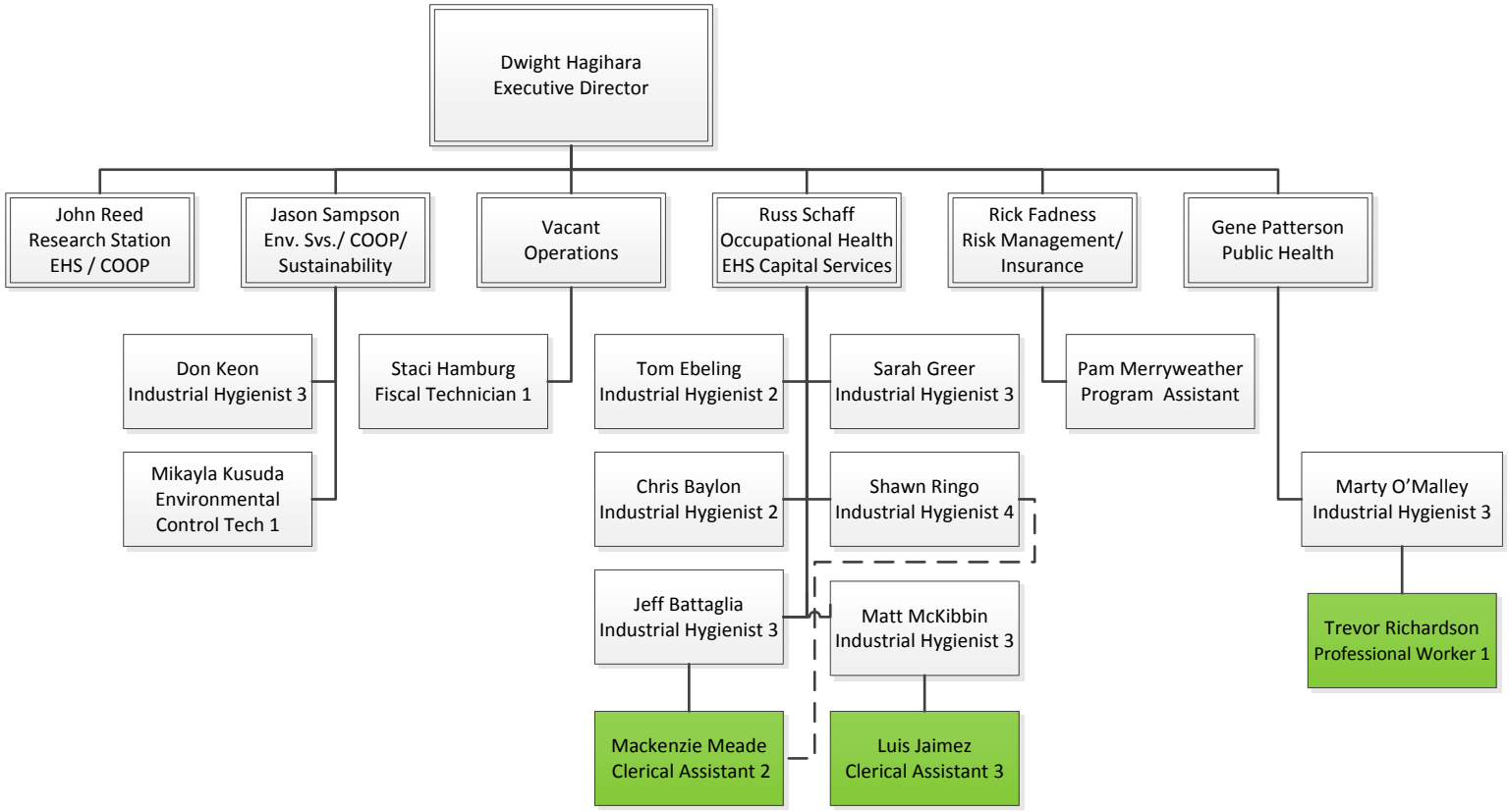
3/26/2014



Environmental Health Safety, Risk Management, Continuity of Operations Planning, Sustainability Services

Washington State University

December 2014



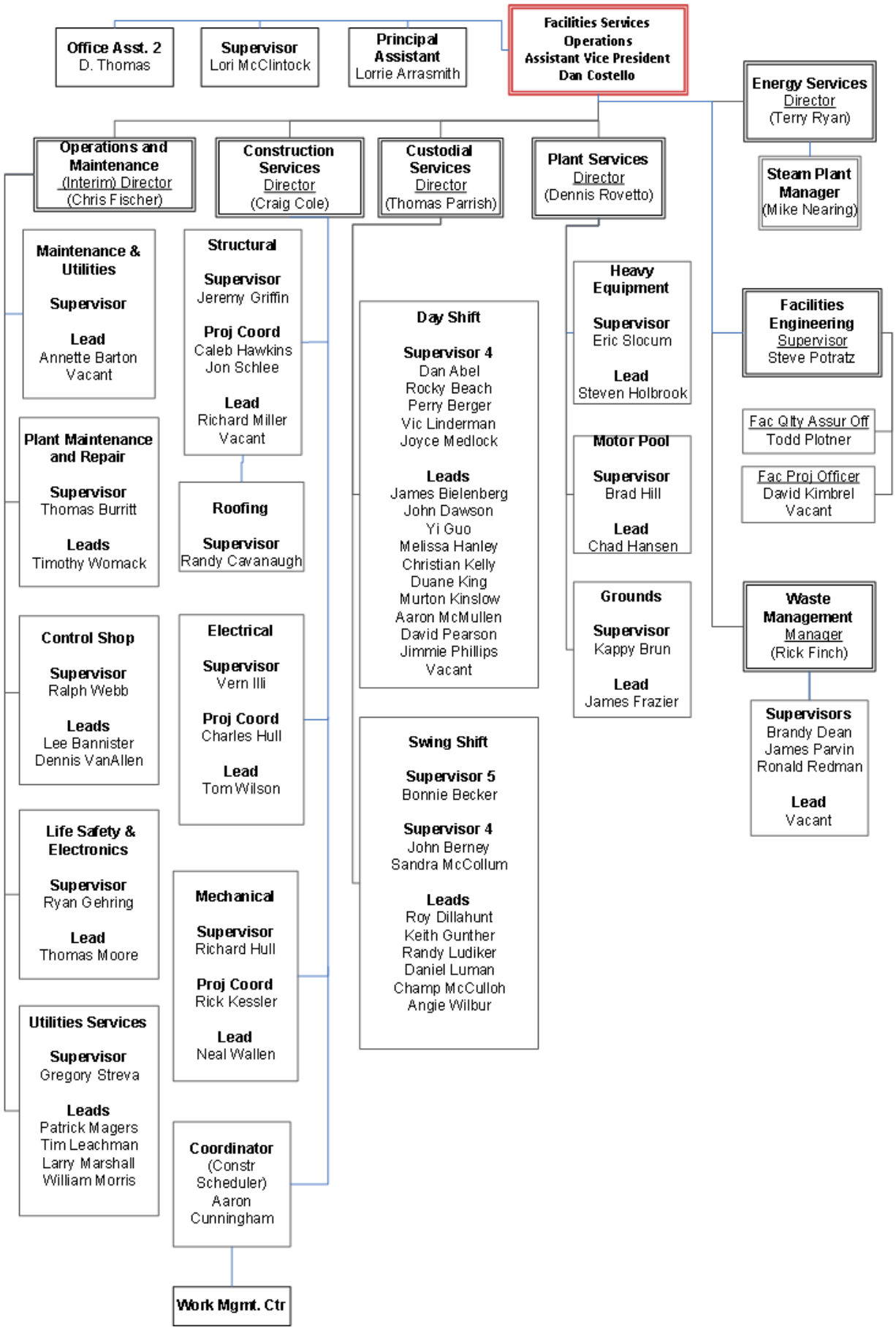

Office Asst. 2
D. Thomas
Supervisor
Lori McClintock
Principal Assistant
Lorrie Arrasmith
Facilities Services Operations Assistant Vice President
Dan Costello
Energy Services
Director
(Terry Ryan)
Steam Plant Manager
(Mike Nearing)
Operations and Maintenance
(Interim) Director
(Chris Fischer)
Construction Services
Director
(Craig Cole)
Custodial Services
Director
(Thomas Parrish)
Plant Services
Director
(Dennis Rovetto)
Maintenance & Utilities
Supervisor
Lead
Annette Barton
Vacant
Plant Maintenance and Repair
Supervisor
Thomas Burritt
Leads
Timothy Womack
Control Shop
Supervisor
Ralph Webb
Leads
Lee Bannister
Dennis VanAllen
Life Safety & Electronics
Supervisor
Ryan Gehring
Lead
Thomas Moore
Utilities Services
Supervisor
Gregory Streva
Leads
Patrick Magers
Tim Leachman
Larry Marshall
William Morris
Structural
Supervisor
Jeremy Griffin
Proj Coord
Caleb Hawkins
Jon Schlee
Lead
Richard Miller
Vacant
Roofing
Supervisor
Randy Cavanaugh
Electrical
Supervisor
Vern Illi
Proj Coord
Charles Hull
Lead
Tom Wilson
Mechanical
Supervisor
Richard Hull
Proj Coord
Rick Kessler
Lead
Neal Wallen
Coordinator
(Constr Scheduler)
Aaron Cunningham
Work Mgmt. Ctr
Day Shift
Supervisor 4
Dan Abel
Rocky Beach
Perry Berger
Vic Linderman
Joyce Medlock
Leads
James Bielenberg
John Dawson
Yi Guo
Melissa Hanley
Christian Kelly
Duane King
Murton Kinslow
Aaron McMullen
David Pearson
Jimmie Phillips
Vacant
Swing Shift
Supervisor 5
Bonnie Becker
Supervisor 4
John Berney
Sandra McCollum
Leads
Roy Dillahunt
Keith Gunther
Randy Ludiker
Daniel Luman
Champ McCulloh
Angie Wilbur
Heavy Equipment
Supervisor
Eric Slocum
Lead
Steven Holbrook
Motor Pool
Supervisor
Brad Hill
Lead
Chad Hansen
Grounds
Supervisor
Kappy Brun
Lead
James Frazier
Facilities Engineering
Supervisor
Steve Potratz
Fac Qlty Assur Off
Todd Plotner
Fac Proj Officer
David Kimbrel
Vacant
Waste Management
Manager
(Rick Finch)
Supervisors
Brandy Dean
James Parvin
Ronald Redman
Lead
Vacant

Table 7-1 WSU Water System Responsible Officials				
Title	**Name**	**Telephone Number**	**Certification**	**Responsibilities**
WSU Water Board	Dan Costello, Dwight Hagihara	(509) 335-9325 (509) 335-3051	N/A	Chairs of the Board
Manager Public Health/Air and Water Quality, Environmental Health & Safety	Gene Patterson	(509) 335-3041	Registered Sanitarian, #295	Central responsibility for environmental health aspects of water system. Primary point of contact with DOH.
Maintenance and Utilities Director, Utilities Services	Chris Fischer	(509) 335-9038	N/A	Maintenance and operations of water system outside of buildings (includes wells, pump stations, distribution and storage facilities).
	Greg Streva	(509) 335-9040	*Water Distribution Manager 3, #012610	Response to emergency repairs and maintenance of water distribution lines.
Utilities Services Supervisor Facilities	Greg Streva	(509) 335-9345	*Cross-Connection Control Specialist, Water Distribution Manager 3	
Life Safety Specialist, FOM Facilities Operations	Todd Leisinger John Baldwin Robert Brooks Larry Marshall Todd Komp Jim Antoine	(509) 335-9000	*B.A.T. *B.A.T. *B.A.T. *B.A.T. *B.A.T. *B.A.T.	Annual testing and repair of backflow prevention facilities, annual flushing program, and 5-year preventative maintenance cycle on system hydrants.
Plumber/Pipefitter/ Steamfitter Lead Facilities Operations	Larry Marshall	(509) 335-9336	- C.C.S Certificate Plumbers License - WWT Op.	Certified cross-connection control specialist. Response to emergency repairs and maintenance of water distribution.
Engineering Manager Facilities Operations	Steven Potratz	(509) 335-9300	P.E. WA Ref#37078	Provide technical support for water system operation and maintenance activities.

*Indicates required certification either by WAC or by WAC specified program documented by WSU.

NOTES:
(1) INITIAL PUMPING RATE
(2) CURRENT PUMPING RATE

ELEVATED OBSERVATORY HILL TANK (HIGH)
0.1 M.G.
OVERFLOW EL 2711.5
60'-0"

NORTH FAIRWAY TANK (HIGH)
2.0 M.G.

OBSERVATORY HILL RESERVOIRS (LOW)
2.0 M.G.
2.0 M.G.
OVERFLOW EL 2651.5

AUTOMATIC CROSSOVER VALVE (NORMALLY CLOSED)

ALTITUDE VALVE STATION

WELL NO. 2 (LOW)
DECOMMISSIONED
500 GPM (1)

OBSERVATORY HILL TRANSFER PUMP STATION
1000 GPM

WELL NO. 5 (HIGH)
INACTIVE-CURRENTLY USED AS MONITORING WELL

EMERGENCY CONNECTION WITH CITY SYSTEM (CLOSED)
(2 LOCATIONS)

LOW DISTRIBUTION SYSTEM

HIGH DISTRIBUTION SYSTEM

EMERGENCY CROSSOVER CONNECTION (CLOSED)
(10 LOCATIONS)

EMERGENCY CONNECTION WITH CITY SYSTEM (CLOSED)
(2 LOCATIONS)

WELL NO. 3 (LOW)
INACTIVE
BROKEN SHAFT
1000 GPM (1)
1100 GPM (2)

WELL NO. 4 (LOW)
ACTIVE
1500 GPM (1)(2)

WELL NO. 1 (LOW)
INACTIVE
500 GPM (1)
417 GPM (2)

WELL NO. 7 (LOW)
ACTIVE
2500 GPM (1)(2)

WELL NO. 6 (HIGH)
ACTIVE
1500 GPM (1)
1000 GPM (2)

WELL NO. 8 (HIGH)
ACTIVE
2500 GPM (1)(2)

DRAWN BY: AJT
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2015 WATER SYSTEM PLAN UPDATE

DOMESTIC WATER SYSTEM

EXHIBIT 7-4

7.3.1 Routine Operations Low & High Zones

All three water sources (Wells No. 6,7 & 8) are automatically turned on and off by the water surface level in the reservoirs in their respective zones (Well No. 4 is manually controlled). The wells are controlled by the CTU (Central Terminal Unit) in the Facility Operations McCluskey operations center via a signal through the CCMS (central control monitoring system) network from the reservoirs. The existing water rights do not allow the instantaneous withdrawal of over 5,000 gpm so the CTU will not allow the operation of any additional wells if Wells No. 7 & 8 are already running. Well No. 3 is manually operated when needed (Well No. 3 currently has a broken shaft and has not operated since April of 2000). Detailed operation procedures have been developed and are available in the Emergency Response Manual and in the Dispatches Response Manual at Facility Operations. Due to safety considerations, WSU has requested that this detailed information be excluded from this document and not be available to the public.

7.3.2 Preventive & Operational Maintenance

Tables 7-2 and 7-3 list some of the preventative and operational (routine) maintenance procedures for the WSU water system:

Table 7-2
WSU Preventative Maintenance

Activity	Frequency
Back flow prevention devices	Annual
Fire hydrant flushing	As needed
Fire hydrant maintenance	5 years
Hydrant flow capacity	6 years
Routine pump maintenance	Annual
Overall primary well pumps	10 years (approximate only)
Paint steel reservoirs	every 25 years or as needed

Table 7-3
WSU Routine Maintenance

Activity	Frequency
Security of all facilities	Continuous*
Source meter calibration check	2 years
Chlorinator maintenance	Daily
Flow data collection (source & use)	Monthly
Well down-hole water surface data	Monthly
Replace Service Meters	
< 2”	15 years
≥ 2”	10 years
Reservoir hatches, vent and overflows	Yearly
Sweep out well houses	Weekly
Well drive shaft lube	Daily

* see vulnerability survey

7.4 Comprehensive Monitoring Plan

The WSU Environmental Health and Safety (EH&S) division is responsible for monitoring the University drinking water quality. Marty O'Malley is the primary individual in charge of sample collection and coordination of the testing. The overall sampling requirements for the campus are summarized in Table 6-6.

A copy of the most recent result for each of the analyses listed in the table above is included in Appendix G-1. The coliform monitoring plan identifies all the sampling locations as well as the acceptable repeat locations upstream and downstream. The current plan includes a monthly schedule of sample sites for the year 2015. A copy of the coliform monitoring plan is included in Appendix G-2.

7.5 Emergency Response Program & Service Reliability

7.5.1 Emergency Response

The Utility Service branch is generally responsible for emergency response to infrastructure problems. Depending on the size and nature of the repair required, work may be performed by staff personnel or contracted out. Personnel would usually handle minor repairs such as a damaged fire hydrant or smaller service main breaks whereas larger items, such as a ruptured 12" service main, could be contracted. The final decision is evaluated on a case-by-case basis. The flowchart in Exhibit 7-5 shows how the relay of information would take place depending on circumstances. For after hour problems a Facility Operation Maintenance Specialists (FOMS) is listed as key contact thru the dispatch center. A FOMS is always on duty at the campus after normal business hours.

Wells No. 1, 3 & 5 are considered emergency sources. Wells No. 1 and No. 3 are not useable at this time due to insufficient water levels and the pump in Well No. 3 has a broken shaft. Well No. 5 has not been used since January 1978 and is now used as a monitoring well. There is a buried hazardous waste site near this well. Although tests have not indicated any contamination exceeding accepted standards, this well is not currently used unless needed for a dire emergency. If needed during an emergency, Wells No. 1 & 3 could be brought on-line through notification to DOH of intent to use, including submittal of water quality testing results. The broken shaft in Well No. 3 would have to be replaced with an appropriate pumping column. The campus wide email system as well as the two local newspapers, the Daily Evergreen and the Moscow-Pullman Daily News, would be used as the public medium to communicate the intent to use these wells. Once approval is granted from DOH, these two wells could be put into use (due to Well No. 5's current use as a monitoring well, it would not be used unless there is a dire emergency). Due to the complexity of the above described process, the minimum time between decision to bring on-line and actual use would be at least 90 days.

WSU Emergency Response Flow Chart

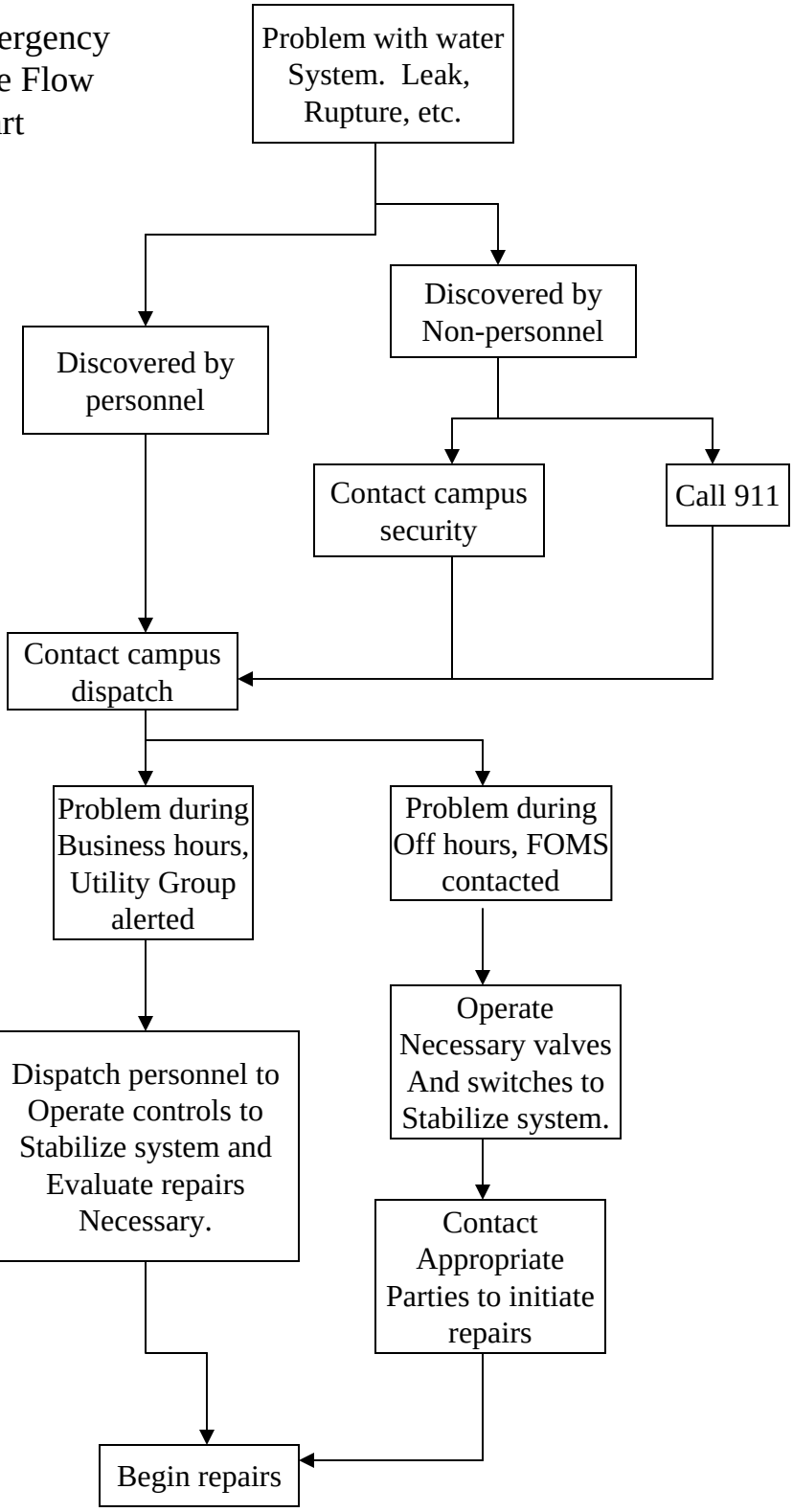


Exhibit 7-5

7.5.2 Notification

The EH&S division is responsible for communication and notification with regard to water quality emergencies such as coliform violations. Gene Patterson or Marty O'Malley would be in charge of the coordination effort. As indicated on the EH&S website (http://www.ehs.wsu.edu/) these individuals can be reached during the day at: (509) 335-3041 and through WHITCOM (911) or the University dispatch during off hours at (509) 335-9000. The campus wide email system as well as the two local newspapers, the Daily Evergreen and the Moscow-Pullman Daily News, would be used as the medium to communicate "boil water" notifications or similar DOH required orders. The following are procedures related to detection of contaminants:

Bacteriological Presence Detection Procedure:

Notification procedures for informing water systems users, the local health department, and DOH of water quality emergencies are an important component of an emergency response program. All public water systems will occasionally detect positive coliform samples, mainly as a result of minor contamination in distribution mains or sample taps, or improper bacteriological sampling procedures. However, the persistent detection of coliforms in the water supply, particularly E. coli or fecal bacteria, may require issuing a public boil water notice to ensure the health and safety of the users. Emergencies such as floods, earthquakes, or other disasters can affect water quality as a result of damage to water system facilities. WAC 246-290-320 requires water utilities to follow specific procedures in the event coliform bacteria are detected in the water system. These procedures are outlined in Exhibit 7-6. In addition to the requirements shown in Exhibit 7-6, WSU is required to submit three (3) repeat samples the month following coliform detection.

VOC/SOC and Inorganic Chemical/Physical Characteristics Detection Procedures:

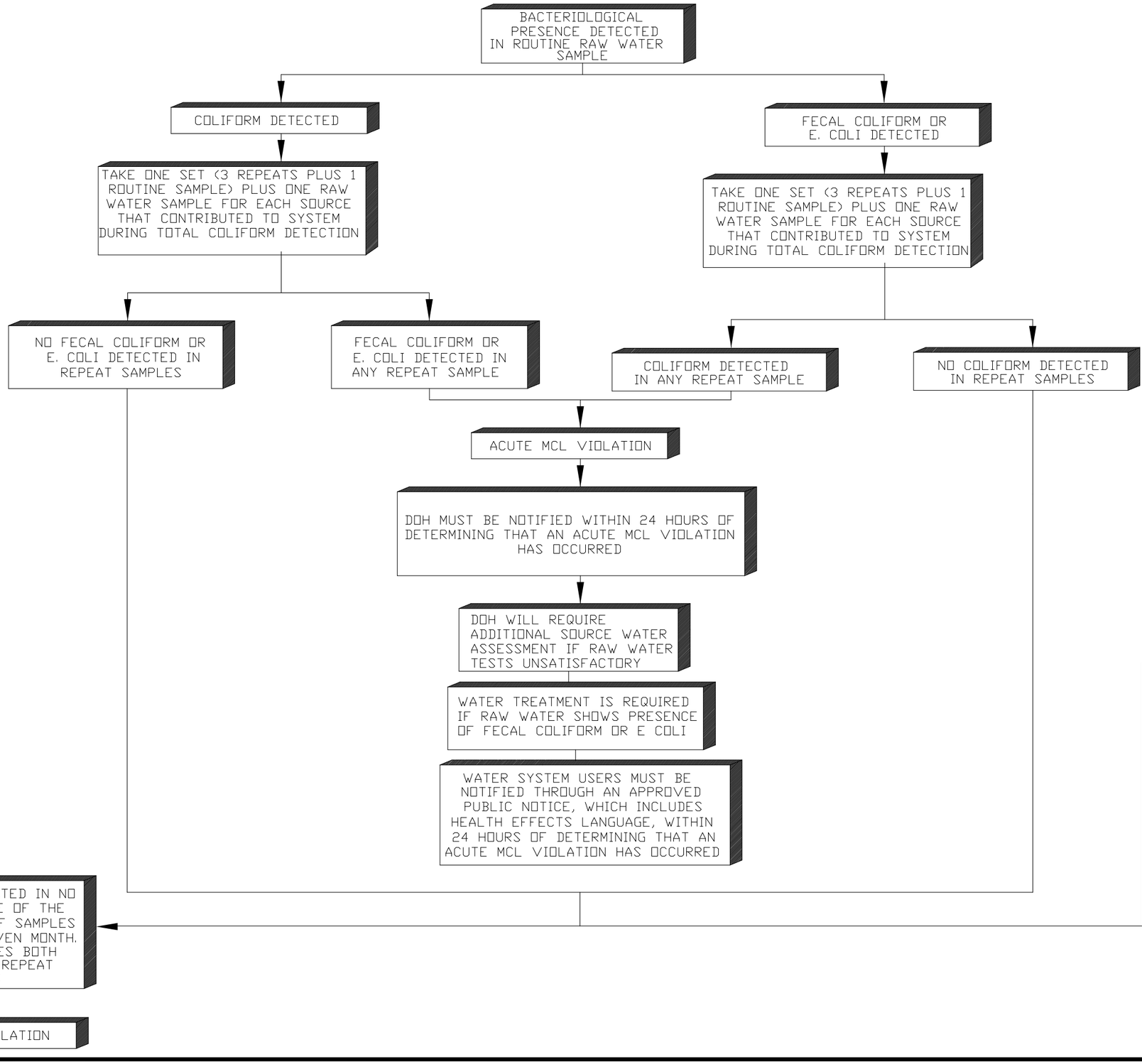
A procedure to comply with DOH requirements in the event of a volatile organic chemical or synthetic organic chemical procedure is presented in Exhibit 7-7. A procedure for an inorganic chemical/physical characteristic detection is presented in Exhibit 7-8.

7.5.3 Vulnerability

An EPA mandated vulnerability assessment was completed in 2004 by WSU. This assessment is on file and can be reviewed. Due to safety considerations, detailed vulnerability information is omitted from this document.

7.5.4 Contingency Plans

Contingency operation plans have been developed and are available in the Emergency Response Manual and in the Dispatches Response Manual at Facility Operations. At the request of WSU, this detailed information has been excluded from this document and is not available to the public.



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2015 WATER SYSTEM PLAN UPDATE

BACTERIOLOGICAL PRESENCE DETECTION PROCEDURE

EXHIBIT 7-6

VOC / SOC CONTAMINANT DETECTED IN SOURCE SUPPLY

REGULATED CONTAMINANT

COLLECT CONFIRMATION SAMPLE(S)

AVERAGE OF FIRST SAMPLE RESULT AND CONFIRMATION SAMPLE(S) RESULT ≥ MCL

REPORT VIOLATION TO DOH WITHIN 48 HOURS. WAC 246-290-320,-480

DOH DETERMINES VIOLATION POSES ACUTE HEALTH EFFECT(S)

DOH DETERMINES VIOLATION DOESN'T POSE ACUTE HEALTH EFFECT(S).

PURVEYOR PROVIDES NEWSPAPER OR MAILING NOTICE TO ALL WATER CUSTOMERS WITHIN 30 DAYS OF THE VIOLATION WAC 246-290-7100(1)-(7)

AWAIT DOH DECISION ON RETURNING SOURCE TO SERVICE

- COMPLIANCE AGREEMENT WITH DOH,
- SOURCE TREATMENT OR LIST OF ALTERNATIVES TO ELIMNATE MCL,
- QUARTERLY MONITORING UNTIL MCL RESOLVED

AVERAGE OF FIRST SAMPLE RESULT AND CONFIRMATION SAMPLE(S) RESULT < MCL

REPORT DETECTION TO DOH WITHIN 48 HOURS

AWAIT DOH DECISION ON RETURNING SOURCE TO SERVICE

- COMPLIANCE AGREEMENT WITH DOH,
- SOURCE TREATMENT OR LIST OF ALTERNATIVES TO ELIMNATE MCL,
- QUARTERLY MONITORING UNTIL MCL RESOLVED

UNREGULATED CONTAMINANT

COLLECT CONFIRMATION SAMPLE(S)

SAMPLE QUARTERLY FOR ONE YEAR, THEN ANNUALLY THEREAFTER IN QUARTER WITH HIGHEST LEVEL

PROPOSED AS MCL?

YES

NO

DOH CONTACTED: HEALTH ADVISORY REQUESTED

HEALTH ADVISORY COMMITTEE INFORMS CITY COUNCIL IF APPROPRIATE

DOH: Washington State Department of Health
WAC: Washington Administrative Code

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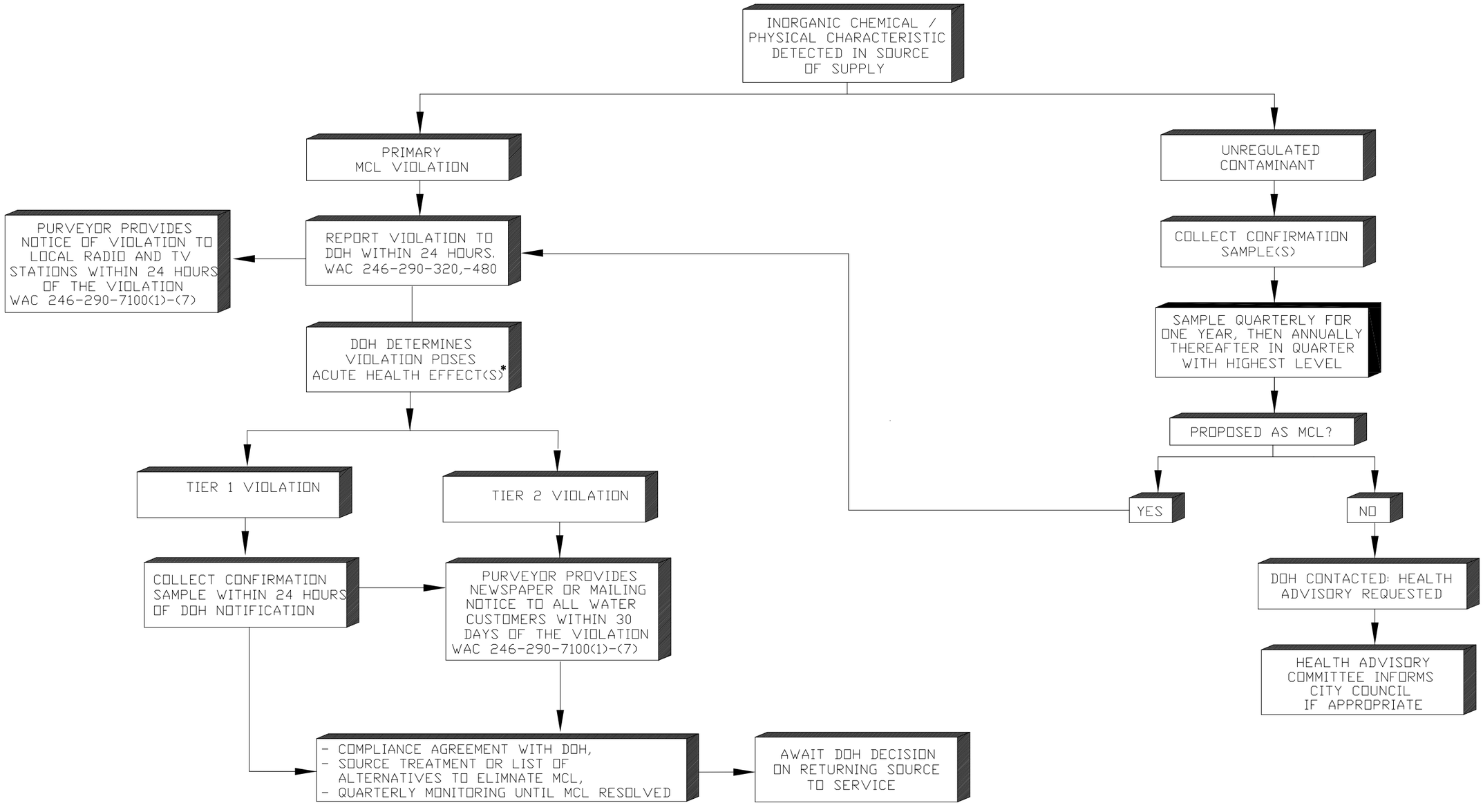
2015 WATER SYSTEM PLAN UPDATE

VOLATILE ORGANIC CHEMICAL/SYNTHETIC ORGANIC CHEMICAL DETECTION PROCEDURE

EXHIBIT 7-7



*A VIOLATION OF THE 10.0 MG/L NITRATE MCL CONSTITUTES AN ACUTE HEALTH EFFECT CONCERN (TIER 1 VIOLATION). ALL OTHERS ARE TIER 2 VIOLATIONS.
DOH: Washington State Department of Health
WAC: Washington Administrative Code

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2015 WATER SYSTEM PLAN UPDATE

INORGANIC CHEMICAL/PHYSICAL CHARACTERISTIC DETECTION PROCEDURE

EXHIBIT 7-8

7.5.5 Service Reliability

A service reliability analysis summarizes what efforts WSU has undertaken to ensure an adequate quality and quantity of water can be provided to its users at all times. The service reliability of WSU's water system is summarized by three primary categories as follows:

Source Reliability: Although the water in the Grande Ronde aquifer is declining, WSU has a very dependable water source for quality and quantity (see Section 2.3.3, *Technical Studies* under Section 4.2.1 and the Wellhead Protection Program in Appendix F-1). Due to the size and depth of the aquifer, it is almost unaffected by yearly climate variations. Additionally, due to the redundancy of withdrawal locations, there is likely to be adequate water supply for the system using other wells (see Section 7.3.1). In spite of the declining water table and considering the substantial depth of Wells No. 6, 7 & 8, there likely will be sufficient water to meet WSU's water demand forecast through the 20 year planning period (see Exhibit 2-6). Nonetheless, implementation of the conservation measures in Chapter 4 should be pursued to minimize impact on the aquifer (see Table 2-7).

Water Right Adequacy: Water right adequacy and future supply options are detailed in Chapter 5.

Facility Reliability: In Chapter 3, the existing water system facilities were analyzed (see Sections 3.3.7 thru 3.3.11) and the following item was found to be inadequate: 1) the existing distribution system to meet fire flow demands (see Table 3-16 and Chapter 9 for a listing of proposed improvements).

7.6 Safety Procedures

The Occupational Health & Safety branch of EH&S coordinates safety training and documentation for the campus on a variety of issues such as excavation, heavy equipment use, and handling of hazardous materials. All appropriate Occupational Safety and Health administration (OSHA) and Washington Industrial Safety and Health Administration (WISHA) regulations are routinely followed during operation of the water system. Maintenance and operation staff are trained in safety practices, including confined space, asbestos-handling, first-aid, fall restraint, and chlorine and fluoride safety training. All wellhouses are equipped with safety equipment, including protective clothing and eyewash baths. A Safety Polices and Procedures Manual (#S70.15) contains these and other requirements (see Appendix G-13). Specific safety considerations for the water system are provided in the following sections:

Confined Space
Some of the valves and other system components are located in vaults or other confined spaces. All water system personnel are trained in confined space safety and WSU maintains and operates the required safety equipment (blower, sniffer, tri-pod and harness) necessary to mitigate the dangers associated with confined space.

Asbestos-Handling
WSU personnel have been trained on the proper methods for repair and disposal of AC pipe in compliance with OSHA standards. General procedures for handling of AC pipe include:

- Notification of the local clean air authority in advance of work if possible.
- Use of protective garments.

- Wetting of area to be serviced throughout the maintenance to minimize dust.
- Cleaning debris off of tools with wet disposable towels.
- Placing of towels, scraps, parts, and garments into disposable bag for transportation to nearest landfill.

Fall Restraint
All of the elevated reservoirs are equipped with safety-climb structures that mitigate the threat of fall to WSU staff. WSU uses appropriate harness-type fall gear when inspecting reservoir roofs and interiors.

Chlorine Safety
The most significant hazard present with the water system is the use of chlorine gas. WSU has appropriate training and education to mitigate the potential danger of this chemical. WSU also equips each wellhouse with protective garments and eyewash baths. WSU staff have familiarized themselves with the Material Safety Data Sheet (MSDS) for this chemical and a copy is provided in Appendix G-12. Because of the hazardous nature of chlorine gas, training is required for personnel involved with changing of the cylinders. A copy of the safety procedures required for the changing of chlorine gas cylinders is included in Appendix G-3. All of WSU's wellhouses are equipped with automated chlorine sensors and ventilation systems to remove chlorine gas in the event of a leak.

7.7 Cross-Connection Control Program

A copy of the WSU Cross-Connection Control (CCC) Program is included in Appendix G-4, including the WSU Water Board's official approval letter dated May 12, 2008. This program establishes the measures necessary for the University to meet requirements of WAC 246-290-490 and DOH with regard to cross-connections. The University has designated Timothy Leachman as the Cross-Connection Control Specialists and Randy Parsons and Ed Hosley as the Backflow Prevention Assembly Testers (BATS). All three individuals have been certified for these tasks through the DOH programs. Mr. Leachman, Mr. Parsons and Mr. Hosley are responsible for review of all proposed construction for backflow prevention assembly acceptability as well as testing and maintenance of existing assemblies. The 2014 Annual Summary Report is included in Appendix G-5.

The majority of existing cross connections have been tabulated and prioritized (see Appendix G-6 for high hazard list). Due to the extensive number of cross connections that exist (see Appendix G-7 for a complete list of devices), installation of new devices and piping to address these problems is implemented on an ongoing basis. The conditions that propose the greatest risk are funded first. Currently there are MCS funds specifically earmarked for CCC repair.

7.8 Customer Complaint Response

Complaints are handled by the WSU Environmental Health and Safety Group. A compliant form example is included in Appendix G-8. These forms are filled out by EH&S when responding to a registered complaint. The following contact information is posted on the EH&S website:

REPORTING COMPLAINTS/EMERGENCIES

Refer all concerns, complaints or suspected illnesses from drinking water to EH&S so that they can be investigated promptly.

During Regular Working Hours

Contact EH&S; telephone 509-335-3041

During Off-hours for Complaints (available 24/7)

Contact the Facilities Operations dispatcher; telephone 509-335-9000

During Off-Hours for Emergencies

Dial 911

Appendix G-9 includes copies of the complaints recorded over the last 6 years showing the standard form and the information included on it (9 complaints received). This form is filled out by EH&S when responding to a complaint from the public or a possible water quality problem. The primary complaints are due to rust from pipes when there is building maintenance or from fire hydrant flushing. It is not due to the well water. WSU responds by asking the users to flush the pipes until it clears up. We also will meet with the people that are complaining and take an iron sample just to confirm that it is pipe rust and not from the wells.

The Consumer Confidence Report is published every year as is posted on the WSU EH&S web site. A copy of the 2007 report is in Appendix G-10.

7.9 Record Keeping and Reporting

Recordkeeping

Facilities Operations Energy Group shall retain records of daily source meter readings for 10 years minimum. Facilities Operations A & E department shall retain project reports, construction documents and related drawings, inspection reports and approvals for the life of the system. Facilities Operations Utilities Maintenance and/or EH&S shall retain other records of operation and analyses for 3 years minimum. EH&S and Facilities Operations Utilities Maintenance shall retain daily fluoride and chlorine test records for 3 years minimum. EH&S shall retain bacteriological sampling records for 5 years minimum. EH&S shall retain chemical sampling records for as long as the system is in operation. EH&S shall retain records of action taken to correct violations and public notifications for 3 years minimum. EH&S shall retain sanitary survey/SPI written reports, summaries or communications for 10 years minimum. Facilities Operations Utilities Maintenance shall retain: 1) cross connection control records for service connections as long as the premises

pose a hazard; 2) backflow assembly inventory information for the life of the assembly or 5 years minimum. Facilities Operations Utilities Maintenance and EH&S shall retain backflow incident records and annual summary reports for 5 years minimum.

Reporting

WSU shall report to DOH within forty-eight hours the failure to comply with any national primary drinking water regulation (including failure to comply with any monitoring requirements). For violations and situations with significant potential to have serious adverse effects on human health as a result of short term exposure, DOH must be notified as soon as possible, but no later than twenty-four hours after the violation is known.

WSU shall submit to DOH reports required by WAC 246-290-480, including tests, measurements, and analytic reports. Monthly reports are due before the tenth day of the following month, unless otherwise specified in this chapter. WSU shall submit to DOH copies of any written summaries or communications relating to the status of monitoring waivers during each monitoring cycle or as directed by DOH. Source meter readings shall be made available to DOH. WSU shall submit an annual Water Facility Inventory (WFI) form update to DOH and shall submit an updated WFI to DOH within thirty days of any change in name, category, ownership, or responsibility for management of the water system, or addition of source or storage facilities. WSU shall notify DOH of the presence of coliform in a sample, within ten days of notification by the laboratory; and fecal coliform or *E. coli* in a sample, by the end of the business day in which WSU is notified by the laboratory. If WSU is notified of the results after normal close of business, then WSU shall notify DOH before the end of the next business day. WSU shall report disinfection by-products information to DOH as specified in 40 CFR 141.134. WSU shall submit to DOH a certification that the system has complied with the public notification regulations when a public notification is required. Along with the certification, WSU shall submit a representative copy of each type of notice.

7.10 Summary of Deficiencies

A written, preventative maintenance procedure would be helpful in designating maintenance intervals for specific maintenance activities on the distribution system (including hydrants), wells, wellhouses, and reservoirs. This information could be inserted into a computer scheduling program that could automatically alert maintenance personnel of upcoming scheduled tasks. This program could also summarize activities performed so specific records are available. This record could also be sorted by specific activities.

8.0 Distribution Facilities Design and Construction Standards

8.1 Design Standards and Construction Specifications

This chapter presents WSU's Distribution Facilities Design and Construction Standards. The Design Standards have been developed to ensure that a consistent minimum level of service is maintained throughout the system and to facilitate planning, design, and construction of water system projects. Developed separately, but for use in conjunction with the Design Standards, the Construction Specifications (Standards) present a detailed description of the design and materials specifications to be observed during any water system improvement project on campus.

WSU is not seeking use of the alternative approval process for the water system. Projects will be submitted for approval to the DOH on an individual basis when necessary as they are proposed. Therefore, these design standards are submitted as general reference only.

8.2 Design Standards

WSU uses AWWA (American Water Works Association) standards, the UPC (Uniform Plumbing Code), the IBC (International Building Code) and the IFC (International Fire Code) for design criteria.

8.1.1 Supply

The WAC 246-290 states that supply and dedicated storage shall be sufficient to provide reliable water supply equal to or exceeding the MDD (maximum day demand). Supply capacity will be sufficient to replenish storage within 3 days of fire or emergency drawdown during MDD conditions. The supply will be provided at a hydraulic grade line (HGL) that meets replenishment needs of storage facilities.

8.1.2 Storage

The 2009 *Water System Design Manual* of the DOH requires public water systems to provide sufficient storage to meet any seasonal or diurnal variations in demand, fire flows, and emergency demands such as during power outages and equipment failures. These Standards utilize these guidelines as criteria for determination of reasonable treated water storage required in each pressure zone, as well as for entire water system

For a given reservoir design, each of the five storage components listed below must be considered:

- Operational Storage;
- Equalizing Storage;
- Standby (Emergency) Storage;
- Fire Suppression Storage; and
- Dead Storage, if any.

Only effective storage may be used in determining actual available, or design storage volume. Effective storage is equal to the total volume minus the dead storage built into the reservoir. The required storage volume is interpreted as the sum of Equalizing Storage and the largest of either Fire Storage or Standby (Emergency) Storage at an

elevation sufficient to provide a minimum 20 psi (static) to the highest customer in any pressure zone. In addition, equalizing storage is evaluated with the requirement that 30 psi (static) is provided to the highest customer within the analyzed pressure zone. Operational storage is any surplus storage that is available after subtracting the other required storage components.

In most cases either the standby or fire suppression volume, whichever is smaller, can be excluded from a water system's storage requirement, a practice termed nesting. Fire authorities at WSU allow the use of nesting standby and fire suppression in designing storage facilities, however WSU has elected not to do so (see section 3.3.8 for a detailed storage analysis).

8.1.3 Distribution System

The function of the distribution system is to convey water to the users at adequate service pressures and to provide fire flows. During the peak-hour demand, the capacity of the distribution system must meet peak hour demands with a residual pressure of no less than 30 psi without fire flow. During fire-fighting events, the minimum residual pressure permitted at all nodes within the pressure zone is 20 psi.

Usually, the inability to meet the above demand conditions results from inadequate distribution capacity; that is, pipes are not large enough or pipeline gridding is poor. The capacity of the distribution system is greatly reduced when head loss is greater than about 10 feet per 1,000 feet of pipe length.

Sometimes increasing pipe diameters or pipeline grid spacing is not sufficient to significantly increase flows. In these cases, it is better to consider adjusting the hydraulic elevation of either the supply or storage facilities. When analyzing the distribution system, the capability to replenish equalizing storage volume must be considered. The equalizing volume must be replenished at a rate sufficient to refill the storage reservoirs during peak demands.

Pipelines

The following general design criteria apply to designing water system pipelines:

- Design Pressure. Water systems shall be designed to provide a minimum peak hour demand pressure of 30 psi with no fire flow. With peak day demand plus fire flow, the minimum pressure shall be 20 psi in all areas. Pipes shall be specified to withstand the maximum test pressures but in no case shall pipes be designed with less than 150 psi pressure classification.

- Minimum Diameter: Water mains shall have a minimum diameter of 8".
- Minimum Cover: Water lines shall be constructed with a minimum of four feet of cover unless otherwise approved by Facility Operations and shall have thrust restraining as specified in the Construction Standards (see Construction Specification section 02665 in Appendix H-1).
- Pipe Materials: Pipe materials must be ductile iron or PVC.
- Separation between Sanitary Sewerlines: Minimum separation distances between water mains and sanitary sewer mains will be 10 feet

horizontally when the mains are parallel, and the water main shall be a minimum of 1.5 feet above the sanitary sewer when crossing as published in the WA State Department of Ecology *Criteria for Sewage Works Design.*

- Disinfection & Pressure Testing: All new piping will be disinfected and pressure tested before being placed in service per the Standard Construction Specifications (see Construction Specification section 15410 in Appendix H-1)

Hydrants

- Fire hydrant spacing: spacing shall not exceed 300 feet or as approved by Facility Operations.

- Hydrant Type: Hydrants shall be Waterous *Pacer* with two 2.5" nozzles and one 4.5" pumper connection, National Standard operating nut and caps, left-hand opening direction, 5.25" valve opening and 5" X 4.5" *Storz* adaptor.

Valves

- Valves: Water valves on mains 12 inches or less in diameter shall be gate valves which meet American Water Works Association C508-8. Valve types and models on larger mains will be as approved by WSU. A sufficient number of valves will be installed in the system to allow isolation of the system for maintenance and repair.

- Blowoff Valves: A blowoff valve must be located at the end, or a fire hydrant must be located within 20 feet of the end of any dead-end water main.

- Air Relief Valves: an air relief valve is required at the high point of all water mains. A blow-off valve or hydrant shall not be considered as a substitute for an air relief valve. Design pipe grades shall minimize the use of air relief valves wherever possible.

Backflow Prevention

- Backflow prevention shall be provided on all domestic water systems serving buildings or structures 3 or more stories or thirty feet in height and/or when any actual or potential physical connection between a potable water line, vessel, machine containing non-potable fluid exists.

8.3 Construction Standards

A complete set WSU's Standard Construction (Specifications) is located in Appendix H-1. Discussed therein are the specific construction requirements for WSU related to water system improvements. These documents will govern the installation of new water infrastructure.

9.0 Capital Improvement Program

As presented in Chapter 3, the deficiencies of the WSU water system are mostly fire flow inadequacies at various buildings as listed in Table 3-17. Under the Peak Hour Demand (PHD) scenario, there are locations throughout both the high and low zones where system pressures did not meet the minimum requirement of 30 psi (see Table 3-15). However, the deficient nodes appear to be in areas that are not providing water service, in areas that are at relatively high elevations, in areas that are simultaneously served by both the low and high zones, or on dead end lines. If water service is necessary in one of these node locations, it is likely that booster pumps would be used to provide minimum pressure to the structure. This situation occurs in several locations throughout the campus where booster pumps are required to provide adequate pressure for multi-story buildings (see Table 3-10).

As the system currently exists, minimum required fire suppression flows using the 2015 Maximum Day Demand (MDD) cannot be supplied to at least 59 buildings. This number reduces to 46 buildings if the deficiencies of only 10% or more are considered. The buildings in this range of 0-10% could be considered acceptable due to assumptions related to the water model and how they relate to the physical water system.

Therefore, the proposed improvements identified below primarily reduce or eliminate deficiencies by increasing distribution pipe sizes, by installing pipes to create loops throughout the distribution system, or by installation of additional fire hydrants.

9.1 Improvement Scenarios

In 2006, Facilities Operations generated a *10 Year Plan for Water System Improvements* (see Appendix I-1). This *Plan* was generated based on information provided in the *Interim* Water System Plan Update (June 2006) by Thomas, Dean & Hoskins, Inc. The *Interim* report listed fourteen improvements to the water system. As part of the last Water System Facility Plan, an electronically actuated valve connecting the two zones in the vicinity of the observatory hill reservoirs was installed. During normal operation, this valve is turned off. If an emergency occurs where water from the high zone is needed in the low zone, the valve will be turned on manually. When the valve is on, it is automatically controlled by the water surface in the low zone reservoirs. The valve is manually cycled (exercised) once a month to prevent water in the adjacent piping from becoming stale. Since this is a manually actuated valve, the year 2015 hydraulic modeling does not incorporate modeling both the low and high zone together.

Additionally, the remaining Improvements in Facilities Operations' *Plan* have been modified and/or eliminated based on different approaches to the modeling as discussed in section 3.3.11 and the development of new water system improvements based on hydraulic modeling results which were created to eliminate or reduce fire suppression flow deficiencies.

The WSU proposed Water System Improvements are presented in Table 9-1 along with the listing of buildings for which fire flow deficiencies are either reduced or eliminated and the estimated 2015 construction costs. Table 9-2 lists the maximum available fire flow at each campus building in the year 2020 based on the implementation of all of these Improvements (see Appendix I-3 & I-4 for water modeling results). Table 9-3 sorts the buildings with fire flow deficiencies by the percent of deficiency (compare Tables 3-16 and 3-17).

Please note the following concerning the Proposed Water System Improvements on Table 9-1:

1. The proposed Improvements are numbered corresponding to the project numbers in the Facilities Operations *10 Year Plan for Water System Improvements.* Three Improvements from the Plan have been eliminated due to reasons discussed above.

2. The Improvements are not listed in a prioritized order. It is anticipated that WSU will prioritize the proposed improvements based upon several factors, including but not limited to: the construction cost of proposed improvements; probable risk and replacement cost of buildings in question; and other campus infrastructure improvements occurring in the vicinity of proposed water distribution system improvements.

3. WSU Department of Capital Planning constructed project on Library Road. This project included adding 12" waterlines to both zones (see maps in Appendix I-2: nodes (low zone) J-215, J-220 J12-7L, J12-7LA; (high zone) J-170, J-170A, J-200, J-203, J-168, J-199, J-225, J-273, J-318, J13-1H, J13-2H, J13-4H, J13-5H & J13-6H).

4. Four new Improvements have been added (#14, #15, #16, and #17) to the plan. Improvement #15, the addition of three fire hydrants on the low zone, significantly improves the fire flow deficiency at all three buildings (Wilson & College Halls and Information Technology) due to the addition of fire hydrants in the low zone (all three buildings are on the high zone). This allows the summation of the highest low and high zone hydrants in calculating the maximum available fire flow as discussed in section 3.3.11.

5. Each Improvement is identified on the maps shown on the proposed High and Low Zone maps in Appendix I-2.

6. WSU understands that each of the individual Improvements will require complete DOH review and approval (Project report & construction document review).

7. WSU is mandated by WSU to complete full metering of the WSU campus by January 22, 2017. An additional $1,000,000 is estimated to complete this project. As of March 2016, this money has not been awarded to WSU by the legislature for this project. WSU will continue to advocate for funding of this project by the state legislature.

A number of the Required Fire Flows (RFF) on Table 9-2 differ from the *Interim* Report due to a reevaluation and recalculation of these flows by Facilities Operations. It is recommended that WSU contract with a fire sprinkler consultant to finalize these RFF. This may further eliminate some buildings from Table 9-3.

Table 9-4 and 9-5 show the proposed improvements including adding a transmission line for each pressure zone from the wells to the reservoirs. For the high zone, a 12" transmission line will be constructed from Well 8 to Fairway Reservoir. For the low zone, a 12" transmission line will be constructed from Well 7 to Observation Hill Reservoir. These are listed as #16 and #17 in Table 9-1.

Finally, WSU should evaluate an alternative approach to eliminate buildings from Table 9-3 by installing internal fire sprinklers. This will reduce the RFF typically by 50% and could potentially

eliminate most of the buildings from Table 9-3. This Improvement is not listed in Table 9-1 because construction costs are unknown.

Finally, it is recommended that WSU review and prioritize the proposed Improvements, develop a specific 6-year improvement program and allocate, as possible, funding for these projects. As each individual Improvement is completed, post-construction water modeling is recommended. This will further refine the 6-year improvement program and provide WSU with better comprehension of the response of the water system to the constructed Improvement.

Table 9-1

Proposed Water System Improvements (To be completed as funding is allocated from legislature)

Improvement No.[1]	Zone	Description of Proposed Improvement and Estimated Cost[2]	Buildings Where Deficiencies Are Reduced or Eliminated (% improvement)[3]
N/A	N/A	Service meter installation campus-wide with automated reading capabilities. **Construction Cost: $4,000,000** **Completion mandated by January 22, 2017** **Cost per year = $2,000,000 if completed by 2017**	Campus-Wide
3	High	Replace 8" pipe with 2,000 LF of 12" pipes along Wilson Road and Stadium Way. **Construction Cost: $600,000**	Beasley Auditorium (28); Wilson (100); Johnson Hall (90);French Admin. (100), Information Technology (100);Todd(68); Johnson Tower (100).
5	High	Replace existing 8" and 6" pipes with 4,300 LF of 12" pipe from Stadium Way and Grimes Way then east to Airport Road along Grimes Way. **Construction Cost: $1,290,000**	Food Services (19); Cattle Feeding Lab (100);McCluskey (100);Beef Cattle Breeding Barn (68); EH&S Building (100); Storage 143A (100).
6	High	Replace existing 6" and 8" pipes with 7756 LF of 12" pipes along Valley Road and Merman Drive; also extend pipe to form loop thru housing **Construction Cost: $2,326,800**	Steptoe Village (100), Chief Joseph Village (93).
9	High	Replace existing 6" pipe along Airport Road from Grimes Way to County Road with 6,780 LF of 12" pipe. **Construction Cost: $2,034,000**	Farm Shops (100); Steffen Center (100); Vet Quarantine Endoparasite Farm (100); Cattle Feeding Lab (100).
2	Low	Replace existing 8" pipe with 1,700 LF of 12" pipe from node J-300 to Observatory Hill reservoirs. **Construction Cost: $510,000**	Thermal Fluids Research Building (61); Physical Education Bldg (14); Smith Gym (47); Commons (25); Kruegel/McAllister (89); Carver Farm (40); Rotunda (100);Columbia Village (100).
4	Low	Replace 550 LF of 6" and 8" pipes with 12" pipe near Physical Education Building (note:12" pipe near Bryan Hall replaced by others). **Construction Cost: $165,000**	Physical Education Building (14);Smith Gym (47).
8	Low	Replace existing 6" pipe with 580 LF of 12" pipe through the Columbia Village **Construction Cost: $174,000**	Carver Farm (40); Columbia Village (100); Chinook Village (76).
7	Low	Install 220 LF of 12" pipe from Campus Avenue to Thatuna Road. This eliminates a dead end. **Construction Cost: $66,000**	Bookstore (20).
13	Low	Replace 6" pipes along Idaho Street with 480 LF of 12" pipes. **Construction Cost: $144,000**	Commons (25).
New 14	Low	Replace 6" and 8" pipes near Stadium Way and the Rotunda with 1,850 LF of 12" pipe. **Construction Cost: $555,000**	Kruegel (89), Wegner Hall (72).
New 15	Low	Add three fire hydrants near College Hall, Information Technology and Johnson Hall. **Construction Cost: $20,000**	Wilson Hall (100), College Hall (100); Information Technology (100)
New 16	High	Construct 12" Transmission line directly from well to reservoir for high zone. Approximately 3300 LF of 12" pipe **Construction Cost: $990,000**	Campus-wide
New 17	Low	Construct 12" Transmission line directly from well to reservoir for low zone.Approximately 3600 LF of 12" pipe **Construction Cost: $1,080,000**	Campus-wide

NOTES:
LF = Linear Feet
1. Denotes Order of Need # from *10 Year Plan for Water System Improvements* from Facility Operations (see Appendix I-2).
2. Estimated using current costs of $300 per lineal foot of 12" pipe.
3. Percent of improvement of Percent Deficient as listed in the right column of Tables 3-16 and 9-2 for the years 2015 to 2020. For example: 2015 % Deficient = 50%, 2013 % Deficient = 25%; therefore percent improvement is 50%. If 100% improvement, the building's fire flow deficiency is eliminated and is listed as "OK" in Percent Deficient column on Table 9-2.

Table 9-2 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Abelson Hall (32)[2]	H	2,250	2,115 J13-1H	2,142 J13-6H	2,220 J14-1H			2,220	**1%**
Administration Annex (38)	H	2,500	2,115 J13-1H	2,142 J13-6H				2,142	**14%**
Agronomy Seed House (115)	H	3,500	5,555 M13-1H					5,555	OK
Albrook Hydraulics Laboratory (71)	L	3,750	4,532 I13-1L	4,699 I13-2L				4,699	OK
Albrook-Hydra Model Lab (355)	L	1,500	4,802 I13-2L					4,802	OK
Animal Disease Biotechnology Facility (807A)[2]	L	2,250	8,034 L14-3L					8,034	OK
Avery Hall (809)[2]	B	1,250	1,185 J12-5H	3,485 J12-7L	1,501 J13-3H			4,669	OK
Beasley Performing Arts Coliseum (806)	H	6,000	4,094 K10-2H	4,139 L10-1H	4,107 L10-2H	3,868 L10-6H	4,011 L10-7H	4,139	**31%**
Beef Cattle Breeding Barn (146)	H	2,250	2,458 O12-1H					2,458	OK
Biotech / Life Sciences ()[2]	H	2,000	4,561 L11-6H	4,396 L12-4H				4,561	OK
Bohler Gymnasium (11A)[2]	L	2,625	3,026 K12-2L	2,976 K12-4L				3,026	OK
Boiler Plant Bulk Storage Building (321)	L	1,500	4,925 I14-1L	5,153 I14-2L				5,153	OK
Bookstore (64)	B	3,250	3,400 J12-7L	1,149 J12-5H	J12-8H			4,549	OK
Bryan Hall (2)[2]	B	1,625	3,485 J12-7L	1,501 J13-3H	2,085 J13-4H			5,569	OK
Bustad (807)[2]	L	2,750	6,442 K14-8L	3,762 K14-9L				6,442	OK
Carpenter Hall (20)[2]	L	1,875	4,624 J13-11L	3,357 J14-7L				4,624	OK
Carver Farm Agriculture Storage Building (120C)	L	2,500	999 L16-3L	1,537 L16-4L				1,537	**39%**
Cattle Feeding Lab (144)	H	3,500	4,536 O13-1H					4,536	OK
Central Receiving (358A)	H	1,500	2,531 N14-2H					2,531	OK
Central Stores Receiving (360A)[2]	B	1,500	1,957 L14-2H	8,034 L14-3L				9,991	OK
Chief Joseph Village (676)	H	3,750	3,430 L7-3H	3,190 L7-4H	2,940 L7-5H	3,314 M6-1H	3,314 M7-1H	3,430	**9%**
Chilled Water Plant (813)	L	1,500	5,214 J14-6L					5,214	OK
Chinook Village (679)	L	3,250	1,556 K17-1L	2,409 K17-2L	1,778 K17-3L	1,244 K16-4L		2,409	**26%**
Clark Hall (99)[2]	H	2,375	3,310 L12-8H	2,832 M12-5H				3,310	OK
Clean Tech [2]	h	1,625	4,741 L13-12H	6,906 L13-11H				6,906	OK
Cleveland Hall (86)[2]	B	2,000	2,220 J14-1H	5,247 J14-3L				7,467	OK
College Hall(4)	H	3,250	2,000 J13-5H	2,067 J13-6H				2,067	**36%**
College Avenue Steam Plant (27)	L	2,500	4,925 I14-1L	5,153 I14-2L	4,802 I13-2L			5,153	OK
Columbia Village (678)	L	1,750	2,039 L16-1L	2,337 L16-2L	2,215 K16-3L			2,337	OK

Table 9-2 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Coman Hall (72)	L	2,750	4,259 K11-6L					4,259	OK
Commons (5)	L	4,000	4,235 J15-1L	4,045 J15-2L	3,312 J15-3L			4,235	OK
Community Hall (6)[2]	L	1,625	1,222 J12-1L	1,903 J12-2L	1,666 J12-3L			1,903	OK
Compton Union Building (63)[2]	H	3,000	3,077 K13-2H	1,980 K13-4H				3,077	OK
Cooper Publications Building (91)[2]	H	1,375	6,128 N13-1H	5,523 M13-2H				6,128	OK
Daggy Hall (803)[2]	L	2,250	4,624 J13-11L	5,247 J14-3L	3,357 J14-7L			5,247	OK
Dana Hall (56)	L	4,250	4,355 I14-3L	4,369 J14-6L				4,369	OK
Dodgen Research Facility (74)	H	2,250	957 O10-1H					957	**57%**
Duncan Dunn Hall (7)[2]	L	1,250	1,222 J12-1L	1,903 J12-2L	1,666 J12-3L			1,903	OK
Eastlick Hall (82A)[2]	B	2,375	2,115 J13-1H	5,247 J14-3L	5,049 J14-5L			7,165	OK
Education Addition (86A) [2]	L	1,250	5,222 J15-1L	5,047 J15-2L				5,222	OK
EH&S Building (90)	H	1,750	4,369 P13-1H					4,369	OK
Electrical/Mechanical Engineering Bldg (78A)[2]	L	2,250	4,703 J13-10L	4,802 I13-2L				4,802	OK
Engineering Teaching/Research Lab Bldg. (58)[2]	L	2,500	4,925 I14-1L	5,153 I14-2L	5,214 J14-6L	4,750 I14-3L		5,214	OK
Ensminger Pavilion (150)	H	2,500	4,427 L13-3H	3,735 L13-4H	4,501 L13-5H			4,501	OK
Farms Services-Shop (103A)	H	1,500	2,781 R9-1H					2,781	OK
Feed Storage Building (839)	H	1,500	4,664 O13-2H					4,664	OK
Fine Arts Building (175)	B	3,500	4,269 K13-1H	3,532 K14-3L				7,802	OK
Food Science/Human Nutrition Bldg. (816)[2]	H	2,500	3,862 L12-3H	4,548 L12-7H				4,548	OK
Food Service Building (89)[2]	H	2,000	4,387 N13-3H					4,387	OK
Football Operations Building [2]	L	1,750	2,976 K12-4L	3,026 K12-2L				3,026	OK
French Admistration Building (92)	H	3,500	3,843 L13-9H	3,507 L13-10H	4,029 L13-1H	3,857 L13-2H		4,029	OK
Fulmer Hall (3)	B	3,500	2,143 J14-1H	4,954 J14-2L	5,314 K14-2L			7,456	OK
Fulmer Hall Annex (3A)[2]	B	2,125	2,220 J14-1H	5,205 J14-2L	5,567 K14-2L			7,787	OK
Fulmer Hall Synthesis Unit (3B)[2]	B	1,750	2,220 J14-1H	5,205 J14-2L	5,567 K14-2L			7,787	OK
Fulmer Hall Vibration Free Unit(3C)[2]	B	1,000	2,220 J14-1H	2,142 J13-6H	5,205 J14-2L	5,567 K14-2L		7,787	OK
Gannon-Goldsworthy Hall (79)[2]	L	2,500	3,885 K14-5L	3,854 K15-1L	3,852 K15-3L	3,945 K15-6L		3,945	OK
General Storage Bldg. (358B)[2]	H	1,875	2,531 N14-2H					2,531	OK
Global Animal Health[2]	B	1,375	2,191 L14-3H	2,037 L15-7L				2,191	OK

Table 9-2 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Grimes Way Steam Plant (840)[2]	H	1,000	5,523 M13-2H	2,961 M14-1H	3,237 M14-2H	3,116 M14-3H		5,523	OK
Grounds Shop (66D)	H	1,500	6,128 N13-1H					6,128	OK
Heald Hall (82)	L	4,250	4,305 J14-3L	4,280 J14-4L	4,370 J14-5L			4,370	OK
Holland Library (62)[2]	B	3,000	3,400 J12-7L	2,000 J13-5H				5,400	OK
Hollingbery Field House (09)	L	3,500	2,998 K12-2L	2,756 K11-9L	4,424 K11-2L			4,424	OK
Honors Hall (14)[2]	L	1,750	4,496 J13-12L	1,903 J12-2L				4,496	OK
Hulbert Hall (808)	H	3,500	3,579 L13-4H					3,579	OK
Incinerator (60)[2]	H	1,500	1,602 N15-1H	2,073 N15-3H				2,073	OK
Indoor Practice Facility (835)[3]	H	2,635	1,482 L11-4H	2,117 L11-5H	2,518 M11-6H			2,518	**4%**
Information Technology Building (812)	H	4,500	2,813 K13-2H	3,533 L13-2H				3,533	**21%**
Johnson Hall (76)	H	6,000	3,872 L12-4H	3,907 L13-3H	3,772 L13-6H			3,907	**35%**
Johnson Tower (94)[2]	H	2,000	1,912 K13-3H	2,018 K14-1H				2,018	OK
Kamiak Apartments (660)	H	2,750	3,678 L7-1H	3,210 L7-2H	2,249 K7-3H			3,678	OK
Kimbrough Music Building (25)[2]	L	2,125	3,485 J12-7L					3,485	OK
Kruegel-McAllister Hall (69)	L	4,250	2,948 K15-5L	3,005 K15-6L	2,859 K15-7L	3,113 J15-8L		3,113	**27%**
L.J. Smith Hall (54)	B	3,500	7,920 L14-3L	1,912 L14-2H				9,832	OK
Lewis Alumni Centre (138)[2]	H	1,500	3,735 L13-4H	3,134 M13-3H				3,735	OK
Lighty Student Services (92A) [2]	H	2,250	3,944 L13-9H	3,580 L13-10H	4,201 L13-1H	4,023 L13-2H		4,201	OK
Math Learning Center (16)	L	1,500	5,247 J14-3L	5,049 J14-5L				5,247	OK
McCluskey Service Bldg-Office (85A)	H	1,500	5,342 N14-1H					5,342	OK
McCluskey Services - Shop Annex (837)	H	3,000	4,946 N14-3H	4,536 O13-1H				4,946	OK
McCoy Hall (44)	B	4,750	1,264 K14-6H	5,072 K14-7L	5,745 K14-8L	3,527 K14-9L		5,745	OK
McCroskey Hall (19)[2]	L	1,250	1,666 J12-3L	1,112 J12-4L				1,666	OK
McEachern Residence Center Service Bldg (805X)[2]	L	2,125	3,835 K15-2L	1,888 K15-9L	1,598 K15-10L	2,409 K15-12L	2,716 K15-13L	3,835	OK
Meats Laboratory (98)	H	1,750	1,844 M12-2H					1,844	OK
Morrill Hall (24)	L	2,250	4,624 J13-11L	5,049 J14-5L				5,049	OK
Motor Pool & Storage (66C)	H	1,500	6,128 N13-1H					6,128	OK
Murrow Communications Center E & W (33E/33W)	B	4,000	3,999 J13-7L	1,872 J13-4H	1,366 J13-3H	930 J13-8L		5,871	OK
Neill Hall (70)[2]	L	1,500	4,205 K14-10L					4,205	OK

Table 9-2 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Nez Perce Village Buildings (677A)	H	2,000	3,771 L8-1H	2,652 M7-2H	2,026 M8-1H			3,771	OK
Northside Residence [2]	L	1,750	4,474 K11-2L	4,386 K11-4L				4,474	OK
Northside Residence II [2]	L	1,750	4,242 K11-5L	4,170 K11-10L	4,292 K11-11L			4,292	OK
Old Golf Clubhouse (365)	H	1,500	1,123 L10-8H					1,123	**25%**
Olympia Avenue Student Housing [2]	L	1,500	1,397 K15-16L	1,616 K15-11L	1,888 K15-9L	1,593 K15-8L		1,888	OK
Orton Hall (87)[2]	L	2,375	3,314 K15-17L	2,853 K16-2L				3,314	OK
Owen Science & Engineering Library (810)	B	5,000	1,983 J14-1H	4,201 J14-2L				6,184	OK
Physical Education Building (96)[2]	L	2,375	3,026 K12-2L	2,942 K12-3L				3,026	OK
Plant Growth Center (122)[2]	H	1,500	4,501 L13-5H					4,501	OK
President's Residence (31)	L	2,250	4,633 I13-1L					4,633	OK
Regents Hill Stearn Hall (65A)[2]	L	2,625	4,386 K11-4L	4,242 K11-5L	4,259 K11-6L			4,386	OK
Residence Inn[2]	H	2,250	3,839 M8-2H	3,779 M8-3H	4,696 M8-4H	4,564 M8-5H		4,696	OK
Rogers Hall (83)[2]	L	2,375	3,815 J16-3L					3,815	OK
Rotunda (80)[2]	L	1,375	3,854 K15-1L	3,744 K15-4L	3,925 K15-5L	3,945 K15-6L		3,945	OK
Safety Building (84)	H	1,500	3,211 K13-2H					3,211	OK
School of Communication Addition (33A) [2]	L	1,250	4,372 J13-7L	3,574 J13-9L	4,624 J13-11L			4,624	OK
Scott Hall (73)[2]	L	1,375	4,259 K11-6L					4,259	OK
Sloan Hall (78)	L	4,750	4,241 I13-1L	4,309 J13-10L				4,309	**9%**
Smith Center for Undergraduate Education (95)[2]	B	3,000	1,838 K13-3H	1,961 K14-1H	3,532 K14-3L	1,922 K14-4L		5,493	OK
Smith Gymnasium (12)	L	4,250	2,831 K12-3L					2,831	**33%**
Steffen Center (180)	H	2,250	4,493 P13-2H					4,493	OK
Stephenson Center Dining Hall (93C)	L	3,500	685 J15-7L	3,282 J16-1L	3,721 J16-4L			3,721	OK
Stephenson East (93E)[2]	L	2,000	2,165 J16-2L	3,882 J16-4L				3,882	OK
Stephenson North (93N)[2]	L	2,000	688 J15-7L	3,882 J16-4L				3,882	OK
Stephenson South (93S)[2]	L	1,875	2,165 J16-2L	3,882 J16-4L				3,882	OK
Steptoe Village (665)	H	3,000	3,301 J7-2H	3,298 K7-1H	3,321 K7-2H	2,191 K7-3H	2,492 K7-5H	3,321	OK
Stevens Hall (34)[2]	B	1,250	1,112 J12-4L	1,185 J12-5H	1,501 J13-3H	963 J13-8L		2,464	OK
Stimson Hall (35)[2]	B	1,625	2,220 J14-1H	5,205 J14-2L	4,205 K14-10L			7,426	OK
Storage (143A)	H	2,250	5,031 N13-2H					5,031	OK

Table 9-2 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Streit-Perham Hall (81C)[2]	L	2,875	1,136 K10-1L	4,349 K11-1L				4,349	OK
Student Recreation Center (819)	H	2,875	3,671 L9-1H	2,732 M9-1H	1,090 L10-8H			3,671	OK
Terrace Apartment Complex (650)	H	2,500	3,443 J7-1H	2,249 K7-3H	3,736 K7-4H	2,553 K7-5H	2,285 K7-8H	3,736	OK
Terrell Library (62A)[2]	B	3,000	2,912 K12-3L	1,980 K13-4H				4,893	OK
Thermal Fluids Research Building (57)	L	2,500	4,802 I13-2L	4,925 I14-1L				4,925	OK
Thompson Hall (1)[2]	L	1,375	4,372 J13-7L	963 J13-8L				4,372	OK
Todd Hall (55)[2]	H	3,000	2,067 J13-6H					2,067	**31%**
Troy Hall (36)	B	2,750	2,018 K14-1H	5,567 K14-2L				7,585	OK
Valley Crest Village (675)	H	3,500	3,930 M11-1H	3,017 M11-2H	3,357 M12-4H			3,930	OK
Van Doren Hall (37)	L	2,500	3,485 J12-7L					3,485	OK
Vet Quarantine Endoparasite Farm (197L)	H	1,500	3,473 Q10-1H	2,449 Q10-2H				3,473	OK
Veterinary Medical Research Building (818)[2]	H	2,000	3,984 L12-6H	4,548 L12-7H	3,310 L12-8H	4,561 L11-6H		4,561	OK
Veterinary Teaching Hospital (818)[2]	L	2,625	2,073 L15-3L	2,592 L15-4L	2,727 L15-5L			2,727	OK
Vogel Plant Biosciences Building (826)[2]	H	2,250	4,396 L12-4H	4,201 L13-1H	4,286 L13-6H			4,396	OK
Waller Hall (39)	L	3,000	4,495 J15-4L					4,495	OK
Washington Building (15)[2]	L	2,125	5,047 J15-2L	4,733 J15-4L				5,047	OK
Webster Physical Science Building (801)[2]	L	2,250	5,205 J14-2L	5,567 K14-2L	4,205 K14-10L			5,567	OK
Wegner Hall (45)	B	4,500	1,264 K14-6H	2,978 K15-3L				2,978	**34%**
Wilmer-Davis Hall (30)[2]	B	2,125	1,222 J12-1L	1,666 J12-3L	1,112 J12-4L	1,185 J12-5H	1,067 J12-8H	2,850	OK
Wilson Hall (40)	H	4,000	1,698 K13-3H	1,794 K13-4H				1,794	**55%**
WSU Children's Center (88)[2]	L	1,500	3,314 K15-17L	2,853 K16-2L				3,314	OK
Yakama Village Apts. (680)[2]	L	1,500	1,520 K18-1L	2,005 K17-4L	2,433 K17-2L	2,756 K17-6L	2,508 K17-5L	2,756	OK

NOTES:

1. Both High & Low Zone hydrants included if building is served by both zones or maximum hydrant If served by one zone only.

2. Building is fully sprinkled. Required Fire Flow shown has been reduced appropriately, typically 50%.

3. This is classified as a temporary nonconforming structure per Rod Holmes, WSU Fire Marshall and a listing of a required fire flow is not necessary. For this Table, the available fire flow is listed as the required fire flow.

Table 9-3 Required and Available Fire Flows at Major Campus Buildings at WSU 2020 Proposed Improvements (without irrigation)				
Sorted on Percent Deficient				
Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
Dodgen Research Facility (74)	H	2250	956.65	57%
Wilson Hall (40)	H	4000	1794.38	55%
Carver Farm Agriculture Storage Building (120C)	L	2500	1537.4	39%
College Hall(4)	H	3250	2067.02	36%
Johnson Hall (76)	H	6000	3906.82	35%
Wegner Hall (45)	B	4500	2977.76	34%
Smith Gymnasium (12)	L	4250	2831.21	33%
Todd Hall (55)2	H	3000	2067.02	31%
Beasley Performing Arts Coliseum (806)	H	6000	4139.29	31%
Kruegel-McAllister Hall (69)	L	4250	3112.85	27%
Chinook Village (679)	L	3250	2408.77	26%
Old Golf Clubhouse (365)	H	1500	1123.02	25%
Information Technology Building (812)	H	4500	3533.08	21%
Administration Annex (38)	H	2500	2142.1	14%
Sloan Hall (78)	L	4750	4308.76	9%
Chief Joseph Village (676)	H	3750	3430.33	9%
Indoor Practice Facility (835)3	H	2635	2517.88	4%
Abelson Hall (32)2	H	2250	2220.27	1%

Table 9-4 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Abelson Hall (32)[2]	H	2,250	2,147 J13-1H	2,151 J13-6H	2,231 J14-1H			2,231	**1%**
Administration Annex (38)	H	2,500	2,147 J13-1H	2,151 J13-6H				2,151	**14%**
Agronomy Seed House (115)	H	3,500	5,668 M13-1H					5,668	OK
Albrook Hydraulics Laboratory (71)	L	3,750	4,988 I13-1L	5,362 I13-2L				5,362	OK
Albrook-Hydra Model Lab (355)	L	1,500	5,513 I13-2L					5,513	OK
Animal Disease Biotechnology Facility (807A)[2]	L	2,250	8,057 L14-3L					8,057	OK
Avery Hall (809)[2]	B	1,250	1,194 J12-5H	3,263 J12-7L	1,516 J13-3H			4,457	OK
Beasley Performing Arts Coliseum (806)	H	6,000	4,192 K10-2H	4,242 L10-1H	4,206 L10-2H	3,946 L10-6H	4,102 L10-7H	4,242	**29%**
Beef Cattle Breeding Barn (146)	H	2,250	1,972 O12-1H					1,972	**12%**
Biotech / Life Sciences ()[2]	H	2,000	4,622 L11-6H	4,509 L12-4H				4,622	OK
Bohler Gymnasium (11A)[2]	L	2,625	2,949 K12-2L	2,915 K12-4L				2,949	OK
Boiler Plant Bulk Storage Building (321)	L	1,500	5,803 I14-1L	6,432 I14-2L				6,432	OK
Bookstore (64)	B	3,250	1,046 J12-8H	1,159 J12-5H				2,204	**32%**
Bryan Hall (2)[2]	B	1,625	3,263 J12-7L	1,516 J13-3H	2,090 J13-4H			5,353	OK
Bustad (807)[2]	L	2,750	6,646 K14-8L	3,655 K14-9L				6,646	OK
Carpenter Hall (20)[2]	L	1,875	4,763 J13-11L	3,349 J14-7L				4,763	OK
Carver Farm Agriculture Storage Building (120C)	L	2,500	988 L16-3L	1,517 L16-4L				1,517	**39%**
Cattle Feeding Lab (144)	H	3,500	4,613 O13-1H					4,613	OK
Central Receiving (358A)	H	1,500	2,542 N14-2H					2,542	OK
Central Stores Receiving (360A)[2]	B	1,500	1,961 L14-2H	8,057 L14-3L				10,018	OK
Chief Joseph Village (676)	H	3,750	3,078 L7-3H	3,026 L7-4H	2,806 L7-5H	3,202 M6-1H	3,171 M7-1H	3,202	**15%**
Chilled Water Plant (813)	L	1,500	6,499 J14-6L					6,499	OK
Chinook Village (679)	L	3,250	1,539 K17-1L	2,380 K17-2L	1,745 K17-3L	1,217 K16-4L		2,380	**27%**
Clark Hall (99)[2]	H	2,375	3,342 L12-8H	2,870 M12-5H				3,342	OK
Clean Tech [2]	h	1,625	4,803 L13-12H	7,154 L13-11H				7,154	OK
Cleveland Hall (86)[2]	B	2,000	2,231 J14-1H	5,953 J14-3L				8,184	OK
College Hall(4)	H	3,250	2,030 J13-5H	2,076 J13-6H				2,076	**36%**
College Avenue Steam Plant (27)	L	2,500	5,803 I14-1L	6,432 I14-2L	5,513 I13-2L			6,432	OK
Columbia Village (678)	L	1,750	1,997 L16-1L	2,304 L16-2L	2,168 K16-3L			2,304	OK

Table 9-4 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Coman Hall (72)	L	2,750	4,113 K11-6L					4,113	OK
Commons (5)	L	4,000	4,142 J15-1L	3,777 J15-2L	3,277 J15-3L			4,142	OK
Community Hall (6)[2]	L	1,625	1,201 J12-1L	1,878 J12-2L	1,632 J12-3L			1,878	OK
Compton Union Building (63)[2]	H	3,000	3,119 K13-2H	2,014 K13-4H				3,119	OK
Cooper Publications Building (91)[2]	H	1,375	6,509 N13-1H	5,664 M13-2H				6,509	OK
Daggy Hall (803)[2]	L	2,250	4,763 J13-11L	5,953 J14-3L	3,349 J14-7L			5,953	OK
Dana Hall (56)	L	4,250	4,809 I14-3L	5,082 J14-6L				5,082	OK
Dodgen Research Facility (74)	H	2,250	967 O10-1H					967	**57%**
Duncan Dunn Hall (7)[2]	L	1,250	1,201 J12-1L	1,878 J12-2L	1,632 J12-3L			1,878	OK
Eastlick Hall (82A)[2]	B	2,375	2,147 J13-1H	5,953 J14-3L	5,572 J14-5L			7,719	OK
Education Addition (86A) [2]	L	1,250	5,822 J15-1L	5,395 J15-2L				5,822	OK
EH&S Building (90)	H	1,750	4,357 P13-1H					4,357	OK
Electrical/Mechanical Engineering Bldg (78A)[2]	L	2,250	5,285 J13-10L	5,513 I13-2L				5,513	OK
Engineering Teaching/Research Lab Bldg. (58)[2]	L	2,500	5,803 I14-1L	6,432 I14-2L	6,499 J14-6L	5,394 I14-3L		6,499	OK
Ensminger Pavilion (150)	H	2,500	4,552 L13-3H	3,824 L13-4H	4,620 L13-5H			4,620	OK
Farms Services-Shop (103A)	H	1,500	2,459 R9-1H					2,459	OK
Feed Storage Building (839)	H	1,500	3,862 O13-2H					3,862	OK
Fine Arts Building (175)	B	3,500	4,326 K13-1H	3,459 K14-3L				7,786	OK
Food Science/Human Nutrition Bldg. (816)[2]	H	2,500	3,939 L12-3H	4,618 L12-7H				4,618	OK
Food Service Building (89)[2]	H	2,000	4,452 N13-3H					4,452	OK
Football Operations Building [2]	L	1,750	2,915 K12-4L	2,949 K12-2L				2,949	OK
French Admistration Building (92)	H	3,500	3,903 L13-9H	3,546 L13-10H	4,132 L13-1H	3,950 L13-2H		4,132	OK
Fulmer Hall (3)	B	3,500	2,153 J14-1H	5,203 J14-2L	5,533 K14-2L			7,686	OK
Fulmer Hall Annex (3A)[2]	B	2,125	2,231 J14-1H	5,589 J14-2L	5,945 K14-2L			8,176	OK
Fulmer Hall Synthesis Unit (3B)[2]	B	1,750	2,231 J14-1H	5,589 J14-2L	5,945 K14-2L			8,176	OK
Fulmer Hall Vibration Free Unit(3C)[2]	B	1,000	2,231 J14-1H	2,151 J13-6H	5,589 J14-2L	5,945 K14-2L		8,176	OK
Gannon-Goldsworthy Hall (79)[2]	L	2,500	3,661 K14-5L	3,632 K15-1L	3,629 K15-3L	3,720 K15-6L		3,720	OK
General Storage Bldg. (358B)[2]	H	1,875	2,542 N14-2H					2,542	OK
Global Animal Health[2]	B	1,375	2,202 L14-3H	1,965 L15-7L				2,202	OK

Table 9-4 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Grimes Way Steam Plant (840)[2]	H	1,000	5,664 M13-2H	2,996 M14-1H	3,273 M14-2H	3,154 M14-3H		5,664	OK
Grounds Shop (66D)	H	1,500	6,509 N13-1H					6,509	OK
Heald Hall (82)	L	4,250	4,300 J14-3L	4,329 J14-4L	4,406 J14-5L			4,406	OK
Holland Library (62)[2]	B	3,000	3,165 J12-7L	2,030 J13-5H				5,195	OK
Hollingbery Field House (09)	L	3,500	2,919 K12-2L	2,706 K11-9L	4,222 K11-2L			4,222	OK
Honors Hall (14)[2]	L	1,750	4,848 J13-12L	1,878 J12-2L				4,848	OK
Hulbert Hall (808)	H	3,500	3,668 L13-4H					3,668	OK
Incinerator (60)[2]	H	1,500	1,617 N15-1H	2,092 N15-3H				2,092	OK
Indoor Practice Facility (835)[3]	H	2,635	1,495 L11-4H	2,144 L11-5H	2,555 M11-6H			2,555	**3%**
Information Technology Building (812)	H	4,500	2,842 K13-2H	3,620 L13-2H				3,620	**20%**
Johnson Hall (76)	H	6,000	3,980 L12-4H	4,032 L13-3H	3,878 L13-6H			4,032	**33%**
Johnson Tower (94)[2]	H	2,000	1,942 K13-3H	2,046 K14-1H				2,046	OK
Kamiak Apartments (660)	H	2,750	2,568 L7-1H	2,079 L7-2H	2,043 K7-3H			2,568	**7%**
Kimbrough Music Building (25)[2]	L	2,125	3,263 J12-7L					3,263	OK
Kruegel-McAllister Hall (69)	L	4,250	2,646 K15-5L	2,690 K15-6L	2,588 K15-7L	2,798 J15-8L		2,798	**34%**
L.J. Smith Hall (54)	B	3,500	7,904 L14-3L	1,916 L14-2H				9,819	OK
Lewis Alumni Centre (138)[2]	H	1,500	3,824 L13-4H	3,169 M13-3H				3,824	OK
Lighty Student Services (92A) [2]	H	2,250	4,003 L13-9H	3,619 L13-10H	4,305 L13-1H	4,117 L13-2H		4,305	OK
Math Learning Center (16)	L	1,500	5,953 J14-3L	5,572 J14-5L				5,953	OK
McCluskey Service Bldg-Office (85A)	H	1,500	5,442 N14-1H					5,442	OK
McCluskey Services - Shop Annex (837)	H	3,000	5,046 N14-3H	4,613 O13-1H				5,046	OK
McCoy Hall (44)	B	4,750	1,276 K14-6H	4,676 K14-7L	5,263 K14-8L	3,421 K14-9L		5,263	OK
McCroskey Hall (19)[2]	L	1,250	1,632 J12-3L	1,085 J12-4L				1,632	OK
McEachern Residence Center Service Bldg (805X)[2]	L	2,125	3,612 K15-2L	1,778 K15-9L	1,513 K15-10L	2,270 K15-12L	2,599 K15-13L	3,612	OK
Meats Laboratory (98)	H	1,750	1,867 M12-2H					1,867	OK
Morrill Hall (24)	L	2,250	4,763 J13-11L	5,572 J14-5L				5,572	OK
Motor Pool & Storage (66C)	H	1,500	6,509 N13-1H					6,509	OK
Murrow Communications Center E & W (33E/33W)	B	4,000	3,864 J13-7L	1,879 J13-4H	1,380 J13-3H	901 J13-8L		5,743	OK
Neill Hall (70)[2]	L	1,500	3,965 K14-10L					3,965	OK

Table 9-4 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Nez Perce Village Buildings (677A)	H	2,000	3,801 L8-1H	2,667 M7-2H	2,044 M8-1H			3,801	OK
Northside Residence [2]	L	1,750	4,363 K11-2L	4,165 K11-4L				4,363	OK
Northside Residence II [2]	L	1,750	4,116 K11-5L	4,080 K11-10L	4,066 K11-11L			4,116	OK
Old Golf Clubhouse (365)	H	1,500	1,131 L10-8H					1,131	**25%**
Olympia Avenue Student Housing [2]	L	1,500	1,266 K15-16L	1,494 K15-11L	1,778 K15-9L	1,477 K15-8L		1,778	OK
Orton Hall (87)[2]	L	2,375	3,109 K15-17L	2,821 K16-2L				3,109	OK
Owen Science & Engineering Library (810)	B	5,000	2,006 J14-1H	3,918 J14-2L				5,924	OK
Physical Education Building (96)[2]	L	2,375	2,949 K12-2L	2,866 K12-3L				2,949	OK
Plant Growth Center (122)[2]	H	1,500	4,620 L13-5H					4,620	OK
President's Residence (31)	L	2,250	5,136 I13-1L					5,136	OK
Regents Hill Stearn Hall (65A)[2]	L	2,625	4,165 K11-4L	4,116 K11-5L	4,113 K11-6L			4,165	OK
Residence Inn[2]	H	2,250	3,881 M8-2H	3,821 M8-3H	4,774 M8-4H	4,603 M8-5H		4,774	OK
Rogers Hall (83)[2]	L	2,375	3,570 J16-3L					3,570	OK
Rotunda (80)[2]	L	1,375	3,632 K15-1L	3,487 K15-4L	3,666 K15-5L	3,720 K15-6L		3,720	OK
Safety Building (84)	H	1,500	3,256 K13-2H					3,256	OK
School of Communication Addition (33A) [2]	L	1,250	4,464 J13-7L	3,513 J13-9L	4,763 J13-11L			4,763	OK
Scott Hall (73)[2]	L	1,375	4,113 K11-6L					4,113	OK
Sloan Hall (78)	L	4,750	4,557 I13-1L	4,702 J13-10L				4,702	**1%**
Smith Center for Undergraduate Education (95)[2]	B	3,000	1,868 K13-3H	1,988 K14-1H	3,459 K14-3L	1,896 K14-4L		5,448	OK
Smith Gymnasium (12)	L	4,250	2,755 K12-3L					2,755	**35%**
Steffen Center (180)	H	2,250	4,493 P13-2H					4,493	OK
Stephenson Center Dining Hall (93C)	L	3,500	679 J15-7L	3,251 J16-1L	3,454 J16-4L			3,454	**1%**
Stephenson East (93E)[2]	L	2,000	2,152 J16-2L	3,711 J16-4L				3,711	OK
Stephenson North (93N)[2]	L	2,000	682 J15-7L	3,711 J16-4L				3,711	OK
Stephenson South (93S)[2]	L	1,875	2,152 J16-2L	3,711 J16-4L				3,711	OK
Steptoe Village (665)	H	3,000	2,959 J7-2H	2,956 K7-1H	2,992 K7-2H	1,989 K7-3H	2,385 K7-5H	2,992	**0%**
Stevens Hall (34)[2]	B	1,250	1,085 J12-4L	1,194 J12-5H	1,516 J13-3H	937 J13-8L		2,453	OK
Stimson Hall (35)[2]	B	1,625	2,231 J14-1H	5,589 J14-2L	3,965 K14-10L			7,820	OK
Storage (143A)	H	2,250	2,697 N13-2H					2,697	OK

Table 9-4 Required and Available Fire Flows at Major Campus Buildings at WSU After Water System Improvements and without irrigation (2020)

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Fire Flow (gpm) at Available Campus Hydrants					Maximum Available Fire Flow[1]	Status/Percent Deficient
			1	2	3	4	5		
Streit-Perham Hall (81C)[2]	L	2,875	1,113 K10-1L	4,245 K11-1L				4,245	OK
Student Recreation Center (819)	H	2,875	3,707 L9-1H	2,780 M9-1H	1,098 L10-8H			3,707	OK
Terrace Apartment Complex (650)	H	2,500	3,091 J7-1H	2,043 K7-3H	3,436 K7-4H	2,444 K7-5H	2,213 K7-8H	3,436	OK
Terrell Library (62A)[2]	B	3,000	2,836 K12-3L	2,014 K13-4H				4,850	OK
Thermal Fluids Research Building (57)	L	2,500	5,513 I13-2L	5,803 I14-1L				5,803	OK
Thompson Hall (1)[2]	L	1,375	4,464 J13-7L	937 J13-8L				4,464	OK
Todd Hall (55)[2]	H	3,000	2,076 J13-6H					2,076	**31%**
Troy Hall (36)	B	2,750	2,046 K14-1H	5,945 K14-2L				7,991	OK
Valley Crest Village (675)	H	3,500	4,054 M11-1H	3,068 M11-2H	3,464 M12-4H			4,054	OK
Van Doren Hall (37)	L	2,500	3,263 J12-7L					3,263	OK
Vet Quarantine Endoparasite Farm (197L)	H	1,500	2,952 Q10-1H	2,250 Q10-2H				2,952	OK
Veterinary Medical Research Building (818)[2]	H	2,000	4,036 L12-6H	4,618 L12-7H	3,342 L12-8H	4,622 L11-6H		4,622	OK
Veterinary Teaching Hospital (818)[2]	L	2,625	2,025 L15-3L	2,524 L15-4L	2,657 L15-5L			2,657	OK
Vogel Plant Biosciences Building (826)[2]	H	2,250	4,509 L12-4H	4,305 L13-1H	4,395 L13-6H			4,509	OK
Waller Hall (39)	L	3,000	4,355 J15-4L					4,355	OK
Washington Building (15)[2]	L	2,125	5,395 J15-2L	4,719 J15-4L				5,395	OK
Webster Physical Science Building (801)[2]	L	2,250	5,589 J14-2L	5,945 K14-2L	3,965 K14-10L			5,945	OK
Wegner Hall (45)	B	4,500	1,276 K14-6H	2,667 K15-3L				2,667	**41%**
Wilmer-Davis Hall (30)[2]	B	2,125	1,201 J12-1L	1,632 J12-3L	1,085 J12-4L	1,194 J12-5H	#N/A J12-8L	2,827	OK
Wilson Hall (40)	H	4,000	1,726 K13-3H	1,829 K13-4H				1,829	**54%**
WSU Children's Center (88)[2]	L	1,500	3,109 K15-17L	2,821 K16-2L				3,109	OK
Yakama Village Apts. (680)[2]	L	1,500	1,507 K18-1L	1,994 K17-4L	2,404 K17-2L	2,719 K17-6L	2,494 K17-5L	2,719	OK

NOTES:

1. Both High & Low Zone hydrants included if building is served by both zones or maximum hydrant If served by one zone only.

2. Building is fully sprinkled. Required Fire Flow shown has been reduced appropriately, typically 50%.

3. This is classified as a temporary nonconforming structure per Rod Holmes, WSU Fire Marshall and a listing of a required fire flow is not necessary. For this Table, the available fire flow is listed as the required fire flow.

Table 9-5 Required and Available Fire Flows at Major Campus Buildings at WSU

2020 Proposed Improvements and Transmission line (without irrigation)

Sorted on Percent Deficient

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
Dodgen Research Facility (74)	H	2250	967.14	57%
Wilson Hall (40)	H	4000	1829.04	54%
Wegner Hall (45)	B	4500	2666.86	41%
Carver Farm Agriculture Storage Building (120C)	L	2500	1517.12	39%
College Hall(4)	H	3250	2076.48	36%
Smith Gymnasium (12)	L	4250	2755.07	35%
Kruegel-McAllister Hall (69)	L	4250	2798.13	34%
Johnson Hall (76)	H	6000	4031.7	33%
Bookstore (64)	B	3250	2204.39	32%
Todd Hall (55)2	H	3000	2076.48	31%
Beasley Performing Arts Coliseum (806)	H	6000	4242.08	29%
Chinook Village (679)	L	3250	2380.07	27%
Old Golf Clubhouse (365)	H	1500	1130.56	25%
Information Technology Building (812)	H	4500	3620.29	20%
Chief Joseph Village (676)	H	3750	3201.95	15%
Administration Annex (38)	H	2500	2151.46	14%
Beef Cattle Breeding Barn (146)	H	2250	1971.79	12%
Kamiak Apartments (660)	H	2750	2567.66	7%
Indoor Practice Facility (835)3	H	2635	2555.15	3%
Stephenson Center Dining Hall (93C)	L	3500	3454.42	1%
Sloan Hall (78)	L	4750	4702.1	1%

Table 9-5 Required and Available Fire Flows at Major Campus Buildings at WSU

2020 Proposed Improvements and Transmission line (without irrigation)

Sorted on Percent Deficient

Major Campus Buildings (building number)	Zone (High, Low, Both)	Required Flow Fire (gpm)	Maximum Available Fire Flow[1]	Percent Deficient
Abelson Hall (32)2	H	2250	2230.6	1%
Steptoe Village (665)	H	3000	2991.71	0%

10.0 Financial Program

10.1 Operating Income

The only services generating income for the WSU water system is from four entities on or adjacent to the campus: The Pullman-Moscow Airport, Housing and Dining, the Student Recreation Center, and the Student Book Corp. The income covers the cost of providing service only for those 4 customers. The income does not provide funding for new projects or significant repairs. Table 10-1 summarizes the rates and fees for a typical month. As indicated in the table, water service at some customer facilities is not metered, so they are billed for water (and sewer) on a "per square foot" cost basis. Appendix J-1 includes a copy of a typical bill for each entity for the 2013 time period.

Table 10-1
Billing Summary

Location	Rate	Average Month
Airport	$91.95 + $2.13 per 100 CuFt June – October; $91.95 + $2.13 per 100 CuFt November through May. The first 500 CuFt are included in the $91.95 base cost. $21.66 fire line base fee	$143.22
Student Recreation Center	$0.90 per 100 CuFt	$486.82
Palouse Ridge Golf Course	$455.55 meter charge + Commercial rate: $3.15 per 100 CuFt + Irrigation Rate: $3.51 per 100 CuFt (charged rate if water usage above 48 million gallons per year)	$455.55
Residence Inn	Commercial rate: $250.15 + $2.13 per 100 CuFt Irrigation Rate: $91.95 + $3.46 per 100 CuFt	$1,930.37
Housing and Dining	$.0123 per square foot average.	$6,953*
Panda Express (CUB tenant)	$100.05 + $2.13 per 100 CuFt. The first 1000 CuFt are included in the $100.05 base meter cost	$292.77
Pizza Pipeline (CUB tenant)	$100.05 + $2.13 per 100 CuFt. The first 1000 CuFt are included in the $100.05 base meter cost	$100.05
WSECU (CUB tenant)	$24.25 + $2.13 per 100 CuFt. The first 500 CuFt are included in the $24.25 base meter cost	$24.25
Subway (CUB tenant)	$48.50 + $2.13 per 100 CuFt. The first 1000 CuFt are included in the $48.50 base meter cost	$84.22
		$10,470.25 **X 12 =$125,643**

*Average costs shown are the water services only; monthly invoices also include additional charges for sewer service.

10.2 Operating Expense

The operating expenses for the University water system include electricity, operating and maintenance costs, and permits and fees. The expense amounts for the fiscal years 2008 to 2014are shown in Table 10-2.

10.3 Revenue Sources

The University water system has six available sources from which to fund repairs and improvements:

1. The Power Plant and Utilities Operating Fund.
2. Minor Capital Renewal (MCR)
3. Minor Capital Improvements (MCI)
4. Minor Capital Safety (MCS)
5. Minor Capital Infrastructure
6. Major Capital

The Utilities Operating Fund is used for routine repair and maintenance. The MCR fund is for facility renewal and replacement projects up to $2,000,000. MCI is for new facility type projects valued up to $2,000,000. The Major Capital Fund is for projects valued over $5,000,000. MCS funds are administered by the Division of EH&S and can be used to fund new or replacement projects under the same constraints as MCR & MCS. Minor Capital Infrastructure is a new capital funding source for use in the utility distribution infrastructure. It has the same restrictions as other Minor Capital Funding sources. The source of all the capital funds is State appropriation of tax dollars. This allotment varies from biennium to biennium depending on the State's funding priorities. The Major Capital Fund requires that the project be specifically itemized for approval in the State budget. MCR, MCI, MCS, MC Infrastructure and Major Capital funds are not allotted for just water projects but include all campus facilities and infrastructure projects. Funding is assigned on a prioritized basis.

The following projects were completed during the last WSP cycle*:

1) Waterline upgrade and extension at Chief Joe apartments.
2) Repaired shaft in Well No. 6
3) Observatory Hill automatic cross-over valve between high and low systems.
4) Library Road waterline upsize; 480 LF of 6" to 12" west of Holland Library.
5) Overhaul of Well No. 7 and equip with monitoring ports to facilitate aquifer monitoring.
6) Library Road high system upsize, 400-feet of 6" to 12" Around Administration Annex.
7) Repair of East Observatory Hill Reservoir currently under construction.

*- these projects are typically related to surface upgrades; replacement of aging waterlines in these areas is justified. Additionally, these projects were previously identified by Facilities Operations as necessary for continued well maintenance and aquifer monitoring. All of these projects were identified previous to and separate from the hydraulic modeling analysis in Chapter 3. Items 1, 4, and 6 above are included in the year 2020 modeling analysis in Chapter 9 and are not included in the CIP because they are already under construction

It is anticipated that the $1,000,000 water metering project will be funded by Major Capital funds as the legislature allocates these funds to WSU. As the funding is assigned based on priority, it is anticipated that the legislature will view this metering favorably as it is mandated by DOH to be completed. The funds have not been provided as of January 2016, but WSU will continue to present this project to the legislature with the understanding of the urgency to meet DOH mandates under Municipal Water Law and that the project must be funded.

All other capital improvement projects listed in Table 9-1 are not given a specific year for completion as funding is not yet available nor is it foreseen what year the funding will become available. WSU will continue to present these projects to the State legislature and they will be completed as funds are allocated from the State. Therefore, no anticipated completion schedules are given for these projects.

TABLE 10-2 2008 – 2014 OPERATING EXPENSES						
FISCAL YEAR (June – July)	**WATER PUMPED (Million Gallons)**	**ELECTRIC PUMPING COSTS**	**MAINTENANCE, OPERATIONS, & CHEMICAL COSTS**	**PERMITS & FEES FOR PUMPED WATER SYSTEMS**	**ADMIN. CHARGE**	**TOTAL COST OF FRESH WATER PUMPED**
2007 – 2008	463.181	$67,101.39	$287,373.15	$26,991.10	$33,187.19	$414,653.57
2008 – 2009	434.039	$70,633.05	$302,498.05	$28,411.69	$34,933.89	$436,477.45
2009 – 2010	436.107	$74,350.57	$318,419.00	$29,907.04	$36,772.51	$459,449.94
2010 - 2011	420.153	$78,263.76	$335,177.90	$31,481.10	$38,707.91	$483,631.52
2011 – 2012	430.366	$82,382.91	$352,818.84	$33,138.00	$40,745.17	$509,085.81
2012 – 2013	431.312	$86,718.85	$371,388.25	$34,882.10	$42,889.65	$535,879.80
2013 – 2014	415.918	$91,283	$390,935	$36,718	$45,147	$564,084

Approximated based on 2013-2014 data

2015
Water System Plan Update
Washington State University
Pullman, Washington

final Report

volume 2 of 3 appendices

Washington State University
World Class. Face to Face.

Prepared By

Taylor Engineering, Inc.
245 E. Main Street
Pullman, Washington 99163

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WASHINGTON STATE UNIVERSITY
April 1, 2016

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APPENDIX A

Item 1 – DOH Water Facilities Inventory (WFI)

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 10/29/2013
Printed: 12/8/2014
WFI Printed For: On-Demand
Submission Reason: No Change

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
93200 Q	WASHINGTON STATE UNIVERSITY	WHITMAN	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 005586
GREGORY M. STREVA [PUBLIC HEALTH MGR] WSU FACILITIES OPERATIONS PO BOX 641150 PULLMAN, WA 99164-1150	WASHINGTON STATE UNIVERSITY JOHN READ WSU ENV HEALTH & SAFETY PO BOX 641172 PULLMAN, WA 99164-1172	TITLE: PUBLIC HEALTH MGR
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM**	
ATTN ADDRESS 2425 GRIMES WAY CITY PULLMAN STATE WA ZIP 99164	ATTN ADDRESS CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (509) 335-9040	Owner Daytime Phone: (509) 335-3041
Primary Contact Mobile/Cell Phone: (509) 595-8591	Owner Mobile/Cell Phone: (509) 335-9000
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax: | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

[x] Agricultural	[x] Hospital/Clinic	[x] Residential
[ ] Commercial / Business	[x] Industrial	[x] School
[x] Day Care	[ ] Licensed Residential Facility	[ ] Temporary Farm Worker
[x] Food Service/Food Permit	[x] Lodging	[x] Other (church, fire station, etc.):
[x] 1,000 or more person event for 2 or more days per year	[ ] Recreational / RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[ ] City / Town	[ ] Federal	[ ] Private	[x] State	6,200,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
93200 Q	WASHINGTON STATE UNIVERSITY	WHITMAN	A	Comm

15	16	17	18										19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT								SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER		PERMANEANT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	Power Plant Well #1 - AGG323		X												X			X					247	417	SE NW	05	14N	45E
S02	InAct 01/31/2001 Power Plant Well #2		X												X		X						214	1	SE NW	05	14N	45E
S03	Power Plant Well #3 - AEH241		X												X			X					223	1100	SE NW	05	14N	45E
S04	Power Plant Well #4 - AEH240		X										X			Y		X					275	1500	SE NW	05	14N	45E
S05	Whitlow Well #5		X												X			X					396	450	NE SW	34	15N	45E
S06	Coliseum Well #6 - AGG329		X										X			Y		X					702	1500	NW NW	04	14N	45E
S07	69880/Pullman Water Dept, City of	69880 V													X			X						0			00N	00E
S08	Well #7 - AGG328		X										X			Y		X					1814	2500	SW NE	05	14N	45E
S09	Well #8		X										X			Y		X					542	2500	NE NW	04	14N	45E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
93200 Q	WASHINGTON STATE UNIVERSITY	WHITMAN	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	4096	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	0		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	145		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	4096		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	250	250	
28. TOTAL SERVICE CONNECTIONS		4346	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per [illegible]? 6019

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	15860	15860	15860	15860	15860	7962	7962	16887	16887	16887	16887	16887
B. How many days per month are they present?	21	21	21	21	21	21	21	21	21	21	21	21

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	25	25	25	25	25	15	15	25	25	25	25	25

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____
DATE: _____

PRINT NAME: _____
TITLE: _____

WS ID	WS Name
93200	WASHINGTON STATE UNIVERSITY

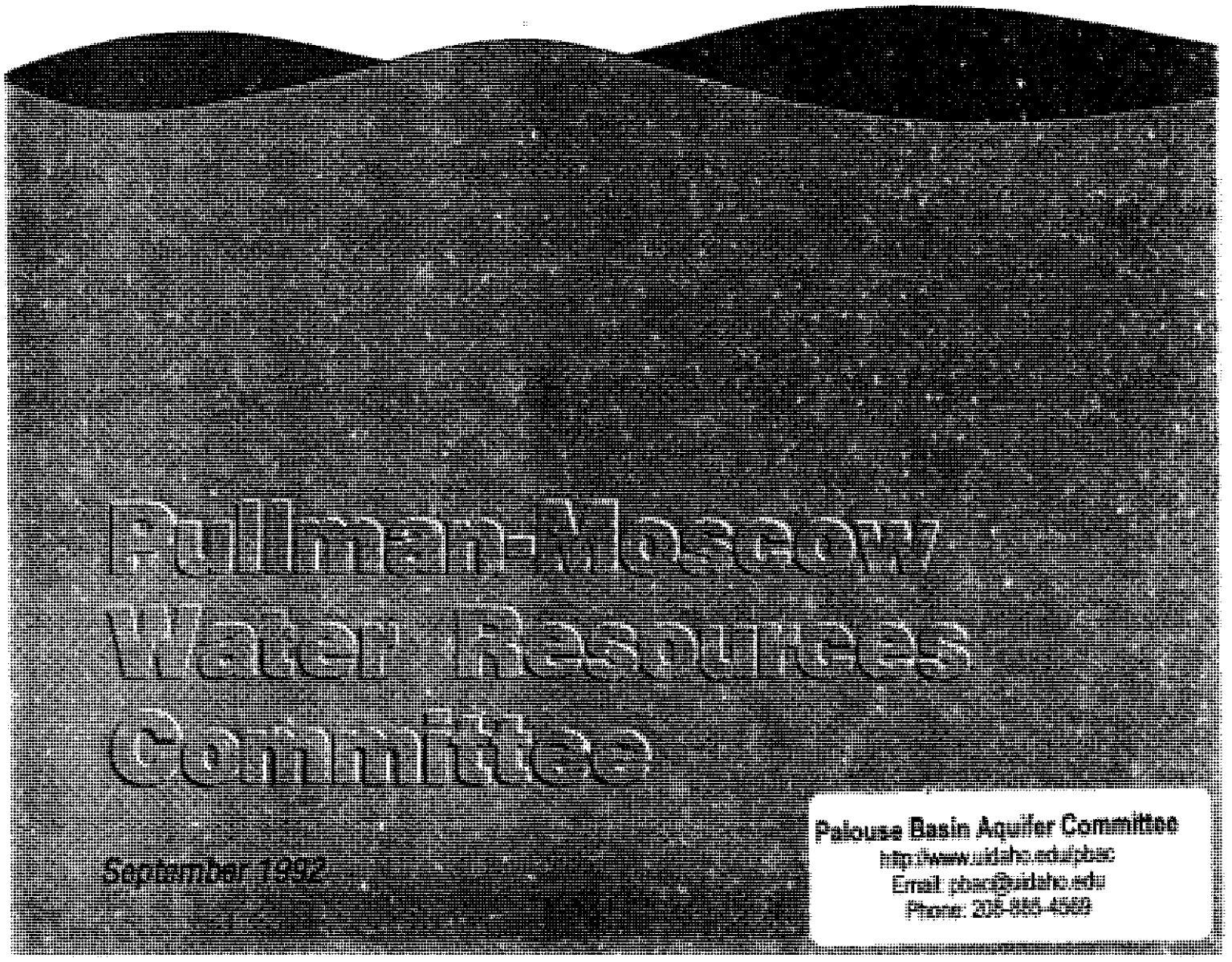
Total WFI Printed: 1

APPENDIX A

Item 2 – Pullman-Moscow Groundwater Management Plan (GWMP)

PBAC COPY

Ground Water Management Plan



September 1992

Palouse Basin Aquifer Committee
http://www.uidaho.edu/pbac
Email: pbac@uidaho.edu
Phone: 208-885-4569

Acknowledgements

ACKNOWLEDGEMENTS

Many people contributed to the development of the Ground Water Management Plan between its start during the spring of 1989 and its acceptance by all six entities, the Idaho Department of Water Resources, and the Washington Department of Ecology in the spring of 1992. However, the plan would not have been completed without the effort of *Kenneth A. Hall* and the various people who served on the Management Plan Subcommittee. Some of those members were *Jim Hudak, Mardi Baron, Jim Nebel, Pam Peterson, Ken Abbey, Craig Benjamin*, and *George Bloomsburg*. The work of *Jeff Filler* as a consultant during the spring of 1990 also was necessary to get the plan pulled together so the committee could finish it. The work of all these people is acknowledged and appreciated.

The publishing assistance of the University of Idaho Facilities Management Communications Department, *Kay Packer* (Coordinator) and *Temple Kinyon* (Graphics Coordinator), and the editing of *Bob Seale* are greatly appreciated.

Lastly, the attention of *Tom Townsend* and *Cal Warnick* was important to the plan and we appreciate their interest in the water resources of the region.

We hope the Ground Water Management Plan will serve the communities well in the years to come.

George Bloomsburg
Executive Secretary
Pullman Water Resources Committee

September 1, 1992

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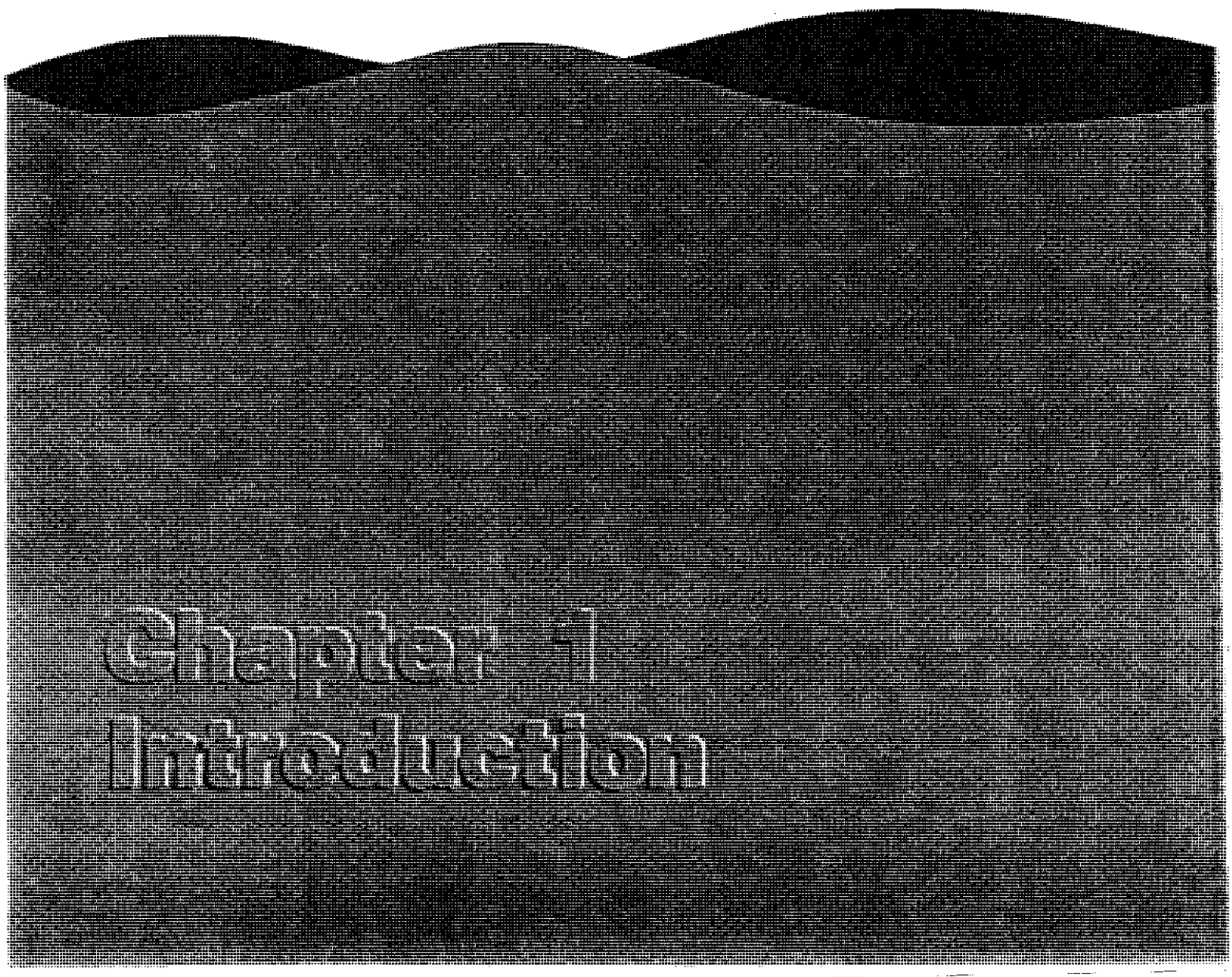

Chapter 1
Introduction

THE PULLMAN-MOSCOW

GROUND WATER MANAGEMENT PLAN

1. INTRODUCTION

1.1 General

The Pullman-Moscow area of eastern Washington and northern Idaho relies almost entirely on ground water for its supply of municipal, institutional, and domestic water. Concern over declining ground water levels in the area motivated the municipalities and universities to form the Pullman-Moscow Water Resources Committee (hereafter referred to as the **COMMITTEE**) to address the declining ground water table issues and coordinate studies of the ground water and alternative water sources. The **COMMITTEE** has more recently been charged with developing a ground water management plan for the area by the governing states' water resource agencies. This document represents the plan developed by the **COMMITTEE**. The Pullman-Moscow Ground Water Management Plan (hereafter referred to as the **PLAN**) . The purpose of the **PLAN** is to ensure that a safe supply of ground water, in terms of quantity and quality, will continue to exist for present and future use in the Pullman-Moscow Basin (hereafter referred to as the **BASIN**).

Chapters 1 and 2 provide introduction and historical background to the **PLAN**. Chapter 3 outlines ground water management in the context of state water laws in Washington and Idaho. Chapter 4 outlines the mission of the **COMMITTEE**. Chapter 5 describes technical aspects of the **BASIN** as well as the general response of ground water aquifers to pumping withdrawals. Chapter 6 contains the program in which management goals and strategies of the local entities are specified. A bibliography and appendices are also included.

1.2 Committee Membership

Membership of the **COMMITTEE** consists: Pullman, Washington; Moscow, Idaho; Whitman County, Washington; Latah County, Idaho; Washington State University; and the University of Idaho (the **ENTITIES**). Each of the **ENTITIES** has two representatives on the **COMMITTEE**. An Executive Secretary also serves the **COMMITTEE** as a part-time employee to perform administrative duties, provide technical assistance, and act as a liaison between the **ENTITIES** and other groups or individuals.

1.3 Charter between Pullman, Moscow, University of Idaho, and Washington State University

The **COMMITTEE** operates as the result of several intergovernmental agreements among the city governments of Pullman and Moscow, the two land-grant universities, and more recently, the two county governments.

Through a 1988 Intergovernmental Agreement (see section 4.2 and appendix A) the **COMMITTEE** is charged to coordinate planning in order to ensure a long-term supply of water for the **ENTITIES**, encourage water conservation, maintain an area ground water data base, investigate the primary and alternative water sources, and act as a liaison between the **ENTITIES** and the governing state agencies.

Through a **Resolution of Understanding** among the city and county governments, the universities, and the governing state water agencies (the Washington Department of Ecology and the Idaho Department of Water Resources), the state governments have agreed to work with the **COMMITTEE** in the formation of the **PLAN**.

1.4 Ground Water Basin Definition, Geology, and Land Use

The **BASIN** managed by the **PLAN** is defined roughly by the surface drainage areas of the South Fork of the Palouse River upstream of the confluence of Four Mile Creek and the South Fork of the Palouse River, and a portion of the Union Flat Creek Drainage, as shown in Figure 1. The studies of Smoot and Ralston (1987) and Lum, *et al.* (1990) includes this same area in addition to a portion of the main Palouse River drainage between Potlatch, Idaho and Colfax, Washington. For modeling purposes, the **BASIN** extends to the Snake River and includes the southwest facing side of the Snake River Canyon. Figure 2 shows the potential impact area of the **PLAN**. The area of potential impact includes the greater Palouse River Basin and the Lower Granite Pool on the Snake River.

Figure 3 shows graphically the main surface and subsurface components of the **BASIN**. Most of the **BASIN** is composed of loess loam soils overlaying many layers of basalt. In the eastern most part of the **BASIN**, the loess soils overlie the granitic basement formation, which extends downward and westward, forming a lower boundary to the basalts. The basalt formations and overlying loess soils continue westward from the **BASIN** toward the Columbia Basin of central Washington. Along the southwestern edge of the **BASIN**, the Snake River Canyon cuts deeply into the basalt flows, which are in places several thousand feet thick. Between the basalt layers lie sedimentary deposits (or interbeds). The basalts and interbeds make up the primary aquifer of the **BASIN**. As one moves westward in the **BASIN** from Moscow to Pullman, the interbeds become thinner and play a less important role in the ground water system.

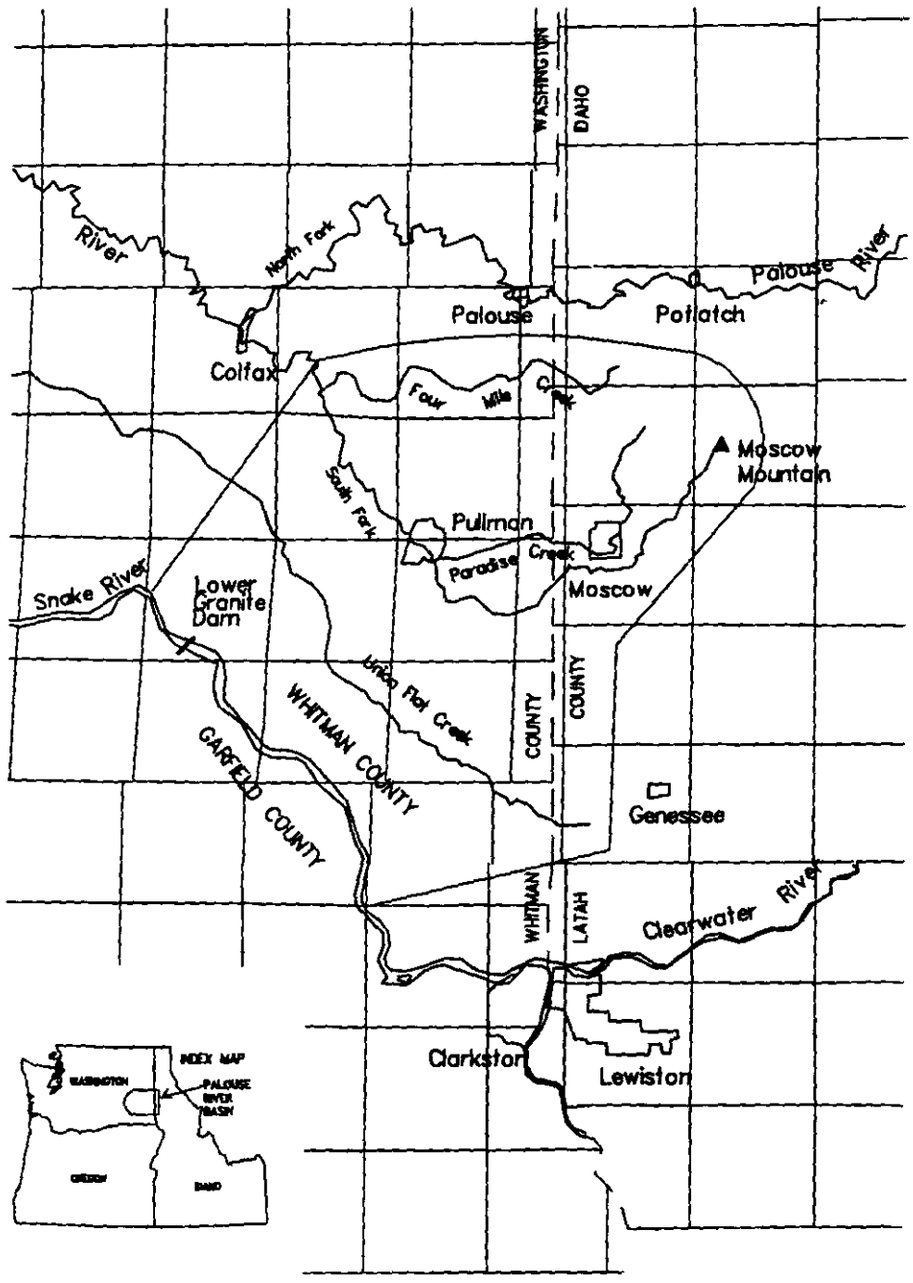


Figure 1. Pullman-Moscow Ground Water Basin (from Lum *et al.*, 1990)

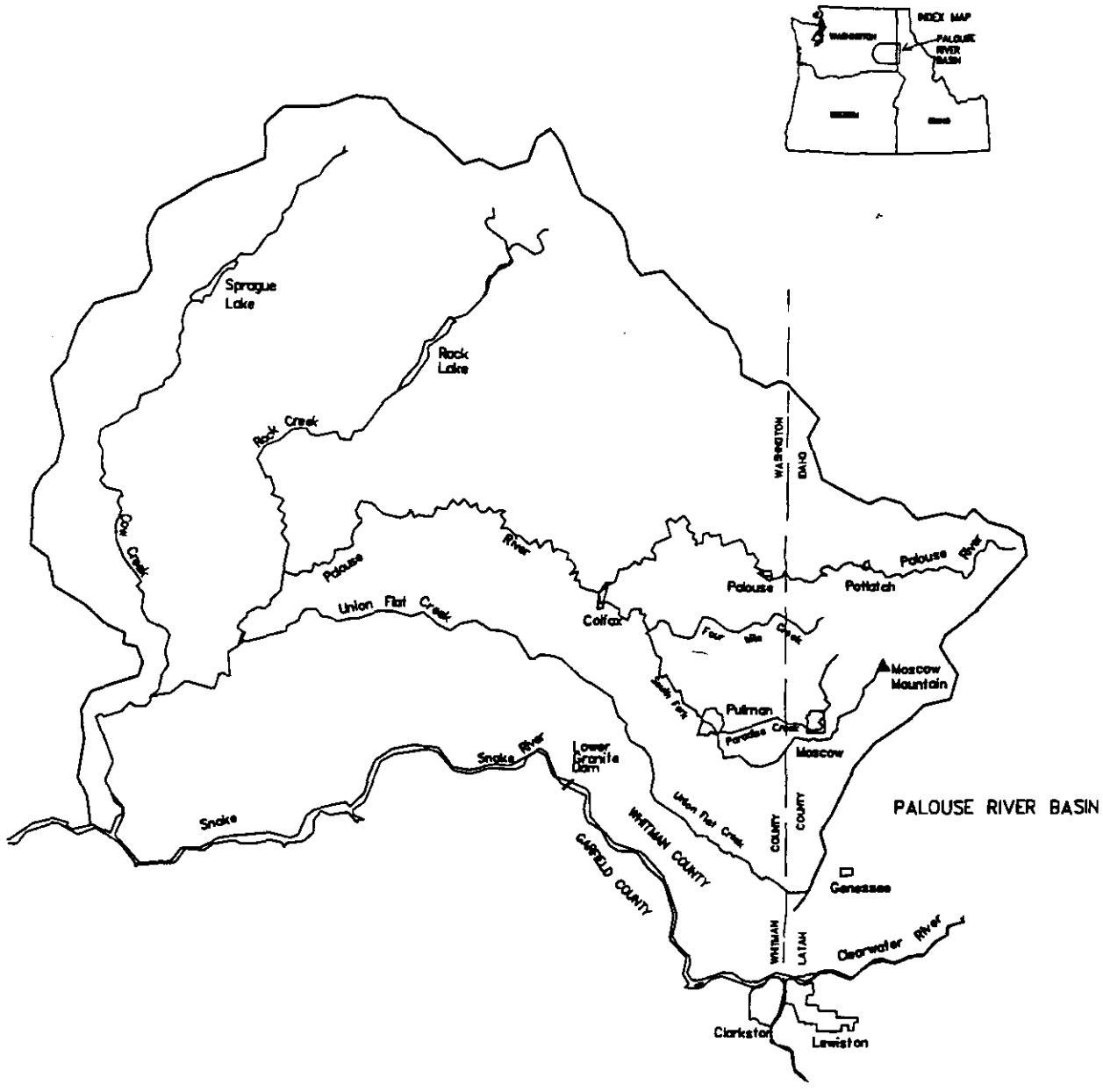


Figure 2. Pullman-Moscow Ground Water Management Plan Potential Impact Area

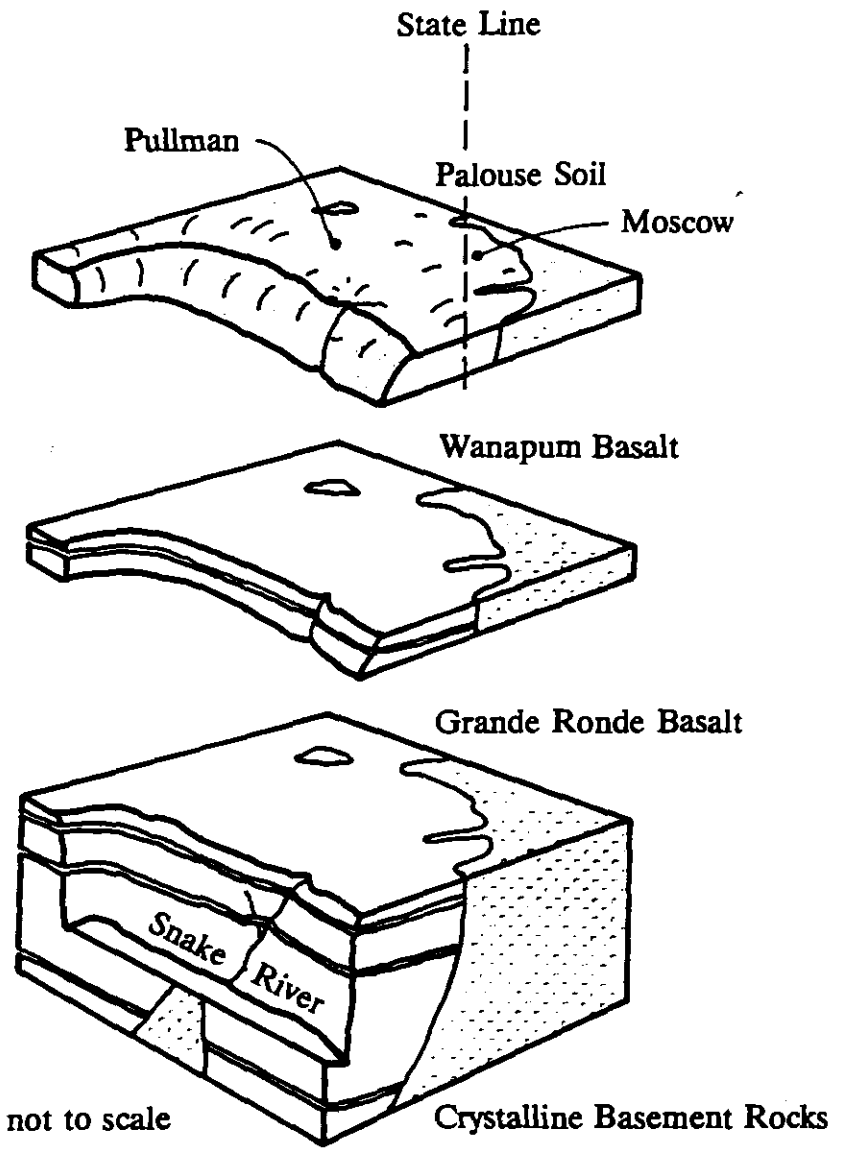


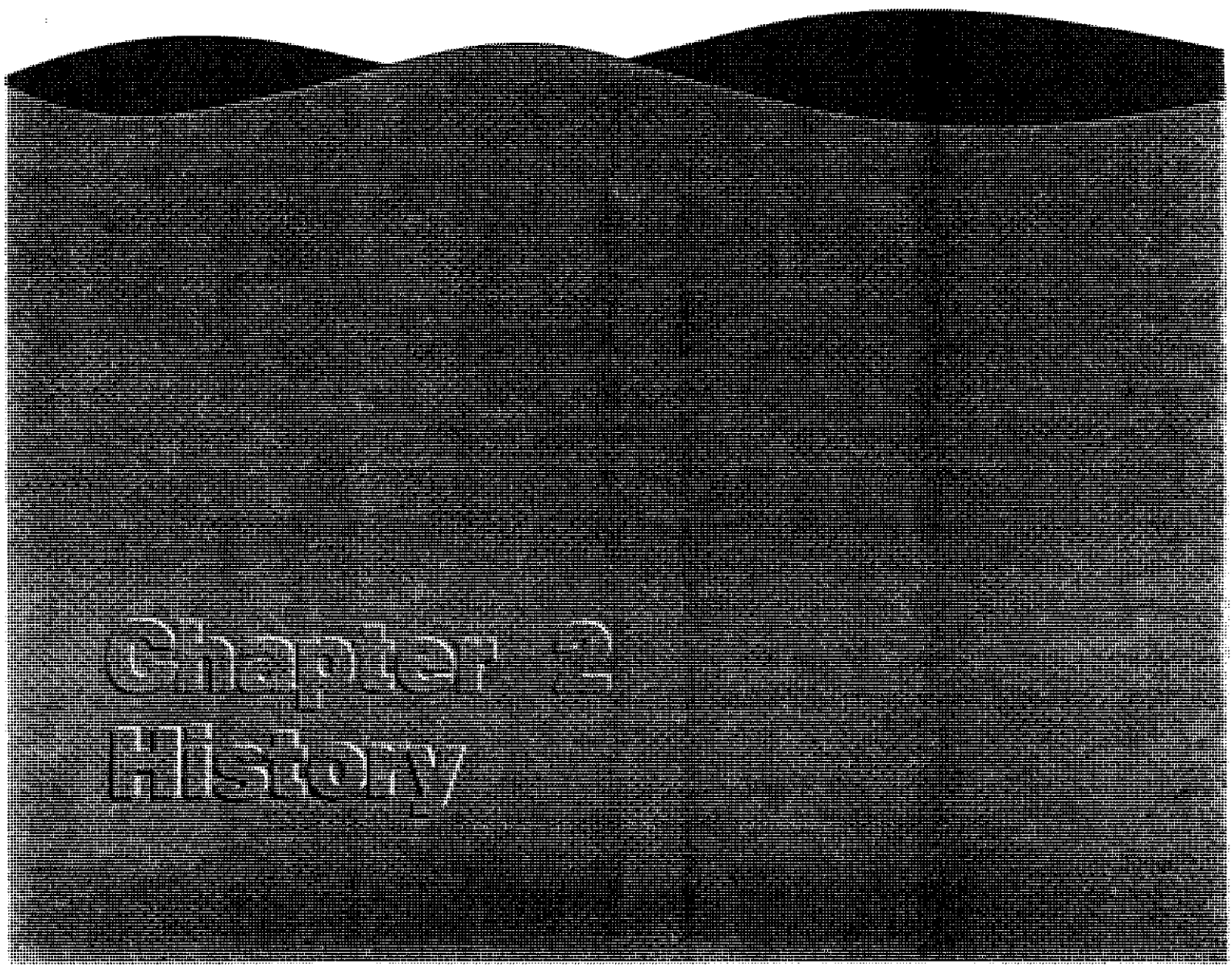
Figure 3. Graphical Representation of the Pullman-Moscow Ground Water Basin

The cities of Pullman and Moscow and the two universities are the major water purveyors in the **BASIN**. Most of the water is pumped from wells penetrating various depths of the basalt aquifers. Primary uses of the water are municipal, institutional, and private; essentially no ground water in the area is used for agricultural irrigation. Primary land use in the **BASIN** is dry-land farming of small grains, peas, and lentils. The high water storage capacity of the loess soils is sufficient to retain enough precipitation from the fall and winter months to carry most of the crops through the drier parts of the year. In the western part of the **BASIN** where the precipitation is less, successful dry land farming includes rotating the fields into fallow to allow sufficient moisture carryover from one year to the next. Prior to development, beginning in the 1800's, most of the **BASIN** was natural grassland and little was woodland.

Annual precipitation in the **BASIN** ranges from 15 inches along the Snake River to about 50 inches at the top of Moscow Mountain at the northeast corner. Precipitation averages 22 inches annually for Pullman and 24 inches annually for Moscow. Most of the precipitation in the area falls in the period November to June. In general, precipitation in the **BASIN** increases eastward and with increased elevation. Streams in the area flow generally to the west and northwest. Ground water in the **BASIN** is believed to flow primarily westward toward the Snake River.

1.5 General Statement of Ground Water Concerns

Water levels in many wells in the Pullman and Moscow areas have declined since their first use. At times, water level declines have averaged one to two feet per year and have been greatest near the city centers. Concerns over the water declines have motivated a number of geologic and ground water modeling studies for the **BASIN**, as well as an evaluation of possible alternative water supplies. Water quality issues are not a major concern in the **BASIN**, because ground water quality is excellent and meets all federal drinking water standards.


Chapter 2
History

2. HISTORY

2.1 General

Prior to the turn of the century, free flowing artesian wells were observed in both Pullman and Moscow. Water usage over the years has caused water levels in both the Pullman and Moscow areas to decline, at rates of one to two feet per year (Figure 9, see Chapter Section 5.4). Originally it was believed that Pullman and Moscow obtained water from different aquifers, due to differences in the water chemistries. As Moscow city wells were drilled deeper during the 1960's, it became apparent that both cities are served by a larger common ground water system. Water levels under both cities continued to decline, and several geologic and ground water modeling studies have investigated the dependability of the Pullman-Moscow aquifers for meeting future water use needs. Studies also have been made of possible alternative water sources for the area. Although the **ENTITIES** have had to drill deeper wells over time to obtain water, costs of obtaining and providing water in the area are lower than in many areas of the nation.

2.2 Geologic Studies

A number of geologic and geohydrologic studies have been conducted over parts or all of the **BASIN**. Exhaustive lists of previous investigations can be found in Ross (1965), Smoot and Ralston (1987), and Lum, *et al.* (1990). Ten Eyck and Warnick (1984) have provided a comprehensive annotated catalog of reports and studies pertinent to the Pullman-Moscow water supply.

Russell (1897) reported flowing artesian wells in Pullman and Moscow in the 1890's. Foxworthy and Washburn (1963) and Walters and Glancy (1969) provided significant geohydrologic studies of the area. Foxworthy and Washburn (1963), Ross (1965), Ringe (1968), Brown (1976), and Cotton (1982) have provided discussions of the geology of the **BASIN**. Klein (1987) and Bockius (1985) provided information on the basalt depths and basalt/granite interface. These and other studies of the **BASIN** have resulted in a general understanding of the ground water system as discussed in Sections 1.4 and 5.2, and used in more recent studies of Smoot and Ralston (1987) and Lum, *et al.* (1990).

2.3 Model Studies

Ground water studies of the **BASIN** have been conducted to provide a better understanding of the ground water system and to evaluate or predict future ground water levels. Jones and Ross (1972) modeled the ground water system of Moscow. Their results suggested that pumping in Moscow area wells was less than the recharge to the area, and that ground water should be able to sustain the needs of Moscow beyond the year 2000. Jones and Ross also suggested that the use of artificial recharge through recharge wells may be feasible for the upper portion of the Moscow area aquifers.

Barker (1979) used a two-dimensional ground water model to study the ground water system supplying both Pullman and Moscow. Barker considered an area of roughly 8-mile radius centered around Pullman. He modeled the subsurface aquifers as a single basalt system. His model underestimated water level declines for the area; water levels estimated for the year 2000 were reached by 1985.

Smoot and Ralston (1987) and Lum, *et al.* (1990), studied the **BASIN** using updated geologic information and a more complex, three-dimensional ground water model. The **BASIN** boundaries used by Barker were expanded to include the entire management **BASIN** shown in Figure 1 as well as a portion of the main Palouse River between Potlatch, Idaho and Colfax, Washington. The basalt formations were divided into an upper Wanapum basalt layer and a lower Grande Rhonde basalt. The **BASIN** was divided horizontally into squares 1/2-mile on a side. In the vertical direction, the **BASIN** was divided into 3 layers: one layer representing the loess soil profile, and two layers representing the basalt formations.

Results of the model studies by Smoot and Ralston (1987) and Lum, *et al.* (1990), suggest that the continuation of water level declines would depend on the rate of usage of the aquifers. These model studies suggest *"that ground water levels would stop declining if ground water pumpage were to stabilize at a constant level. However, ground water levels will continue to decline in the foreseeable future as long as ground water pumpage continues to increase"* [Lum, *et al.*, (1990) page 1]. Both studies also suggest that the present rate of water withdrawal is somewhat less than the rate at which the **BASIN** is recharged.

2.4 Alternative Water Sources (Imported Water)

Water level declines in the **BASIN** have motivated studies of alternative sources of water for the area. Ebasco Services (1958) suggested that supplemental water supplies could be obtained using surface storage reservoirs in the **BASIN**. A number of water transfer schemes bringing water from outside the **BASIN** were also considered, ie., diversion from the Potlatch River near Julietta; diversion from the Clearwater River upstream from Lewiston; and diversion from the North Fork of the Palouse River. Stevens, *et al.* (1970) proposed six potential water supply sources: two diversion and storage schemes using the North Fork of the Palouse River; two schemes utilizing water from the Potlatch River; a scheme utilizing water pumped from Dworshak Reservoir; and a scheme of pumping water from Lower Granite Reservoir near Wawawai. Stevens, *et al.* (1973) also reported on a reconnaissance level feasibility study of a combined pumped-storage municipal water supply project near Union Flat and Almota Creeks.

Some of the above schemes as well as a number of proposed flood control projects for the Palouse River Basin are summarized in a recent reconnaissance study by the U.S. Corps of Engineers (1989). The proposed alternatives identified by the corps are shown in Figure 4. Ground water and municipal water supply concerns in the **BASIN** have not

been severe enough to motivate further study of these alternatives as of spring 1990.

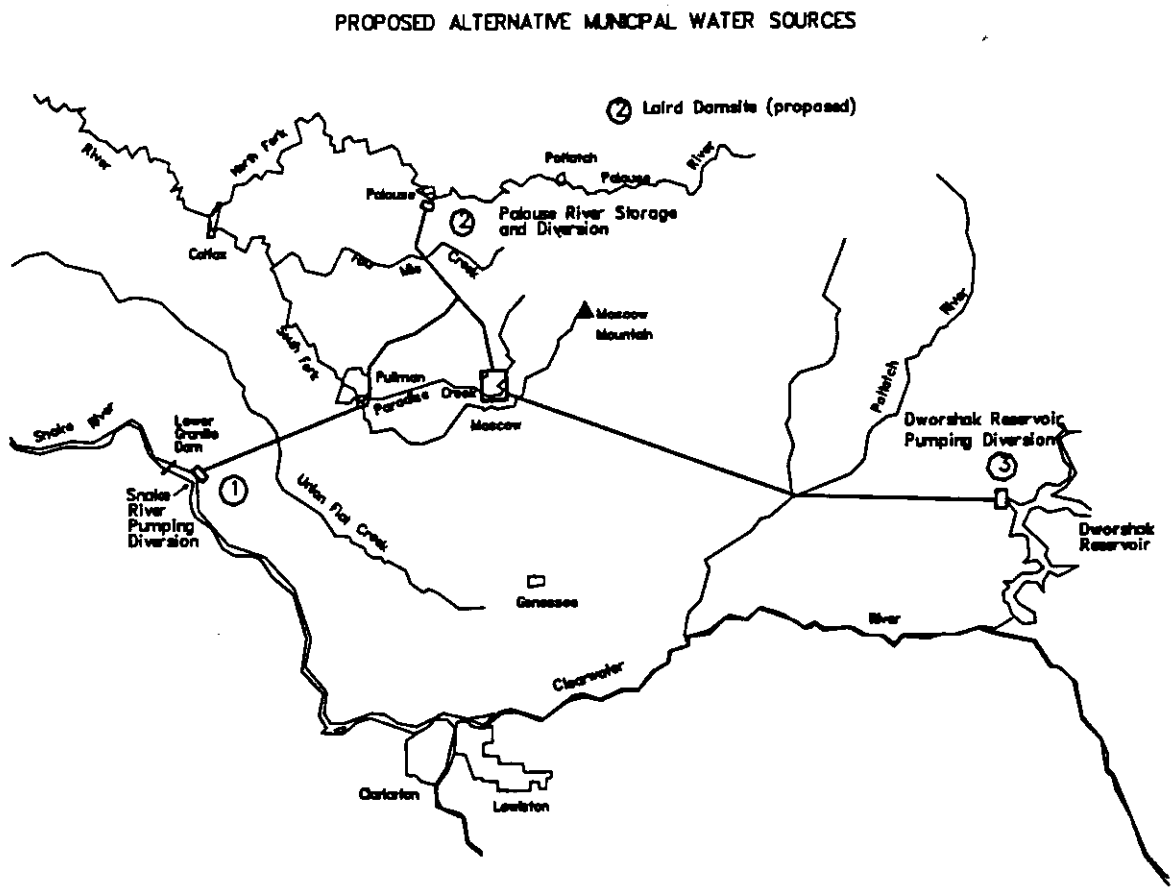
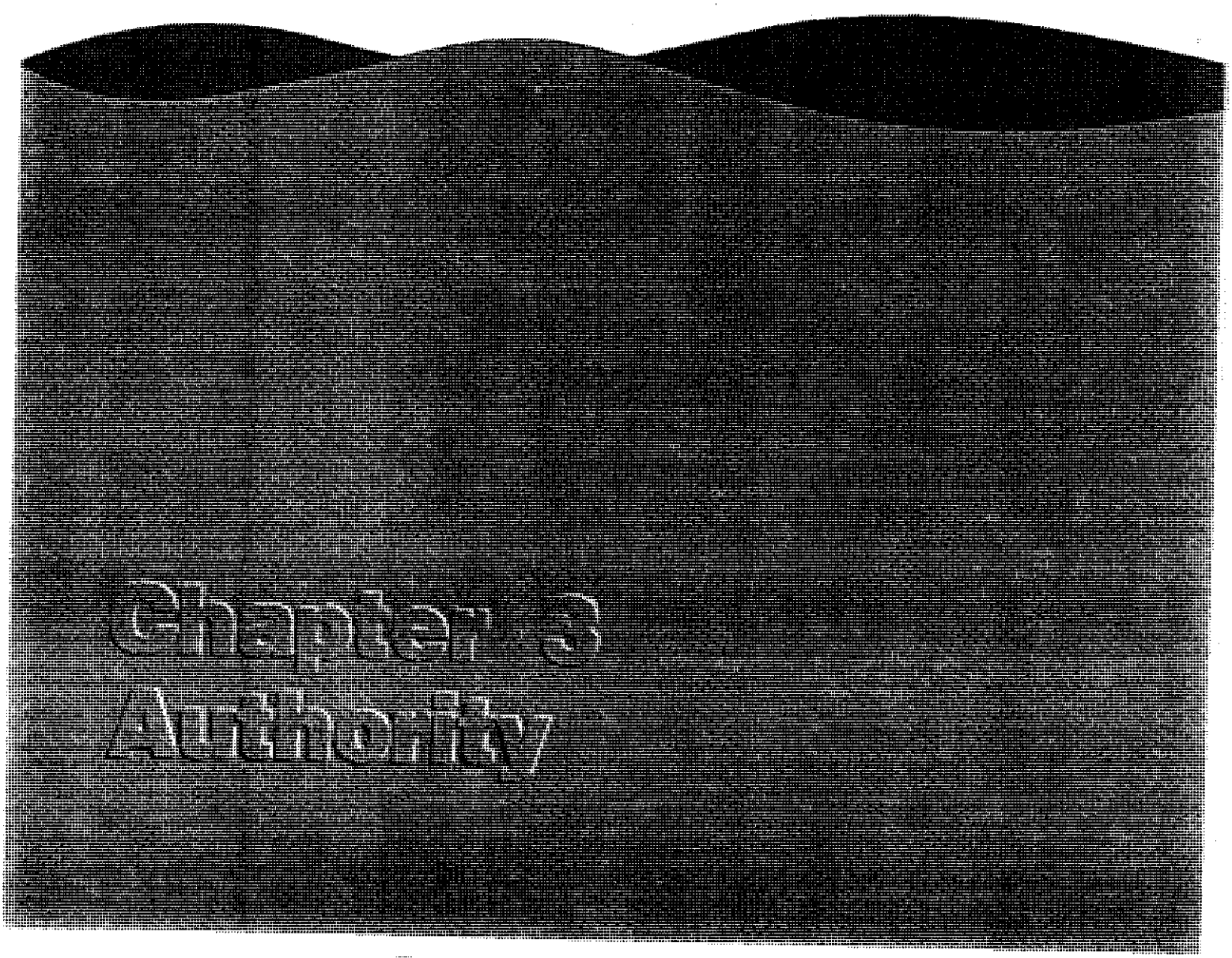


Figure 4. Proposed Municipal Water Supply Alternatives (as identified by the Corps of Engineers, 1989).


Chapter 3
Authority

3. AUTHORITY

3.1 General

The state governments of Washington and Idaho are charged with the administration of ground and surface water rights within their boundaries. Ground and surface waters are considered public property, and are "appropriated" in the form of "water rights". In the states of Washington and Idaho, water rights are obtained and protected in terms of a "prior appropriation" doctrine, such that a right that is "first in time" is "first in right". Water rights are generally established (through an application process) by diverting water that has not been previously appropriated and putting it to a beneficial use. In principle, the prior appropriation doctrine mandates that in periods or conditions of water shortage, "junior" (in time) water rights holder's water supplies are reduced or terminated to protect the "senior" rights.

The appropriation of ground water is generally limited to the amount of natural recharge to the **BASIN** or aquifers. However, the natural recharge to a ground water system is often difficult or impossible to determine. As a result, a recharge criterion is rarely satisfactory for actually limiting ground water use. Instead, water use is generally limited on the basis of feasible or economic pumping lift and potential impairment to present or senior users. In conditions of over-appropriation of ground or surface water, junior water rights are generally regulated in favor of valid senior water rights.

3.2 Administration Under the Washington Code

In Washington, ground water use is limited to provide a "safe sustained yield" to existing water rights. The safe sustained yield criterion includes the protection of economic or feasible pumping lift and protection against impairment of present or senior users.

Washington code also allows for the designation of "Ground Water Management Areas" and "subareas". Ground Water Management Areas may be designated in areas of existing or potential water supply problems (either quantity or quality). The Ground Water Management Area Program in Washington is designed to promote ground water management at the local level with assistance (both administrative and financial) from the state.

Codes specific to ground water use in Washington are listed below.

- Appropriation doctrine for ground water--Revised Code of Washington (RCW) 90.44.010.
- Administration of Ground Water Rights--RCW 90.44 and Washington Administrative Code (WAC) 173-100.050.
- Ground water use limited so as to maintain a safe sustained yield--RCW 90.44.130.

- Prevention of ground water waste--RCW 90.44.110.
- Impairment of senior users--WAC 173.150.050.
- Definition of impairment--WAC 173.150.060.
- Determination of reasonable or feasible pumping lift--WAC 173.150.050.
- Adjudication of ground water rights--RCW 90.03.110 and 90.44.220.
- Ground Water Management Areas and Subareas--RCW 90.44.180 and 90.44.400.
- Ground Water Management Areas and Programs--WAC 173-100.050.
- Protection of upper aquifer zones--WAC 173-154.
- Protection of withdrawal facilities associated with ground water rights--WAC 173-150.
- Well drillers licensing and well construction programs--RCW 18.104.

3.3 Administration under the Idaho Code

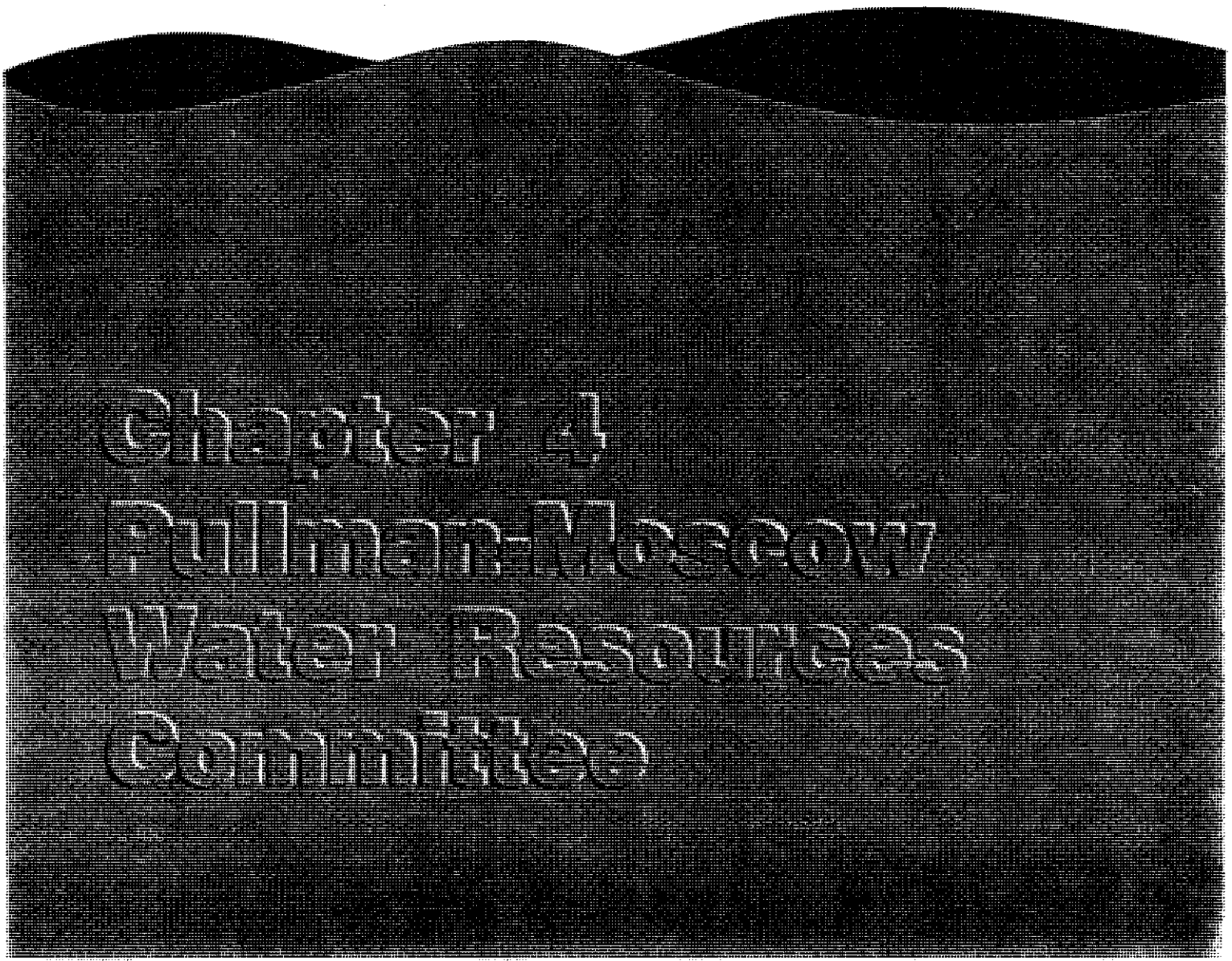
Ground water in Idaho is managed using three principle criteria: 1) Ground water development or use must not exceed the average annual recharge to the basin; 2) existing ground water users must be protected in regard to reasonable pumping levels; and 3) a reasonable enforcement of relative priorities among users must not block full economic development of a ground water basin. In Idaho, the Director of Water Resources may restrict any water right application based on the above criteria.

Idaho code also allows for the designation of Ground Water Management Areas. A Critical Ground Water Area may be designated wherever or whenever the ground water supply is insufficient to provide for irrigation or other uses at the present rate of withdrawal. In a Critical Ground Water Area, the Director of Water Resources may deny future water right applications as well as terminate or reduce present use, in accordance with priority dates. Ground Water Management Areas may be designated in areas believed to be approaching the "Critical" stage. In such areas the Director may also deny future permit applications and reduce present usage. Ground Water Management Area designation can be brought about by a decree of the Director, while Critical Ground Water Area designation involves a public hearing procedure.

Codes specific to ground water use in Idaho are listed below.

- Appropriation doctrine for ground water--Idaho Code (IC) 42-103.

- Administration of ground water--IC 42-201.
- Ground water use limitation in regard to natural recharge--IC 42-.237a.
- Prevention of ground water waste--IC 42-237a.
- Protection of reasonable pumping levels--IC 42-226.
- Impairment of senior users--IC 42-226.
- Adjudication of water rights--IC 42-1406.
- Ground Water Management Areas--IC 42-233b.
- Critical Ground Water Areas--IC 42-233b.
- Recharge Districts--IC 42-4201A and 42-4202.


Chapter 4
Pullman-Moscow
Water Resources
Committee

4. THE PULLMAN-MOSCOW WATER RESOURCES COMMITTEE

4.1 General

A Pullman-Moscow Water Resources Committee represented by Pullman, Moscow, University of Idaho, and Washington State University was formed in 1967 to undertake a cooperative effort in addressing the water supply problems being faced by the **ENTITIES**. Since its formation, the **COMMITTEE** has supported a number of studies of the local ground water resource and alternative sources of water for the **ENTITIES**. The **COMMITTEE** has worked in cooperation with the Washington Department of Ecology, the Idaho Department of Water Resources, the U.S. Geological Survey, and the U.S. Army Corps of Engineers on numerous water issues. The **COMMITTEE** has also retained various consultants on water supply issues or concerns. In 1988, membership of the **COMMITTEE** was extended to Whitman and Latah Counties. In 1989, a Resolution of Understanding was developed among the **COMMITTEE** and the State agencies whereby the **COMMITTEE** would, with assistance of the two States, develop the **PLAN** for the **BASIN**.

Member **ENTITIES** are outlined in Section 1.2. Representatives of the **ENTITIES** at the time of plan adoption are listed in Appendix E.

Costs of operating the **COMMITTEE** are borne by the **ENTITIES** and include salaries and consultant fees, clerical help, research and publishing costs, and other expenses. Costs are divided between the **ENTITIES** according to shares. The two cities and two universities have two shares each, while each of the counties has one share, for a total of ten shares.

4.2 Intergovernmental Agreements

Several intergovernmental agreements have been executed by the **ENTITIES** for purposes such as retaining consultants, determining operating budgets, and defining membership. Specific purposes of the Intergovernmental Agreement of 1988 (which superseded previous agreements) are listed below:

1. Coordinate planning to assure a long-range supply of water to the **ENTITIES**.

2. Update and expand the data base already begun during earlier studies.

3. Encourage conservation in order to extend the useful life of the aquifers.

4. Investigate alternative sources of water which can meet the incremental increases in demand of the region.

5. Educate and advise the **ENTITIES** and the public on the quality and quantity of the public water supplies serving Pullman, Moscow, and the surrounding area.

6. Act as a liaison between the **ENTITIES** on water resource concerns.

7. Promote communication between the **ENTITIES**, the Washington State Department of Ecology, and the Idaho Department of Water Resources (see Appendix for full document).

4.3 Role of the Executive Secretary

In 1988 the paid position of an Executive Secretary for the **COMMITTEE** was established. Specific duties of the Executive Secretary are summarized below:

1. To maintain a data base of information on the **BASIN** ground and surface waters, including pumping records and copies of reports written on the **BASIN** over the past 100 years.

2. To serve as a liaison between the two state water agencies and the **COMMITTEE.**

3. To serve as an advisor to the **COMMITTEE** concerning technical aspects of proposed future studies.

4. To provide continuity to the **COMMITTEE.**

5. Perform administrative services of the **COMMITTEE** including minutes and mailings.

6. Aid the **COMMITTEE** in formulating an action plan for the **ENTITIES** (see Appendix for full document).

4.4 Resolution of Understanding

Specific Objectives agreed upon in the Resolution of Understanding of 1989 among the **ENTITIES** and the state water agencies are listed below:

1. The **COMMITTEE** will pursue funding to conduct and promote studies and research relative to improving knowledge of the water resources of the **BASIN.**

2. The **COMMITTEE** will prepare a management plan for the **BASIN** in cooperation with the two state agency parties, The Washington State Department of Ecology and the Idaho State Department of Water Resources, which will address both water quantity and water quality concerns.

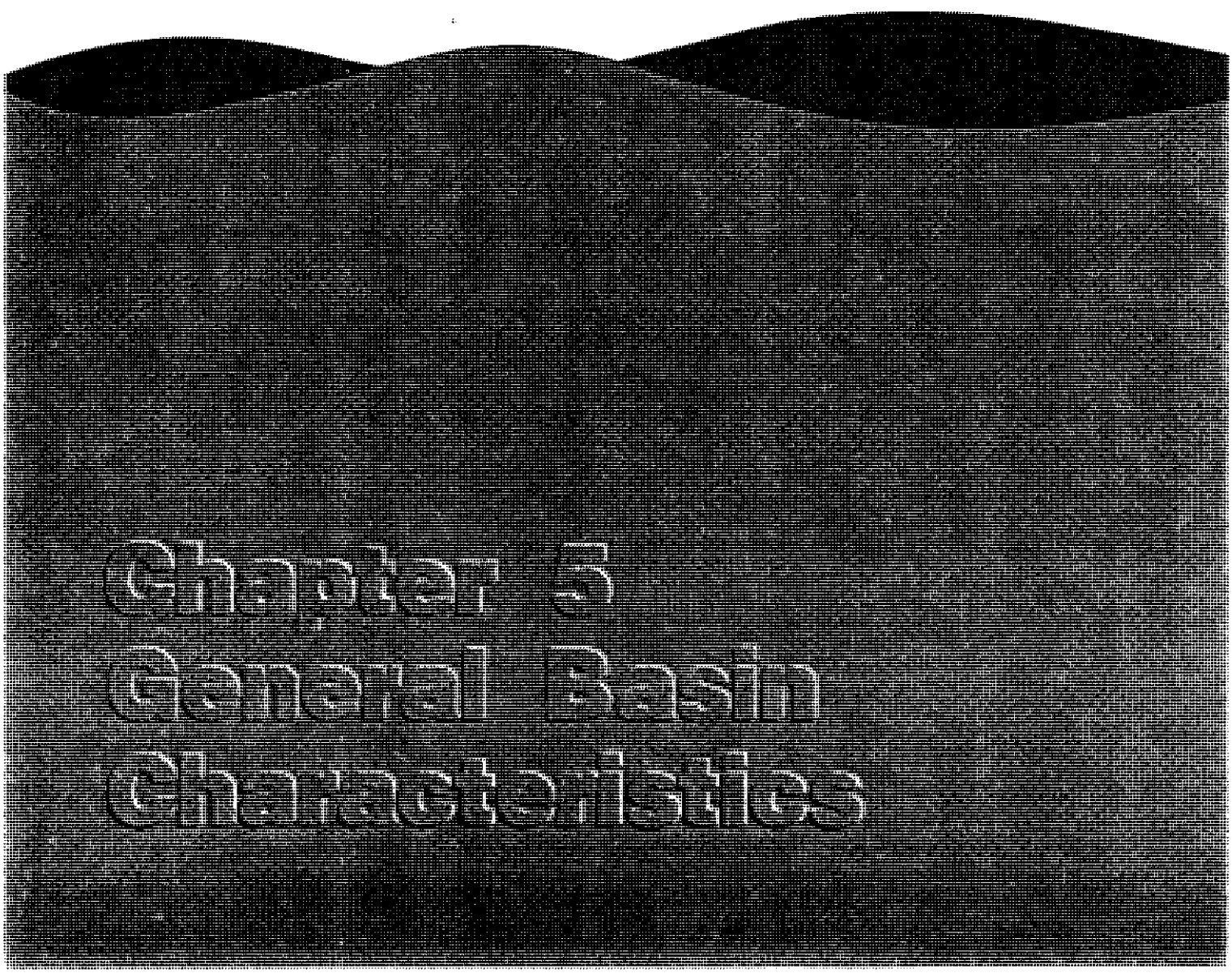
3. The **COMMITTEE** will prepare, as an initial step in the development of the management plan a principal work plan and time schedule which will outline the concerns and issues to be studied. This work plan will indicate the party or parties with responsibilities for each task and an estimated schedule for completion of each task.

4. The **COMMITTEE** will encourage public involvement in the development of the **PLAN** through public hearings and education programs.

5. The **COMMITTEE** will facilitate the implementation of the **PLAN** in concert with the member **ENTITIES** (see Appendix for full document).

4.5 Committee Role - Past, Present, and Future

The **COMMITTEE** has provided a coordinated effort among the **ENTITIES** in addressing water supply concerns and issues for the **BASIN**. This effort has resulted in a number of studies being performed in cooperation with other government agencies and private consultants. This effort has also resulted in the charge for the **COMMITTEE** to develop the **PLAN**. The **COMMITTEE** will continue to coordinate cooperative management of the **BASIN** ground water resources, and act as an advisory and oversight body in the implementation of the **PLAN**. The **COMMITTEE's** role pursuant to the **PLAN** is discussed in greater detail in Section 6.3.


Chapter 3
General Basin
Characteristics

5. GENERAL BASIN CHARACTERISTICS

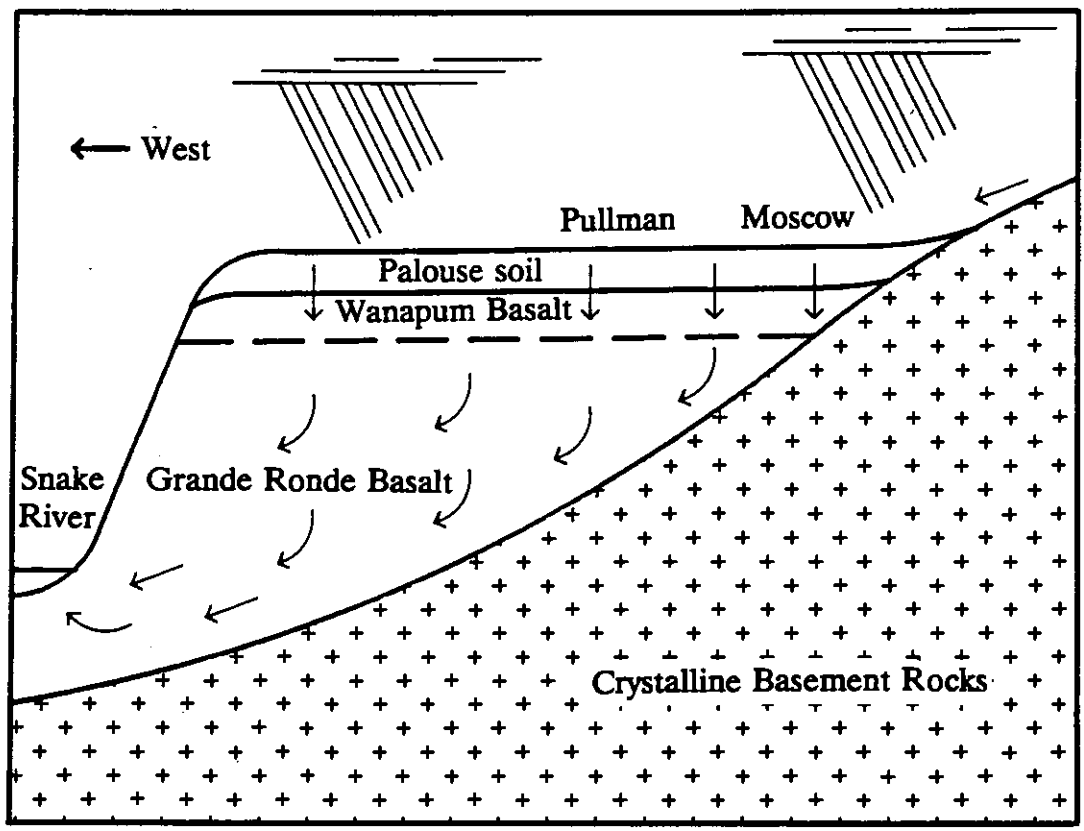
5.1 General

For effective ground water management, it is essential that water managers, water users, decision makers, and the general public have a basic understanding of the **BASIN** aquifers, as well as the general response of the aquifers to pumping or usage. In this chapter, basic characteristics of the **BASIN** aquifers are explained, as well as observed responses of the aquifers to pumpage and recharge. Also included in this chapter are historical and current information on the **BASIN** ground water system.

5.2 Ground Water Flow and Storage in the Pullman-Moscow Basin

Ground water in the **BASIN** originates as precipitation in the form of rain or snow (Figure 5). Some of the precipitation runs off directly and leaves the **BASIN** as stream flow. Precipitation that does not run off directly infiltrates into the soil, and may move downward, laterally, or may be stored in the soil for consumptive use by surface vegetation. Water that is not used consumptively by plant cover moves further downward and may form saturated zones in the soil. From the soil water table, the water may continue to move downward toward the basalt formations or laterally toward streams in the area. Streams that lie above the water tables may also lose water into the ground water system. Wells can be drilled into the soil water tables, but generally yield relatively small amounts of water due to the low soil permeability.

Ground water that reaches the basalts generally is stored in or travels through voids in the basalt and inter-lying sedimentary deposits. These voids may be in the form of cracks and joints in the basalts or spacing around individual grains in the sedimentary deposits. Model studies of the **BASIN** supported by field investigations suggest that the general direction of ground water flow is downward and toward the west. Some of the ground water near the surface of the basalt formations may move into streams in the **BASIN**. Ground water that is deeper in the aquifers moves toward and eventually discharges into the Snake River, seeps out along the Snake River canyon walls, or moves farther westward toward the Columbia basin. The movement of ground water toward the west and downward in the aquifers is the result of a potential or hydraulic gradient in those directions. Water levels in wells generally decline or are deeper in the aquifers to the west.



Cross-section not to scale

Figure 5. Conceptual Representation of Surface and Ground Water Flow in the Pullman-Moscow Basin.

The basalt flows terminate near the eastern edge of the **BASIN** east of Moscow. Where there is no basalt, ground water is believed to flow along the westward sloping granitic basement formation and enter the basalt aquifers at the basalt-basement interface (Figure 5). Exact ground water flow paths and travel times in the **BASIN** are not known. In the Moscow area, the shallow Wanapum Basalt layer plays a more important role in the ground water system. Effective ground water management in the Moscow area will need to consider the somewhat distinct (and yet interconnected) behavior of the upper Wanapum and deeper Grande Rhonde Basalt zones of the aquifers.

5.3 Ground Water Response to Usage

Under natural conditions, a balance exists between the amount of ground water being discharged from a basin (in this case to the Snake River, streams in the **BASIN**, or toward the Columbia Basin), and the recharge or amount of water coming into the **BASIN** in the form of precipitation or percolation from streams or other water bodies. When ground water is pumped (or removed artificially) from a ground water system, the natural balance is interrupted.

When water is pumped from a well, the water level, or corresponding water pressure near the well, is lowered, or drawn down (Figure 6). This draw-down provides the pressure gradient that causes the ground water to flow toward and into the well. Draw-down due to pumping is greatest near the pumping center and decreases outward. As pumping from the well continues, the extent of the lowered water levels expands, forming a cone of depression around the well or pumping center. This cone of depression expands until a new equilibrium condition is reached. The new equilibrium condition generally results in:

- a decrease in natural discharge from the **BASIN**;
- a decrease in the amount of ground water stored in the **BASIN**; and
- an increase in **BASIN** recharge.

In the **BASIN**, pumping withdrawals may result in decreased discharge to streams in the area, decreased discharge to the Snake River, and decreased ground water flow westward toward the Columbia Basin. Since surface water usage in the **BASIN** is minimal, such changes in discharge are not of primary concern.

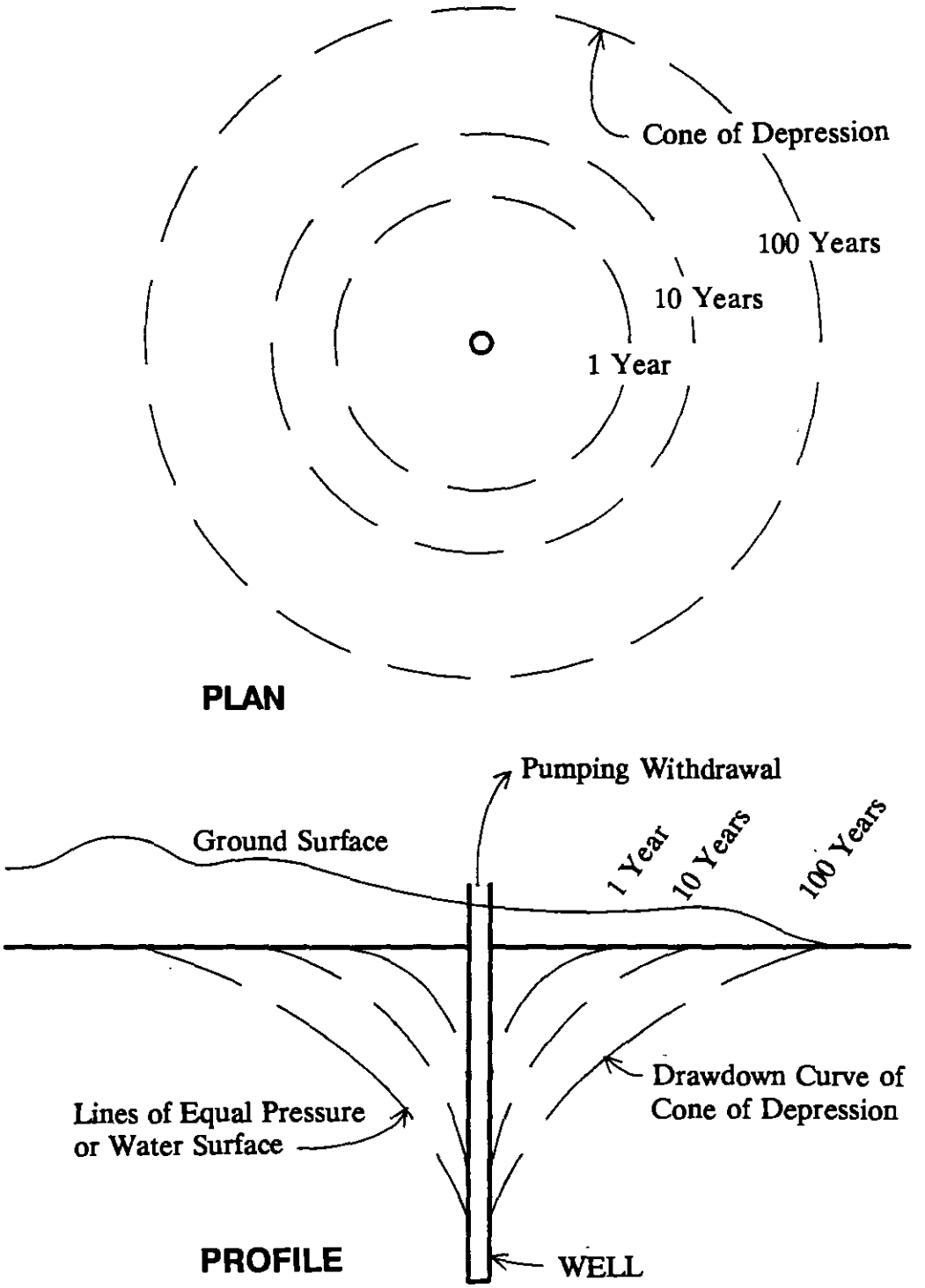


Figure 6. Conceptual Representation of Draw-down of Water Levels Over Time Around an Area of Constant Pumping.

The cone of depression caused by pumping always lowers the ground water levels or pressures around the well, regardless of the amount of recharge. Some ground water storage will always be lost with pumping. In areas where there are several wells operating at significant withdrawal rates, for example in or around a municipality, the effects of pumping several wells will be similar to that of a single well, ie., water levels will be drawn down throughout and around the area containing the wells. The area containing and surrounding the wells will always experience some water level decline. In the **BASIN** this effect can be seen by the reduced water levels in and around the two major cities, with the declines decreasing outward. Ground water levels farthest from the major pumping centers have experienced the smallest declines, and in some places may approximate pre-development conditions.

In some basins, a lowering of the ground water table can actually cause a greater amount of water to be recharged to the basin as excess surface water is diverted into the ground water system by the water level change. This effect, however, does not appear to play a significant role in the **BASIN**. Studies are presently underway at the University of Idaho in regard to ground water recharge from area streams (see Ralston and Li, 1989).

The response of a ground water system to pumping is more complicated than diversion of surface waters. The effects of surface water diversions are generally observed immediately and generally occur only in the downstream direction. The effects of ground water withdrawals, on the other hand, are not confined to a single direction. In fact, pumping may affect water levels in a basin in all directions. Furthermore, the time required for pumping effects to reach various points in a ground water system often takes years. In this regard, ground water management may be difficult, and model studies can play an important role.

As long as the discharge (both natural and pumping) from a basin is less than the recharge, water level declines (the time-lag effect notwithstanding) will be roughly proportional to the pumping amount. When the discharge from a basin exceeds the natural recharge, ground water levels will continue to decline, and ground water will be mined or depleted, even when pumping is held constant. Careful monitoring and analysis of ground water levels in an area are important to assure that such a condition does not develop.

Recent modeling studies of the Pullman-Moscow ground water basin [Lum *et al.* (1990)] suggest that mining is not occurring and that declining water levels are the result of increased pumping rates. This result needs to be further investigated by additional model studies.

5.4 Present Basin Conditions

Present (1990) water levels in principal wells in the **BASIN** are at an elevation of about 2260 feet (above mean sea level) for Pullman, and 2250 feet for Moscow. Due to topographical differences between and

within the cities, water levels are approximately 75 to 250 feet below the land surface in the Pullman/Washington State University wells, and some 300 feet below the surface in the Moscow/University of Idaho wells.

Figure 7 shows the historical combined pumping of Pullman, Moscow, Washington State University, and the University of Idaho. Pumping volumes are averaged over 5-year periods and, therefore, do not directly reflect year-to-year variations. Figure 8 shows more recent pumping withdrawals for the **BASIN**. Withdrawals by the city of Pullman are combined with Washington State University; Moscow withdrawals are combined with those of the University of Idaho. As the figures indicate, pumping withdrawals have generally stabilized for both communities over the last 15 years.

Figures 9 and 10 show historical ground water levels in the Pullman and Moscow areas. Water levels in the Moscow area have stabilized (as of 1985-1989), while water levels in Pullman continue to show some decline.

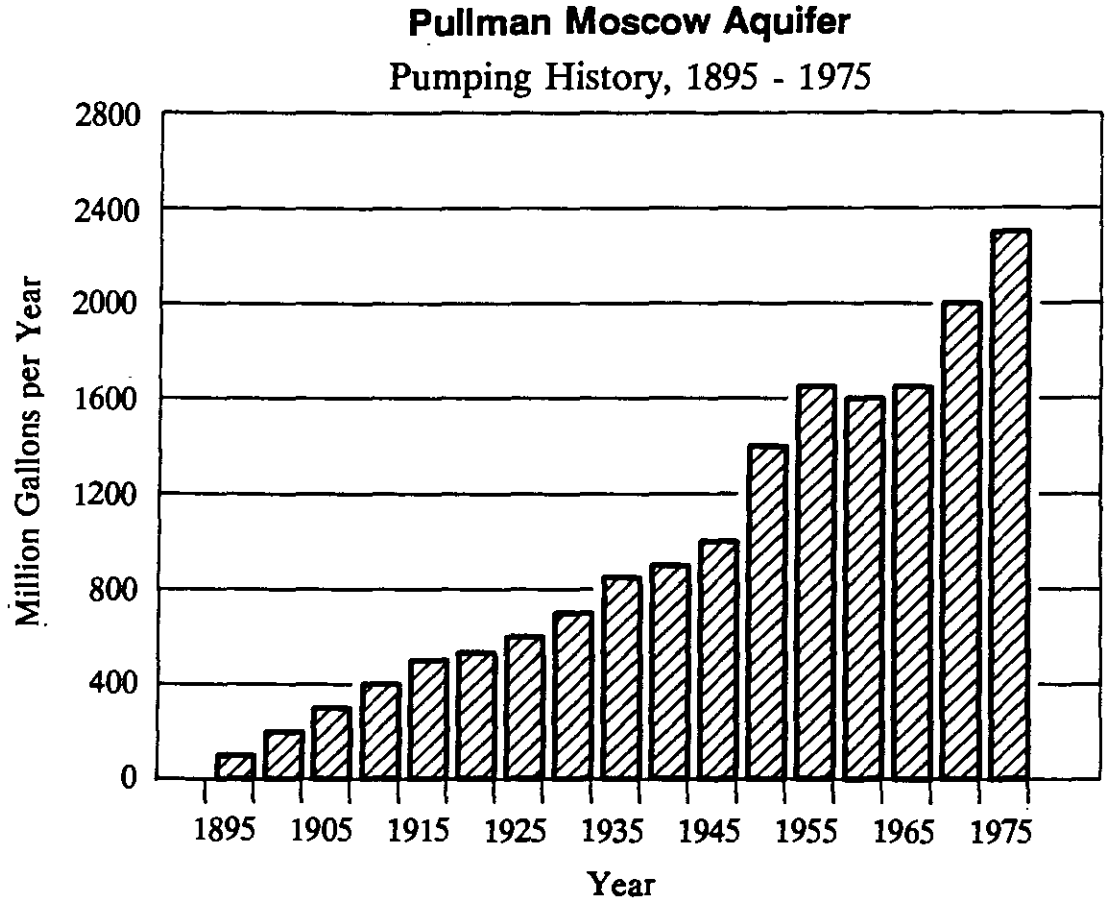


Figure 7. Historical Pumping Withdrawals in the Pullman-Moscow Area (Data from Lum, et al., 1990, Figure 9).

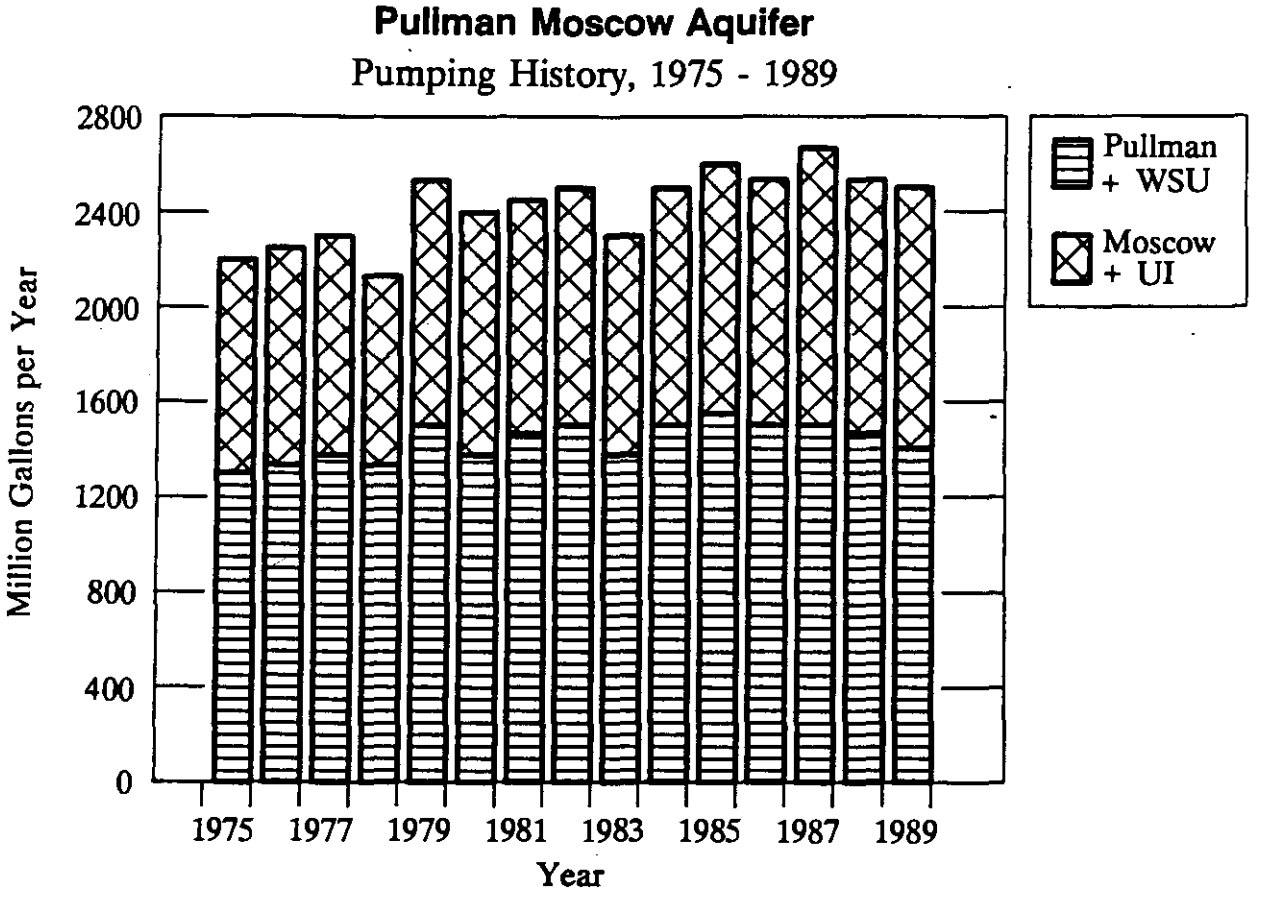


Figure 8. Recent Withdrawals in the Pullman-Moscow Area (Data from Pullman-Moscow Water Resources Committee).

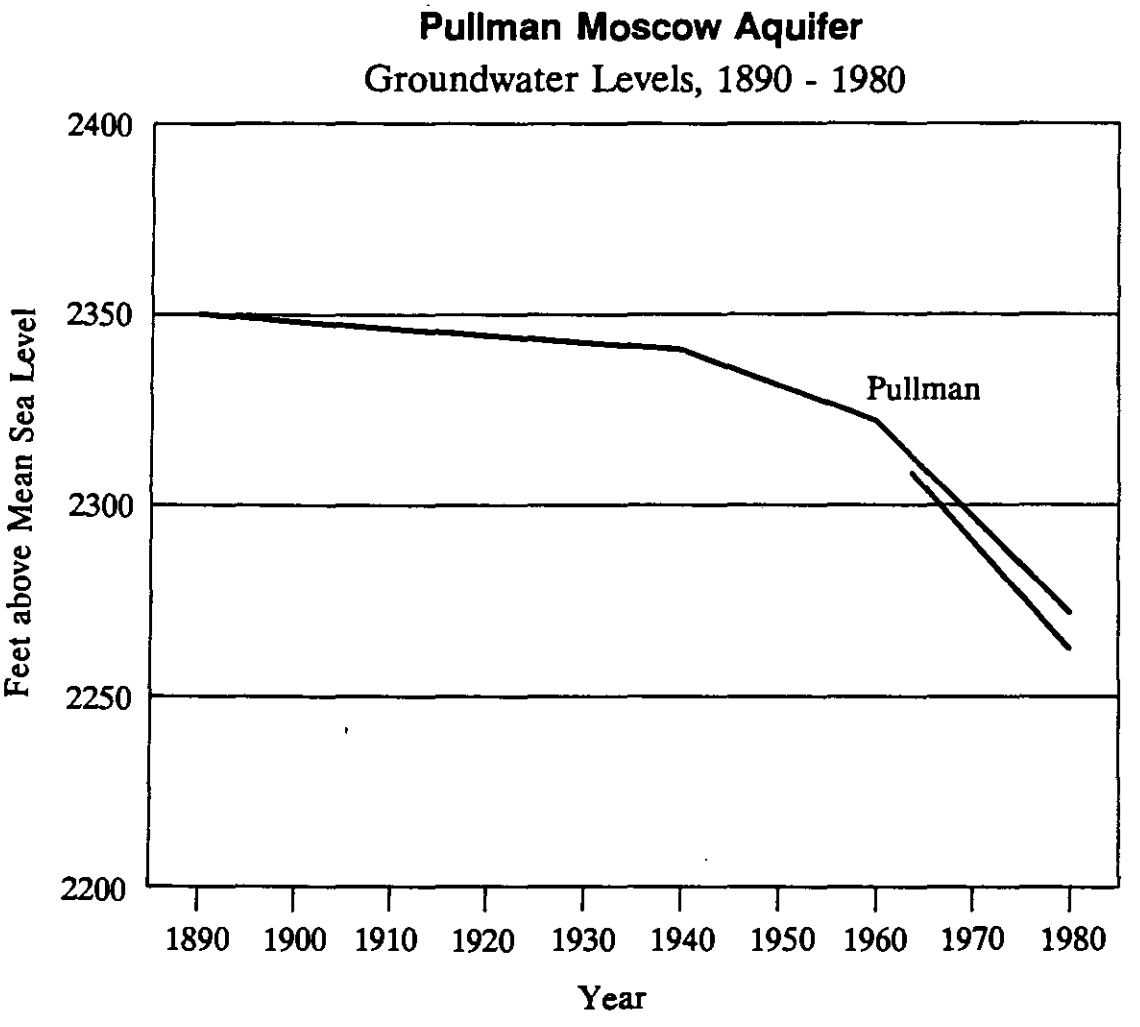


Figure 9. Historical Ground Water Levels in the Pullman-Moscow Area (Adapted from Lum, et al., 1990).

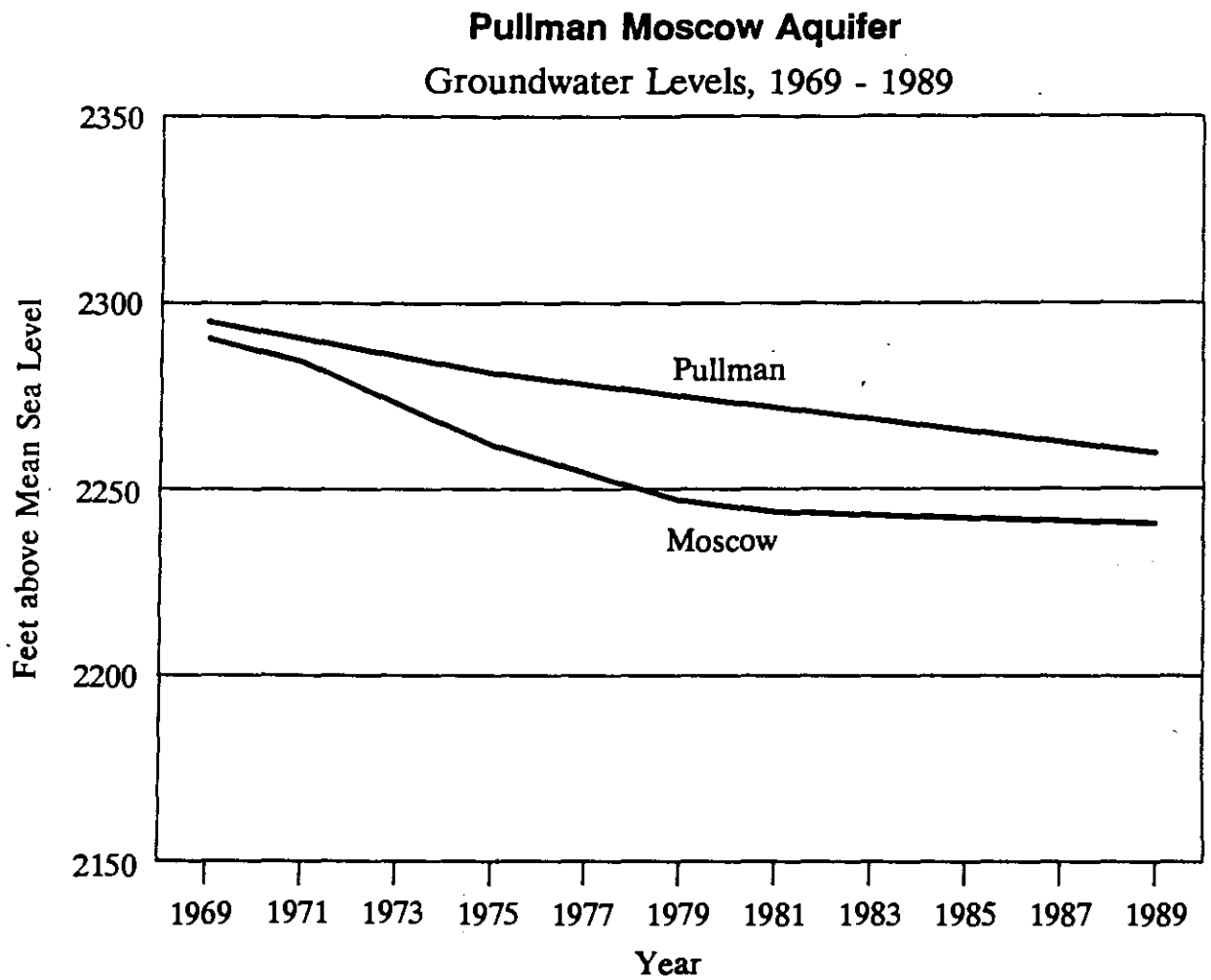
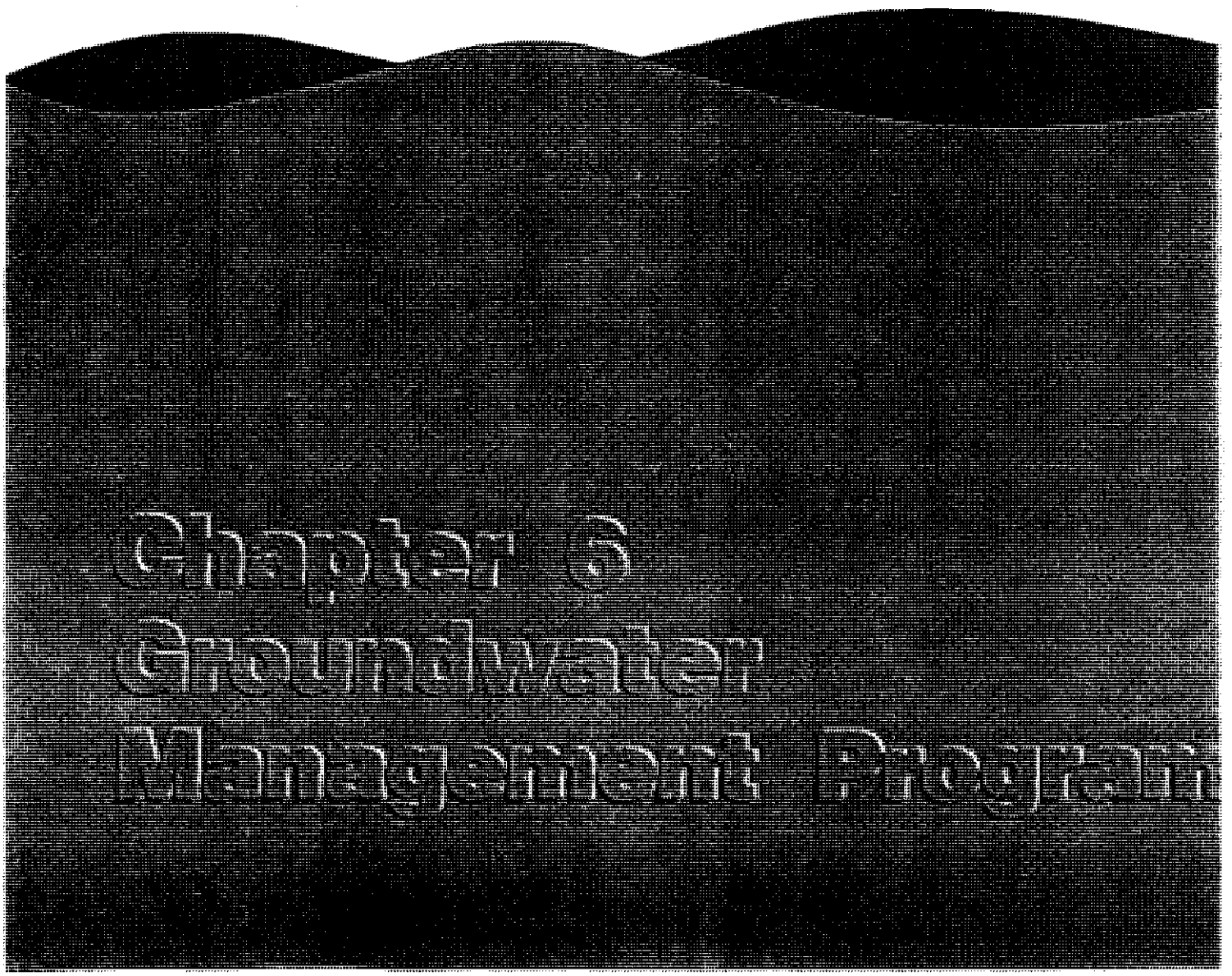


Figure 10. Recent Ground Water Levels in the Pullman-Moscow Area (Data from the Pullman-Moscow Water Resources Committee).


Chapter 6
Groundwater
Management Program

PULLMAN-MOSCOW WATER RESOURCES COMMITTEE

ACTION PLANS

6. GROUND WATER MANAGEMENT PLAN

6.1 Overview

Successful management of the Pullman-Moscow ground water resource requires the utilization of an effective management plan. This chapter describes the role of the **COMMITTEE** and its goals and actions. Also in the chapter are the stated action plans of the **ENTITIES** for achieving the goals of the **PLAN**. The need for educational programs and conservation activities are addressed in the following paragraphs. Provisions for annual reviews of these adopted plans, reporting procedures, data maintenance, and recommended research for the **BASIN** are also set forth.

6.2 Role of the Committee

The role of the **COMMITTEE** is to encourage **ENTITIES** to implement the **PLAN**. The **COMMITTEE** will also monitor the success of the **ENTITIES** in carrying out their action plans and achieving the goals of the **PLAN**. Each **ENTITY** will be expected to adopt an action plan, interfacing with the stated goals of the **PLAN**. The **COMMITTEE** will provide guidance related to water-use plans, conservation strategies relative to water use, implementation policies, and the preparation of local ordinances or zoning regulations.

6.2.1 Education and Information Exchange

One of the key functions of the **COMMITTEE** will be to provide a forum for the exchange of successful and effective management policies, strategies, and techniques among the **ENTITIES** and other interested groups and governing bodies. Public involvement and education in **BASIN** water management issues are extremely important. The success of public education and the level of participation in conservation and other water resource issues will be assessed annually. It will be incumbent upon the members of the **COMMITTEE** to keep abreast of effective water resource management practices and articulate these concepts to the **ENTITIES** and their constituents. Action plans will be revised as new techniques for managing the ground water and better understanding of the basin ground water system become available.

6.2.2 Data Base

It shall be the responsibility of the **COMMITTEE** to continue to gather, maintain, and evaluate a data base of well locations, water consumption, and water levels for the **BASIN**. The **COMMITTEE** will

develop a program of data monitoring and analysis to better evaluate the ground water system response to consumption patterns. From this information, the **COMMITTEE** will ascertain **BASIN** water consumption and water level data in conjunction with the goals of the **PLAN**. Furthermore, the **COMMITTEE** will begin accumulating information and data related to monitoring the quality of the ground water. State and Federal water management agencies will be consulted and worked with in order to maximize effective data gathering and analysis.

6.2.3 Research

Many research projects have been completed over the past decade in the hopes of better understanding the **BASIN** configuration. From this research has evolved a conceptual view of the aquifers system with the acceptance of the USGS **MODEL**. To further refine the **MODEL**, the **COMMITTEE** will continue to acquire, maintain, and upgrade information as it relates to the ground water system.

This research will need to continue to be a cooperative effort with state, federal, local, and private sources. Over the course of the next several years, the **COMMITTEE** will establish research priorities essential to furthering the understanding of the **BASIN**.

Research regarding the **BASIN** will be conducted in the following main areas:

- Model studies to evaluate the effects of various alternative management strategies on the aquifer;
- Field investigations to better determine the geologic and hydrogeologic characteristics of the **BASIN**; and,
- Economic or cost-feasibility studies of various alternative conservation measures and incremental water supply sources.

These research areas are outlined in greater detail in Appendix D. It will be the responsibility of the **COMMITTEE** to prioritize actual research needs, set budgets for such activity, and identify and solicit revenue sources.

6.2.4 Annual Reports

The **PLAN** will be reviewed at least annually by the **COMMITTEE**. The **COMMITTEE** will be responsible to see any annual adjustments or changes in the **PLAN** are endorsed by the governing state agencies and adopted by the **ENTITIES**.

6.2.5 Five-Year Plan Review

At the end of each five-year cycle a detailed **PLAN** review will be made and the **PLAN** will be modified as necessary to reflect the changing needs of the **ENTITIES** and the **PLAN**. The goals, recommended

strategies, and research priorities will be evaluated in regard to changing physical, economic, social, and political conditions of the Pullman-Moscow area. These revisions will be implemented based upon updated **BASIN** information, the success of particular management strategies, and input from public hearings. The adoption and implementation of any changes to the **PLAN** will be done with the full review of the **ENTITIES** and the two state agencies.

6.2.6 Reporting

The **COMMITTEE** will provide five year progress reports summarizing the success of the **PLAN**. The report will be made available to the public, the **ENTITIES**, and the state agencies detailing the progress made on each of the **PLANS'** goals as well as the success of the **ENTITIES** in implementing this action plan. Furthermore, water usage and water level trends in the **BASIN** will be documented in relationship to the **MODEL** and the target goals of the **PLAN**.

6.3 Goals of the Committee

The following goals and their expanded definitions form the foundation of the **PLAN**. The **ENTITIES** are to include in their respective action plans strategies for attaining the goals of the **PLAN**. The action plans combined with the **COMMITTEE's** goals form the substance of the **PLAN**.

- GOAL -

- **TO PROVIDE FOR FUTURE BENEFICIAL USE OF THE BASIN GROUND WATER WITHOUT DEPLETING THE BASIN AQUIFERS WHILE PROTECTING THE QUALITY OF THE WATER.**

  The primary goal is to insure that a stable ground water level is maintained in the **BASIN** aquifers. The **COMMITTEE** adopts the standard that the two universities and the two cities shall attempt to limit their annual aquifer pumping increases to one percent (1.0%) of their pumping volume based on a five (5) year moving average starting with 1986. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average for the two universities and the two cities. These initial limits on pumping rates are based upon historical data and water levels predicted by the **MODEL**. An estimate of the dispersed county pumping will be made based on an average per capita use for all county residences within the **BASIN** boundaries. Latah and Whitman counties will attempt to limit pumping increases from the **BASIN** aquifers to 125% of the estimated 1990 pumping levels. Further refinement of the **MODEL** will be necessary to establish acceptable limits on long term pumping rates which will confirm a stable water level for future users. The **COMMITTEE** will update the **MODEL** periodically and

acceptable pumping levels may be modified upward or downward upon agreement by the **ENTITIES**.

- GOAL -

- **TO PROMOTE A PROGRAM OF PUBLIC EDUCATION AND AWARENESS REGARDING BASIN GROUND WATER MANAGEMENT ISSUES.**

  The **COMMITTEE** shall pursue and develop a program of public education to encourage conservation and reuse of water. Programs soliciting public support for committee activities and efforts to stabilize the water level will be developed.

- GOAL -

- **TO PROMOTE CAREFUL MONITORING AND ANALYSIS OF THE GROUND WATER LEVEL AND USAGE DATA FOR THE BASIN.**

  The **COMMITTEE** shall continue to maintain records of the ground water levels and usage data collected on the **BASIN**.

- GOAL -

- **TO CONTINUE TO EXPLORE POSSIBLE SUPPLEMENTAL WATER SOURCES FOR ANTICIPATED AND POTENTIAL FUTURE WATER USE IN THE BASIN.**

  The **COMMITTEE** shall pursue the development of a Least Cost Plan (**LCP**) for providing supplemental water which will be completed within three years after the date of acceptance of this **PLAN** by all six **ENTITIES** and the states. The **LCP** shall evaluate potential incremental sources of water for the region and the relative costs of such sources. The information documented in the **LCP** shall be used in refining a course of action to insure an adequate long term water supply for the **ENTITIES**. The **LCP** shall be updated when the **COMMITTEE** determines there is just cause for an update.

- GOAL -

- **TO REVIEW AND MAKE RECOMMENDATIONS ON ALL WATER USE OR LAND USE APPLICATIONS WHOSE ANTICIPATED IMPACT ON THE GROUND WATER SYSTEM POTENTIALLY LIES OUTSIDE THE STATED GOALS OF THE PLAN OR POLICIES ADOPTED BY THE MEMBER ENTITIES.**

- GOAL -

- **TO REVIEW AND MAKE RECOMMENDATIONS RELATIVE TO THE DEVELOPMENT OF AN AGREEMENT FOR WATER TRANSFERS ACROSS THE STATE LINE.**

6.4 Role of the Entities

Responsibility of implementation of the **PLAN** rests with the **ENTITIES.**

6.4.1 Plan Adoption

Each **ENTITY** will incorporate the **PLAN** into their respective city or county comprehensive plan or university development plan.

6.4.2 Plan Implementation

In conjunction with the **PLAN**, each **ENTITY** has developed an action plan supporting the goals of the **PLAN.** The action plan adopted by each **ENTITY** is enumerated in the following paragraphs. Each **ENTITY** reserves the right to modify and improve its individual action plan as it deems appropriate. However, each modification shall be made in accordance with the provisions of the **PLAN.**

Specific reference to the issue of *Growth and Potential Developers* will be addressed in each **ENTITY's** action plan as follows:

1. Incorporate into each **ENTITY's** comprehensive plan anticipated growth rates and corresponding water usage increases with strategies for meeting the water needs of the community, county, or university.

2. Adopt regulations requiring developers to provide water conservation, re-use, and recycling plans along with anticipated use and impact statements before their developments are approved. (See Washington interim guidelines for major water users.)

ACTION PLANS OF THE ENTITIES

Moscow Action Plan

The following is the action plan of the City of Moscow. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the City of Moscow proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (745 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (increase from 700 mgy to 875 mgy).
- Continue summer/winter differential water rates.
- Require developers to project water use.
- Participate in programs that offer free water conserving devices to customers.

- Create a conservation fund with a four cents/1,000 gallon surcharge to customers to pay for those devices, to fund research projects recommended by the **COMMITTEE**, and hire assistance to implement programs.

- Adopt local codes requiring new water users to utilize water conserving appliances, ie., smaller toilet tanks, etc.

- Meter city use of water.

- Calibrate consumer meters.

- Address water issue in Comprehensive Plan.

- Participate in education programs, ie., schools, bill stuffers, cable T.V.

- Encourage recycling at building permit level for major water users.

- Continue to make city wastewater treatment plant (WWTP) effluent available to the University of Idaho.

- Continue use of WWTP effluent for irrigation at WWTP.

- Establish demonstration projects utilizing low water requirements - landscaping parks utilizing low irrigation trees and shrubs.

- Continue 24 hour daily recordings of water levels and pumpage.

- Continue submitting data to the **COMMITTEE** computer program in timely manner (monthly.)

- Assure the ground water quality is protected in the **BASIN** by:

  Reviewing any project with possible recharge to the aquifers.

  Complying with or exceeding State and EPA water quality standards for discharge into streams.

  Regulating toxic and hazardous waste storage to create strict standards to prevent contamination of aquifers.

  Prohibiting chemical dump site over the aquifers.

  Continuing compliance with EPA regulations regarding underground storage tanks.

Pullman Action Plan

The following is the action plan of the City of Pullman. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the City of Pullman proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (827 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (increase from 767 mgy to 959 mgy).
- Address water use in City's Comprehensive Plan and Zoning Code.
- Require new development to submit projected water use.
- Enact most stringent code available regarding low flow plumbing fixtures for new construction and remodel building permits.
- Participate in programs that offer users flow restrictors and toilet dams to reduce consumption.
- Consider increasing user rates during summer irrigation periods to discourage wasteful practices.

- Install low water use landscaping at all City facilities and install more efficient irrigation systems.

- Require installation of low water use landscaping on all new commercial and multi-family developments.

- Enact a conservation surcharge on all users with revenues dedicated to educational efforts including **COMMITTEE** sponsored research projects.

- Distribute conservation information through mailings to users, T.V., radio, and newspaper advertisements.

- Construct low irrigation demand landscaping demonstration projects on city owned sites.

- Continue membership in **COMMITTEE** with funding for studies and research projects.

- Continue input to the **COMMITTEE** of city's monitoring efforts. Develop usage data by user class ie., residential, single family, multi-family, commercial, institutional, industrial.

- Comply with all State and Federal regulations pertaining to hazardous materials, storm water disposal, solid waste disposal, sewage sludge disposal, non-point source, household contributions, and well construction and abandonment.

Latah County Action Plan

The following is the action plan of Latah County. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Latah County proposes the following goals apply to all land under the authority of County government:

- Estimate the dispersed/county pumping based on an average per capita use for all county residences both within the **BASIN** boundaries and for the full county.
- Latah County will attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 figures. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average.

Work with the Planning and Building Department to:

- Provide educational brochure with building permits promoting water conservation, low water use landscaping, and general sensitivity to the Pullman-Moscow Aquifer.

- Encourage use of low water volume fixtures. Consider offering a financial incentive for conservation devices at the time of application for permit of new construction.

- Encourage well registration for purposes of data collection.

Establish water conservation policies at all facilities and/or properties managed by Latah County. These policies shall pertain to irrigation practices and physical features of construction.

Refine the county emergency response plan to handle disasters which could affect ground water contamination.

Encourage the development and implementation of water and power conservation programs developed by governmental agencies and private industry.

Endorse and provide funding for water research projects.

Work with the County Cooperative Extension Office and Soil Conservation Service District to develop an outreach program for water quantity and quality education.

Seek assurances of ground water quality in conjunction with solid waste disposal sites. This will include baseline monitoring of present and future solid waste disposal sites.

Regulate development on or the drainage of wetlands not regulated by definition by the Army Corps of Engineers.

Regulate developments which could jeopardize water quality.

Use a land use procedure, for example a "conditional use permit," for developments which propose to use water supplies in the day-to-day operation of a non-residential or commercial venture.

Use the **COMMITTEE** to conduct a preliminary recommendary hearing prior to the above mentioned County proceeding in the case of a land use with a dependence on water use for successful operation of a commercial venture.

Updated Comprehensive Plan will reflect water conservation and protection goals.

Develop a local well-head protection ordinance.

Recognize riparian zones within the County and offer protection through ordinance or conditional use permit review.

Define and support programs for protection of water quality as administered by the North Latah Health District and the state agencies with local authority in this field.

Amend the Zoning Code to require Conditional Use Permits for projects with water impacts.

Apply water protection program standards to the whole county.

Whitman County Action Plan

The following is the action plan of Whitman County. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Whitman County proposes to:

- Estimate the dispersed county pumping based on an average per capita use for all county residences within the **BASIN** boundaries. Whitman County Department of Environmental Health will attempt to limit significant pumping increases from the **BASIN** aquifers.
- Review and, if necessary, amend the county comprehensive plan and zoning policies to address quantity and quality concerns.
- The Whitman County Department of Environmental Health and the Washington State Extension Service office will promote conservation practices and use of water saving devices for <u>all</u> water users (no matter what type of source.)
- Encourage the use of water saving devices for all new construction via hand-outs with the building permit application.
- Continue to encourage all public water purveyors to meter all services within their systems.

- Promote wise landscaping and "water" uses through the use of "best management practices" concepts.

- Support the COMMITTEE in pursuing research projects.

- Support the Washington State Department of Health requirements that all new public drinking water wells to install static level measuring devices at the time of pump installation. All existing public drinking water sources, if not already so equipped, will be retrofitted with such a measuring device at the time of pump/hardware removal.

- Support the Washington State Department of Health requirements that pump head measuring and monthly recording of pumping volumes as part of the annual report.

- Support the identification of critical recharge areas within the county.

- Assure that new developments comply with State agency regulations for ground water and surface water protection.

University of Idaho Action Plan

The following is the action plan of the University of Idaho. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water levels and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the University of Idaho proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986. This average will begin at 353 mgy plus the new allocation for well #5 of 48 mgy for a total of 401 mgy. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average. (1981-1985 average is 301 times 125% equals 376 mgy plus 48 mgy from well #5 for a total allocation of 424 mgy.)
- Continue to switch domestic irrigation from wells #3 and #4 to the recycled water irrigation system.
- Submit an application to the State of Idaho for permission to switch water sources for select programs from wells #3 and #4 to well #5 and future shallow wells.
- Continue to install best available conservation technology in new facilities and building remodels.

- Increase recharge through infiltration via land application of stream runoff and recycled water at various places around the University of Idaho campus.

- In selected areas of campus, provide demonstration sites for research and testing of xerophytic grasses, shrubs, flowers, and other landscaping which require less water.

- Financially support the **COMMITTEE'S** educational efforts.

- Supplement the **COMMITTEE's** educational program with distribution of appropriate information on campus water use and conservation.

- Make public all successful University of Idaho water conservation demonstration projects which can be copied by the public or other **ENTITIES.**

- Continue to supply **COMMITTEE** with monthly data on ground water pumping and recycled water irrigation volumes.

- Comply with all State and Federal regulations pertaining to hazardous materials, storm water disposal, solid waste disposal, sewage sludge disposal, non-point sources, and well construction and abandonment.

Washington State University Action Plan

The following is the action plan of Washington State University. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Washington State University proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (increase from 702 to 877 mgy).
- Convert irrigation to computer controlled automatic systems on 70-90% of all turf within 10 years.
- Eliminate 20 GPM of cooling water to the drain within three years.
- Financially support the **COMMITTEE** activity.
- Install water meters on its major water users.
- Supplement the **COMMITTEE**'s educational program with distribution of appropriate information on campus.

- Report all appropriate water data to the **COMMITTEE** for analysis.
- Set a goal of no increase in withdrawal rate for the next two years to test the **MODEL** with actual data.
- Protect the ground water quality by:

  Maintaining good landscape practices and reviewing chemical use.

  Monitoring and/or eliminating all underground storage tanks containing chemicals.

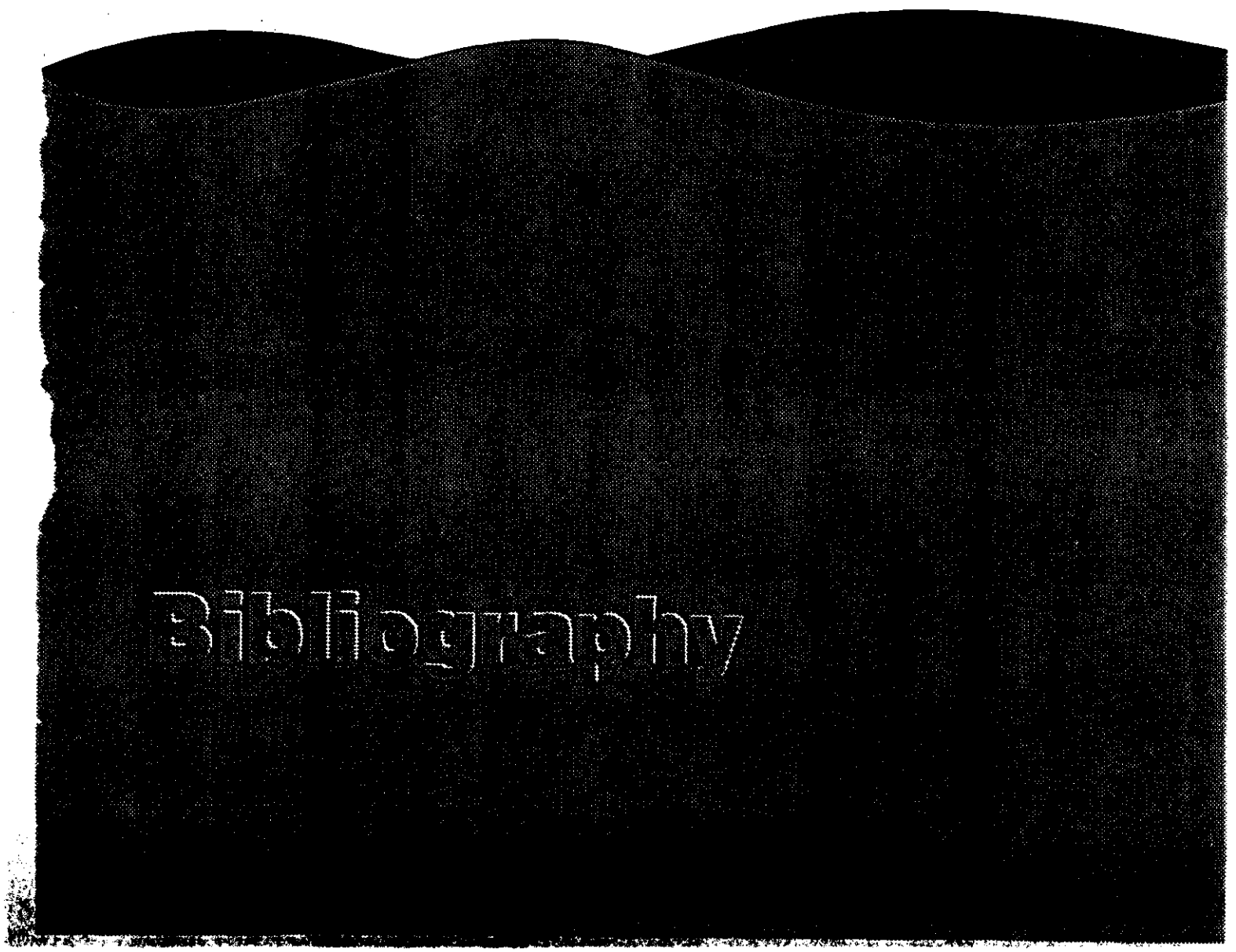
  Continued monitoring of the old hazardous waste site.

  Monitoring sewer systems and correcting any deficiencies (leaks, cross connections, etc.) noted.

  Monitoring existing septic tank systems and properly siting future systems.

  Insuring that proper well construction procedures are followed.

  Complying with all State and Federal regulations pertaining to ground water and surface water quality.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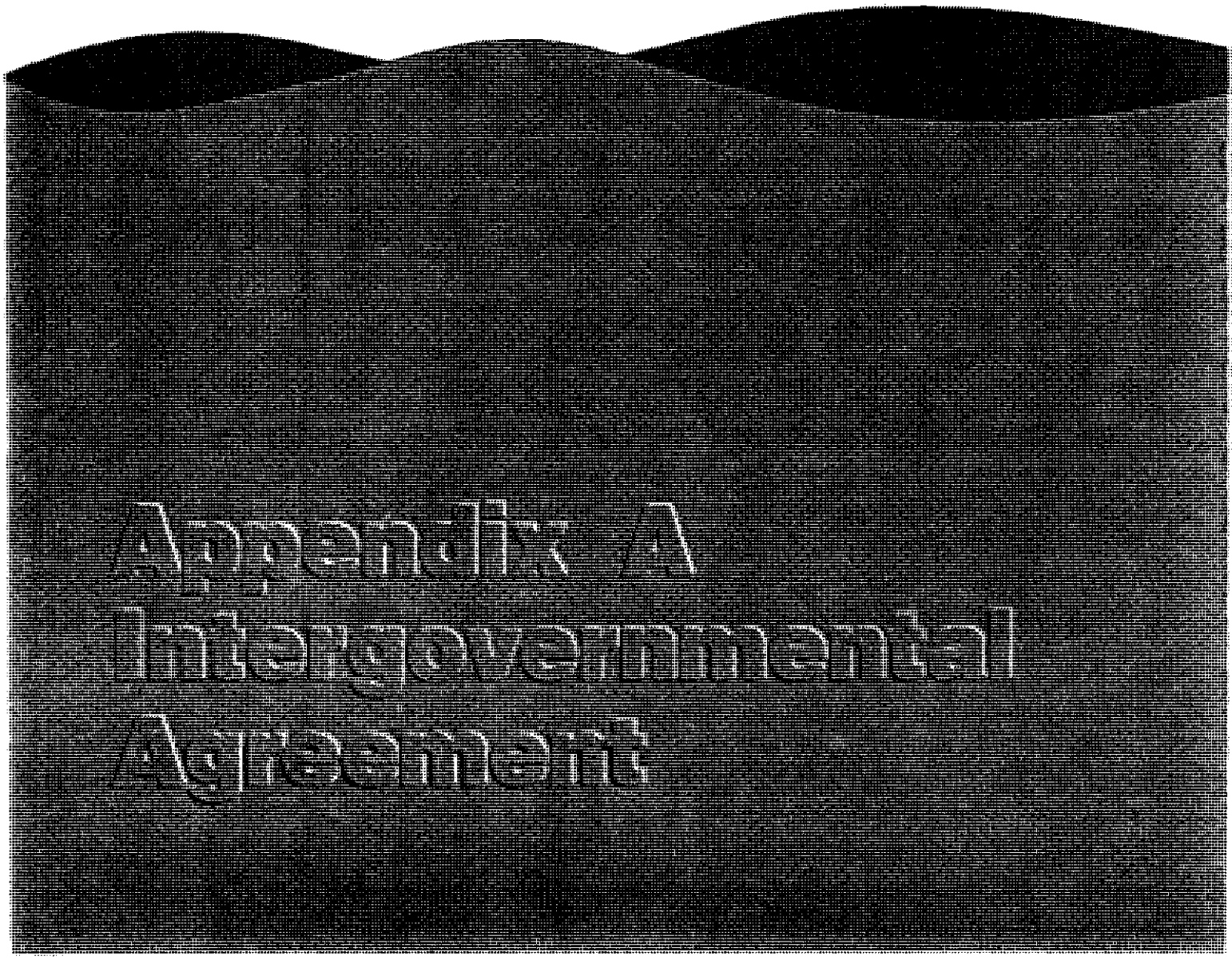

Appendix A
Intergovernmental
Agreement

APPENDIX A

INTERGOVERNMENTAL AGREEMENT

(Pullman-Moscow Water Resources Committee)

THIS AGREEMENT is entered into by the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University (hereinafter sometimes referred to as the Entities) to be effective the first day of August, 1988 or as soon thereafter as the requirements set forth in Paragraph XIV are accomplished.

WITNESSETH:

WHEREAS, the water supply in Latah County, Idaho, and Whitman County, Washington, is an important regional concern; and,

WHEREAS, the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University deem it in the public interest to work jointly and cooperatively on water resource problems and issues; and,

WHEREAS, the Entities are authorized to enter into and carry out this Intergovernmental Agreement pursuant to the provisions of Idaho Code Sections 67-2326 et. seq., and Chapter 39.34 of the Revised Code of Washington; now, therefore

IT IS HEREBY AGREED by and between the Entities as follows:

I. Committee Established: In order to carry out the purposes established in this Agreement, the Entitles hereby agree to the establishment of a committee to be known as the Pullman-Moscow Water Resources Committee (PMWRC).

II. Membership: The PMWRC shall consist of twelve appointed members with two members each representing the following Entitles: the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University. Each member shall serve at the pleasure of the Entity which appoints that member for a term of two years with the 1st term beginning on August 1, 1988.

III. Purpose: The purposes of this Agreement are to:

(A) coordinate planning to assure a long-range supply of water to the entities;

(B) retain the momentum and continue to update and expand the database already begun through previous studies;

(C) encourage conservation to promote the life of the aquifer serving the Entities;

(D) investigate continuing and/or alternate sources of water;

(E) educate and advise the entities on the quantity and quality of the public water supply for the water basin serving the Cities of Moscow, Pullman, and the surrounding area;

(F) act as liaison between the Entities on water resource concerns; and

(G) promote communication between the Entities, the Washington Department of Ecology, and the Idaho Department of Water Resources.

IV. Powers: The PMWRC shall have the power to:

(A) collect and disseminate statistics and other information;

(B) allocate expenditures of funds contributed by the Entities;

(C) designate one of the Entities as a depository for funds and for the administration of those funds;

(D) hire personnel (by written agreements setting forth all duties and compensation) who will serve at the pleasure of, and whose duties will be determined by, the PMWRC;

(E) enter into legal and financial agreements, but only after any such agreements have been reviewed and approved by the Entities;

(F) apply for and administer grants; and

(G) work with the Entities in educating the public.

V. Officers and Voting:

(A) One member shall serve as Chairperson, one member shall serve as Vice Chairperson, and one member shall serve as Secretary. One member may serve as Treasurer and this office may be combined with the office of Secretary if the PMWRC so chooses.

(B) Each member of the PMWRC shall have one (1) vote. In the event of a tie vote, the issue shall fail.

(C) Entities may select alternate members in a manner considered appropriate by the selecting Entity. In the event that an appointed member of the PMWRC will be unable to attend a meeting of the PMWRC, the Entity represented by that appointed member may be represented by that appointed member. Alternate members representing absent appointed members shall have the same privileges as appointed members; provided, however, that no Entity shall have more than two votes on the business coming before the PMWRC.

VI. Meetings and Election of Officers:

(A) The PMWRC shall hold meetings at such times and places as set forth in its by-laws.

(B) The PMWRC shall annually elect its officers as set forth in its by-laws.

(C) The quorum necessary for the PMWRC to transact business or elect officers shall be constituted when seven members or a majority of the members representing the Entities entitled to vote in accordance with the provisions of Paragraph VII (D)are present at the meeting.

VII. Financing:

(A) Annually the PMWRC shall establish a budget for the ensuing operating year, which budget shall be established in sufficient time to allow each Entity to budget its contribution for the ensuing operating year.

(B) Contributions are due and payable from each entity with one half of the amount due on July 1st and the remaining one half on January 1st of the following year of each year of this Agreement. The funding ratio for contributions for administration and projects which uniformly impact all Entities shall be as follows:

The University of Idaho, Washington State University, the City of Moscow, and the City of Pullman, shall each, as its contribution, pay twenty (20) percent of the operating budget of the PMWRC;

The County of Latah and the County of Whitman shall each be responsible for ten (10) percent of the operating budget of the PMWRC.

(C) This funding ratio may be altered for the funding of specific projects according to the interests and benefits of each participating entity. Altered funding ratios shall be approved by each Entity participating in the altered funding ratio.

(D) Any Entity not current in the payment of a contribution shall lose all voting rights until such time as that Entity is current in contributions for that operating year.

VIII. Duration: This Agreement shall have a term of ten years from and after August 1, 1988, unless the PMWRC is sooner dissolved as set forth in Paragraph XI (A).

IX. Annual Report: The PMWRC shall report on its activities to each Entity on an annual basis.

X. By-Laws: The PMWRC may adopt, amend or repeal by-laws, in whole or in part which are not inconsistent with the terms and conditions of this Agreement, by a majority vote at any regular or special meeting of the PMWRC. A majority vote for the purposes of adopting, amending or repealing by-laws means a majority of all members of the PMWRC qualified to vote in accordance with the provisions of Paragraph VII (D) and not a majority of a quorum.

XI. Dissolution and Disbursement of Funds and Property:

(A) Any Entity may automatically withdraw from the PMWRC by submitting a written statement setting forth its intent to withdraw to the remaining Entities at least sixty (60) days prior to the effective date of its withdrawal.

(B) The PMWRC shall be dissolved through a written agreement approved by a majority of the Entities or through the withdrawal of three of the participating Entities.

(C) Any surplus funds or property remaining at the time of dissolution shall be distributed to the Entities in the proportion to the amount of money each Entity had contributed to the PMWRC budget during the one-year period (365 days) prior to the dissolution. If it is impossible to distribute such property, it shall be sold as surplus property of auctioned off with the proceeds disbursed as set forth in this Paragraph (C).

XII. Real Property: The PMWRC may neither acquire nor hold real property.

XIII. Expenditures: The disbursement of funds contributed by the Entities and received from other sources shall be managed by one of the Entities to be designated by the PMWRC which may, from time to time, be changed by a majority vote of all Entities participating in the membership of the

PMWRC qualified to vote in accordance with the provisions of Paragraph VII (D) and not a majority of a quorum.

XIV. Filing and Effective Date: Copies of this Agreement shall be filed with the Pullman City Clerk, Whitman County Auditor, the Secretary of State of the State of Washington, the Moscow City Clerk, the Latah County Auditor, and the Secretary of State of the State of Idaho prior to its entry into force. This Agreement shall be effective upon execution by the Entities and the accomplishment of all filing requirements as provided herein subject to the approval of the Secretary of State for the State of Idaho as provided for in Section 67-2329 Idaho Code.

XV. Repealer: As between the City of Pullman; the City of Moscow; the County of Whitman, Washington; and the County of Latah, Idaho; all earlier agreements between them relating to water supply and the Pullman-Moscow Water Resources Committee that have not already terminated by the passage of time or the completion of their purpose(s) are hereby revoked and terminated, and specifically the following inter-local agreements shall be automatically terminated on the effective date of this Agreement, to-wit:

(A) Agreement for Engineering Services Water Supply Study Pullman-Moscow Water Resources Committee.

Dated: January 15, 1970

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University
Stevens, Thompson & Runyan, Inc.

(B) An Agreement Relating to a Water Study for Pullman-Moscow Region.

Dated: February 11, 1970

Signatories: Washington State University
University of Idaho
City of Pullman
City of Moscow

(C) An Agreement Relating to the Pullman-Moscow Water Resources Committee.

Dated: October 30, 1972

Signatories: Washington State University
University of Idaho
City of Pullman
City of Moscow

(D) An Agreement Relating to the Pullman-Moscow Water Resources Committee.

Dated: July 11, 1974

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University

(E) Contractual Agreement between the City of Pullman, acting for the Pullman-Moscow Water Resources Committee and Washington State University on behalf of the College of Engineering.

Dated: August 13, 1974

Signatories: The City of Pullman acting for the Moscow-Pullman Water Resources Committee
Washington State University

(F) An Agreement Relating to the Pullman-Moscow Water Resources Committee (Study of aquifer serving Pullman/Moscow area).

Dated: January 30, 1985

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University

IN WITNESS WHEREOF, the parties to this Agreement have caused it to be executed to be effective the day and year first set forth above, and each signatory represents that he or she is authorized to sign this Agreement.

CITY OF PULLMAN, WASHINGTON

/s/ Carole A. Helm
Mayor

ATTEST:

/s/ John Tonkovich
Financial Director

CITY OF MOSCOW, IDAHO

/s/ Gary Scott
Mayor

ATTEST:

/s/ Elaine Russell
Clerk

WHITMAN COUNTY, WASHINGTON

/s/ Dan Boone
Commissioner

/s/ James Hanning
Commissioner

/s/ John Henley, Jr.
Commissioner

LATAH COUNTY, IDAHO

/s/ Tom Spangler
Commissioner

/s/ Laverne Nelson
Commissioner

/s/ Nancy Johansen
Commissioner

Appendix B
Resolution of Understanding

APPENDIX B

RESOLUTION OF UNDERSTANDING
between
PULLMAN-MOSCOW WATER RESOURCES COMMITTEE
IDAHO DEPARTMENT OF WATER RESOURCES
WASHINGTON DEPARTMENT OF ECOLOGY
1989

WHEREAS, the Pullman-Moscow Water Resources Committee composed of representatives of Pullman, Moscow, University of Idaho, Washington State University, Whitman County and Latah County has an interest in the protection and management of the ground water resources of the Pullman-Moscow basin; and

WHEREAS, the Idaho Department of Water Resources and Washington Department of Ecology have the legal authority and the technical expertise to administer and regulate water law in their respective states, and the responsibility and desire to participate and assist in the management of the ground water resources; and

WHEREAS, there is evidence to show that the potential exists for the overuse of quality ground water resources within the basin; and

WHEREAS, a ground water management plan developed and implemented in concert with public needs and interests and in accordance with state and local laws, rules and regulations can serve to avert the overuse of the ground water resources in the basin; and

WHEREAS, the parties to this Resolution are desirous of developing and implementing such a ground water management plan; and

WHEREAS, the parties hereto are authorized to enter into this Resolution of Understanding for the purposes stated herein.

NOW, THEREFORE BE IT RESOLVED that the parties to this Resolution do agree to the following:

The Idaho Department of Water Resources (IDWR) and Washington Department of Ecology (WDE) agree to commit sufficient staff time to assist in the completion of such tasks as may be appropriate. IDWR and WDE further agree to pursue the implementation of a coordinated Washington-Idaho ground water management plan for the Pullman-Moscow basin in accordance with their respective state law policies.

The Pullman-Moscow Water Resources Committee (PMWRC) agrees to work with the state agencies and to serve as the forum for input from local governments, interest groups and private citizens.

Specific obligations of the Committee are as follows:

1. PMWRC will pursue and administer funding to conduct and promote studies and research relative to improving knowledge of the water resources of the basin.

2. PMWRC will prepare a management plan for the basin in cooperation with the two state agency parties (IDWR and WDE), which will address both water quantity and water quality concerns.

3. PMWRC will prepare as an initial step in the development of the management plan a principal work plan and time schedule which will outline the concerns and issues to be studied. This work plan shall indicate the party or parties with responsibilities for each task and an estimated schedule for completion of each task.

4. PMWRC will encourage public involvement in the development of the water management plan through public hearings and education programs.

5. PMWRC will facilitate the implementation of the ground water management plan in concert with the member entities of the Committee.

BE IT FURTHER RESOLVED, this Resolution shall be effective upon execution by all parties and accomplishment of the filing requirements and approvals as may be necessary. This Resolution shall remain in effect until the completion of the ground water management plan or until any party to the agreement terminates its participation by written notice of termination to the other parties.

This Resolution can be amended at any time by written notice to all parties, except that action by the Committee at a regularly scheduled meeting and notice to IDWR and WDE shall satisfy the written notice for PMWRC or Committee members.

/s/ Carole Helm 5-30-89 Pullman Date	/s/ Mardi Baron 5-30-89 Moscow Date
/s/ Kenneth E. Abbey 5-30-89 Washington State Date University	/s/ Joseph Geiger 5-30-89 University of Idaho Date
/s/ John Henley 5-30-89 Whitman County Date	/s/ Nancy Johansen 5-30-89 Latah County Date
/s/ Fred Olsen 5-30-89 Washington Department Date of Ecology	/s/ Wayne Haas 5-30-89 Idaho Water Resources Date

Appendix G
Public Input

APPENDIX C

PUBLIC INPUT

In October of 1989 a community workshop was held in Pullman to allow public participation in the identification of ground water concerns and their possible solutions. The workshop was beneficial in that it allowed people in the Pullman-Moscow area to voice concerns and suggestions and to become better informed on the **BASIN** ground water problems or issues. From the workshop, it became apparent that:

1. community people do want to become involved in **BASIN** ground water issues,

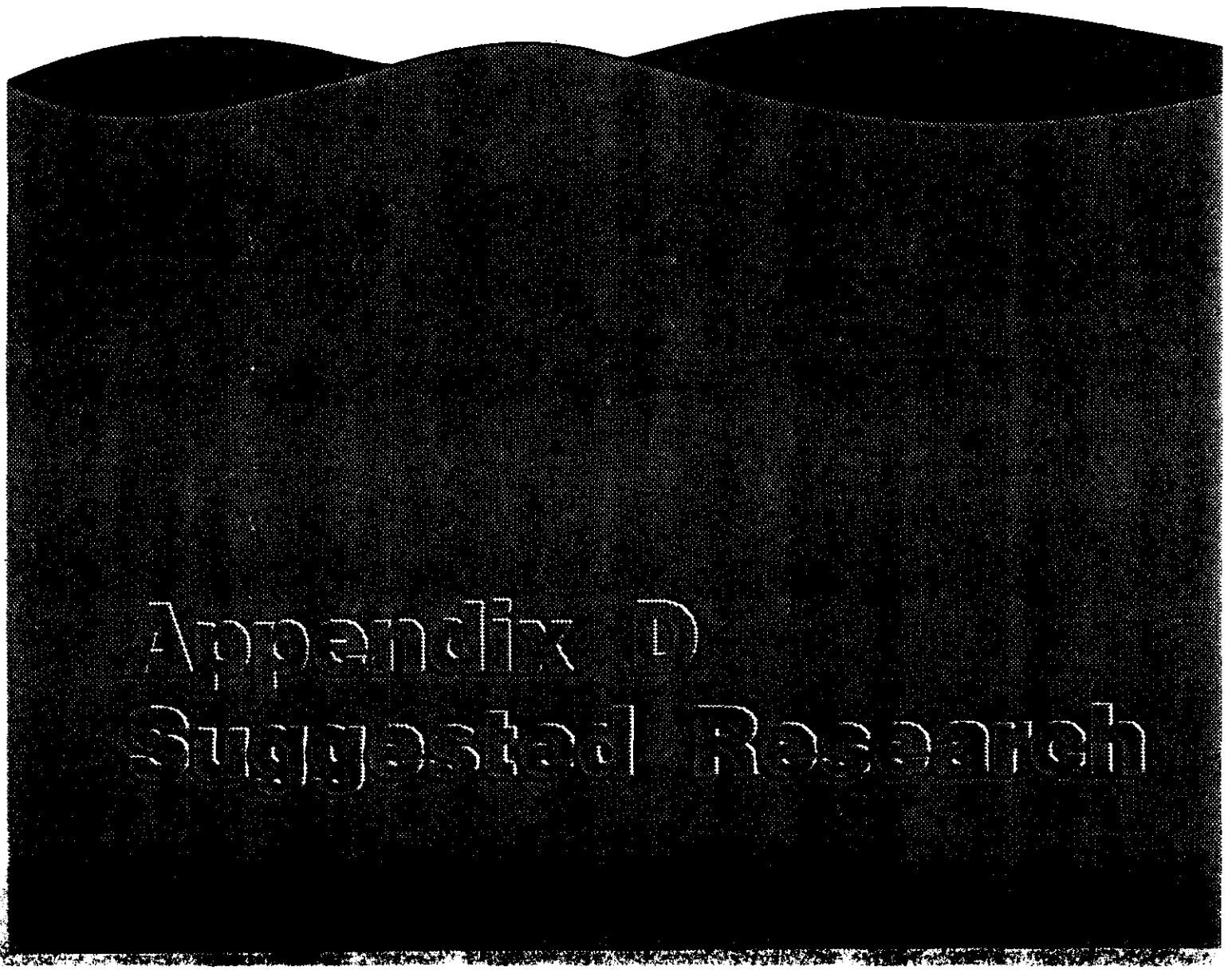
2. the public is in need of more information regarding the **BASIN** ground water system, and,

3. the public is in favor of water conservation in the **BASIN.**

Community participation in the **PLAN** development and adoption will be furthered through public input via the member entities, another community workshop, and a public hearing.

The second public workshop was held on October 10, 1991 in Moscow, Idaho. After brief comments from officials of the Idaho Department of Water Resources and the Washington Department of Ecology, the group was requested to consider two questions: 1) your assessment of actions proposed for your area and 2) how citizens involvement can be developed. Six groups were then formed to consider these questions in relation to each of the six entities. Revisions in the action plans of the entities resulted from these discussions.

The final public hearing was held on March 25, 1992 in Moscow, Idaho. There were no changes suggested to the **PLAN**. Idaho Department of Water Resources and Washington Department of Ecology officials announced that they were developing an interagency agreement under which the **PLAN** would be administered. A copy of the agreement is included as Appendix F of the **PLAN**.


Appendix D
Suggested Research

APPENDIX D

SUGGESTED RESEARCH

Areas of research that will aid effective management of the **BASIN** are outlined below:

1. Field investigations

    a. Geologic studies;

    b. Flow path and flow time studies;

    c. Soil percolation (lysimeter) studies;

    d. Studies of the recharge from (or discharge to) streams in the **BASIN**;

    e. **BASIN** discharge to streams and rivers in the **BASIN** and seepage to the Snake River canyon;

    f. Artificial recharge using recharge ponds or reservoirs and recharge wells; and

    9. Soil recharge enhancement and erosion reduction studies;

2. Model studies

    a. Acquisition of a computer ground water **MODEL**; for convenient use by the **COMMITTEE** and **ENTITIES**;

    b. Study of the sensitivity of **MODEL** output to **MODEL** input, particularly in areas where relatively large uncertainties exist in the input data;

    c. update and upgrade the **MODEL** as appropriate to accommodate updated input information or changing computational or output needs; and

    d. use the **MODEL** to evaluate alternative management strategies or scenarios.

3. Feasibility studies

    a. Conservation, re-use, and recycling methods;

    b. Alternative surface water sources, including water storage within the **BASIN** and water transfers from outside the **BASIN**;

    c. Inter-entity water transfers;

d. Alternative ground water sources;

e. Split uses of upper and lower aquifers water; and,

f. Dual water systems for irrigation with lower quality water.

Appendix E
Committee
Representatives

APPENDIX E

COMMITTEE REPRESENTATIVES

(1990 - 1991)

Pullman

Jim Hudak, Director of Public Works, City of Pullman
Craig Ward, City Council
AL Halvorson, City Council (from 1989 to January 1991)
Louie Sauer, City Council (from February 1991 to present)

Moscow

Gary Presol, City Engineer, City of Moscow
Mardi Baron, City Council

Whitman County

Maggie McGreevy, County Commissioner
Jim Nebel, County Health Department

Latah County

Pam Peterson, County Planner
Nancy Johansen, County Commissioner

Washington State University

Joe Spoonemore, Director, Physical Plant
Ken Abbey, Assistant Vice President, Business (from 1988 to September 1990)
Craig Benjamin, Energy Manager, Physical Plant (from October 1990 to present)

University of Idaho

Kenneth A. Hall, Director, Facilities Management
Larry Kirkland, Energy Engineer, Facilities Management

Appendix F
Resolution to Adopt Interagency Agreement

BEFORE THE DEPARTMENT OF ECOLOGY
OF THE
STATE OF WASHINGTON

AND THE

DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

IN THE MATTER OF THE) COORDINATED MANAGEMENT) OF THE PULLMAN-MOSCOW) GROUND WATER AQUIFER)	INTERAGENCY AGREEMENT

WHEREAS, the ground water resource located in the Palouse River/Hangman Creek basins of Latah County, Idaho and Whitman County, Washington, is an important water source for citizens of both Washington and Idaho; and

WHEREAS, the Pullman-Moscow Water Resources Committee (PMWRC), made up of representatives from Whitman County, Latah County, City of Pullman, City of Moscow, Washington State University, and University of Idaho, has been established in recognition of local concerns for the safety and reliability of the ground water resource because of continuing declines in ground water levels in the Pullman-Moscow aquifer; and

WHEREAS, computer-simulated modeling studies sponsored by the PMWRC indicate that the ground water level declines will continue if annual rate of withdrawal from the aquifer increases; and

WHEREAS, applications filed in both Washington and Idaho in recent years for large withdrawals of water from the aquifer indicate the potential exists for substantially increased ground water withdrawals and an associated decline in ground water pumping levels; and

WHEREAS, the PMWRC has adopted a coordinated management plan which sets goals for improved management of the Pullman-Moscow aquifer and action plans aimed at achieving these goals have been adopted by each of the entities belonging to the PMWRC; and

WHEREAS, the Director of the Department of Ecology of the State of Washington is charged with the administration of ground water resources to maintain a safe sustained yield (Revised Code of Washington 90.44.130) and is authorized by Washington law to represent the state in matters pertaining to interstate water rights and water development; and

WHEREAS, the Director of the Department of Water Resources of the State of Idaho is charged with the administration of ground water to maintain reasonable pumping levels (Section 42-226, Idaho Code) and is authorized by Section 42-1805, Idaho Code to represent the state in matters pertaining to interstate water rights and water development; and

WHEREAS, the responsible officials of each state desire to achieve coordinated management of the ground water resources of the Pullman-Moscow aquifer in accordance with their respective state laws and in cooperation with the PMWRC and its member entities;

NOW, THEREFORE, IT IS HEREBY AGREED THAT administration of the ground water resources of the Pullman-Moscow aquifer will be in accordance with the adopted "Groundwater Management Plan" of the PMWRC to the extent that such plan can be implemented and administered under the laws of each state. The following specific actions will be taken by the administrative agency of each state to implement the plan:

1. Issuance of new permits to appropriate ground water and approval of applications to change existing ground water rights will be guided by the withdrawal limitations in the PMWRC plan. The state administrative agencies will provide copies of all such applications to the PMWRC for review and evaluation relative to compliance with the PMWRC plan. The decision-making authority rests with the state agency, but the recommendations of the PMWRC will be made part of the official record for each application.

2. Applicants proposing significant (as determined by the director of the state within which the application is filed) increases in withdrawal of ground water from the Pullman-Moscow aquifer will be required to provide information on alternative sources of water, conservation practices to be implemented to reduce the quantity of water withdrawn, and similar information needed to demonstrate compliance with the PMWRC plan.

3. Applications for transfer of ground water rights across the state line will be considered in accordance with the applicable laws of each state and will be guided by the PMWRC plan.

4. The administrative agency of each state will, within the funding available and the priorities set by the director of each state, endeavor to enforce the applicable laws of each state relative to supervision of construction and maintenance of wells, unauthorized diversion and use of water, and conservation of water to achieve the goals of the PMWRC plan.

5. Within funding specifically available for such purposes, the administrative agency of each state will cooperate in studies necessary to evaluate the ground water resource and improve management of it.

6. A representative of each agency will be designated by the director of each agency as responsible for coordination of the agency's activities with the PMWRC.

IT IS FURTHER UNDERSTOOD that this agreement is effective upon signature by both directors and accomplishment of such filing, notice or approval requirements as may be necessary. This agreement shall remain in effect until terminated by written notice by either party.

DATE: Apr. 18, 1992

Fred Olsen

FOR CHUCK CLARKE
DIRECTOR
WASHINGTON DEPARTMENT OF ECOLOGY

DATE: April 20, 1992

R. KEITH HIGGINSON
DIRECTOR
IDAHO DEPARTMENT OF WATER RESOURCES

Appendix G
Resolution of Acceptance

RESOLUTION OF ACCEPTANCE
between the parties of the
PULLMAN-MOSCOW WATER RESOURCES COMMITTEE

1992

WHEREAS, the Pullman-Moscow Water Resources Committee (hereinafter "PMWRC") composed of representatives of Pullman, Moscow, University of Idaho, Washington State University, Whitman County and Latah County (hereinafter "PARTIES") has an interest in the protection and management of the ground water resources of the Pullman-Moscow basin (hereinafter "BASIN"); and

WHEREAS, there is evidence to show that the potential exists for the overuse of quality groundwater resources within the basin; and

WHEREAS, a ground water management plan developed and implemented in concert with public needs and interests and in accordance with state and local laws, rules and regulations can serve to avert the overuse of the ground water resources in the basin; and

WHEREAS, a Groundwater Management Plan has been developed by the PMWRC; and

WHEREAS, the parties to this Resolution are desirous of implementing such a groundwater management plan; and

WHEREAS, parties hereto are authorized to enter into this Resolution of Acceptance for the purposes stated herein.

The PMWRC recommends the Groundwater Management Plan to the PARTIES for acceptance and implementaiton.

NOW THEREFORE BE IT RESOLVED, this Resolution shall be effective upon execution by all parties and accomplishment of the filing requirements and approvals as may be necessary. This Resolution shall remain in effect until any party to the agreement terminates its participation by written notice of termination to the other parties.

P.E. May 8, '92
Chairman Date
Pullman-Moscow Water Resources Committee

3 June '92
Pullman Date

5/11/92
Moscow Date

7/21/92
Washington State University Date

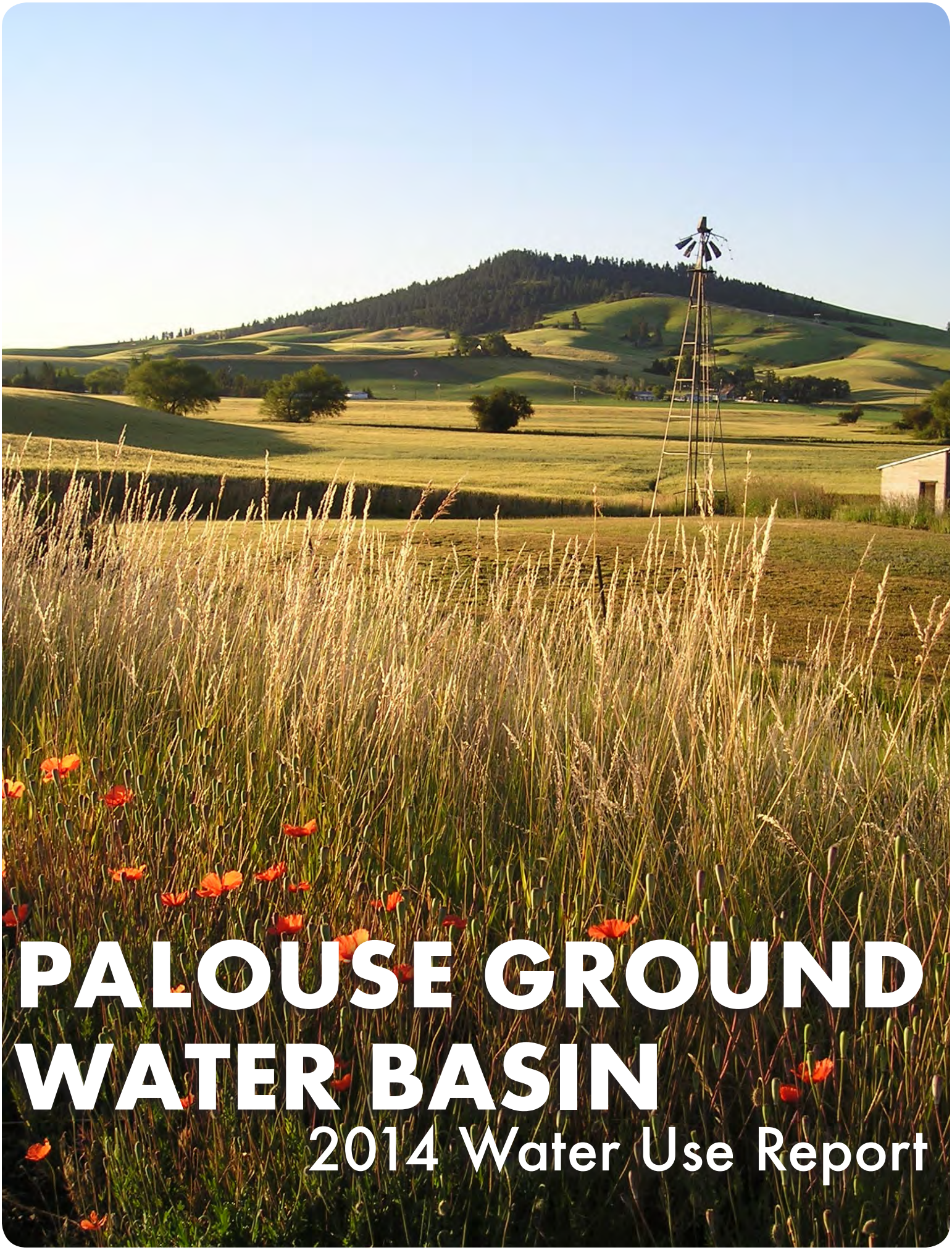
8/11/92
University of Idaho Date

7/28/92
Whitman County Date

5-26-9
Latah County Date

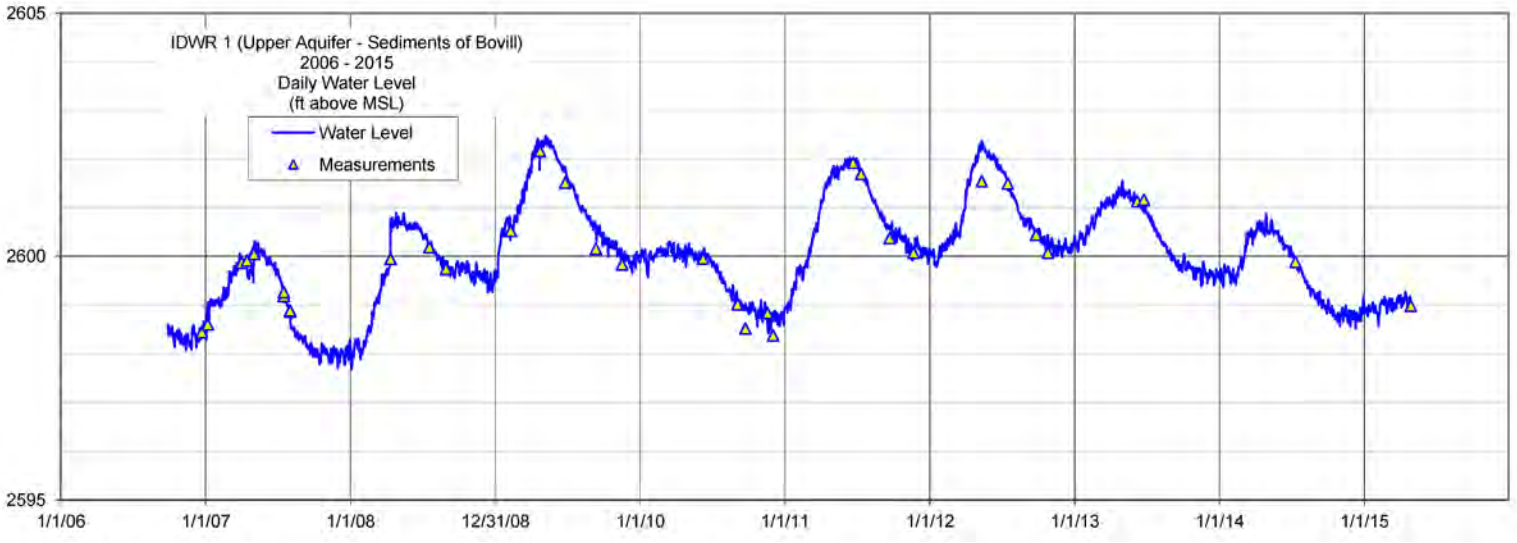
APPENDIX A

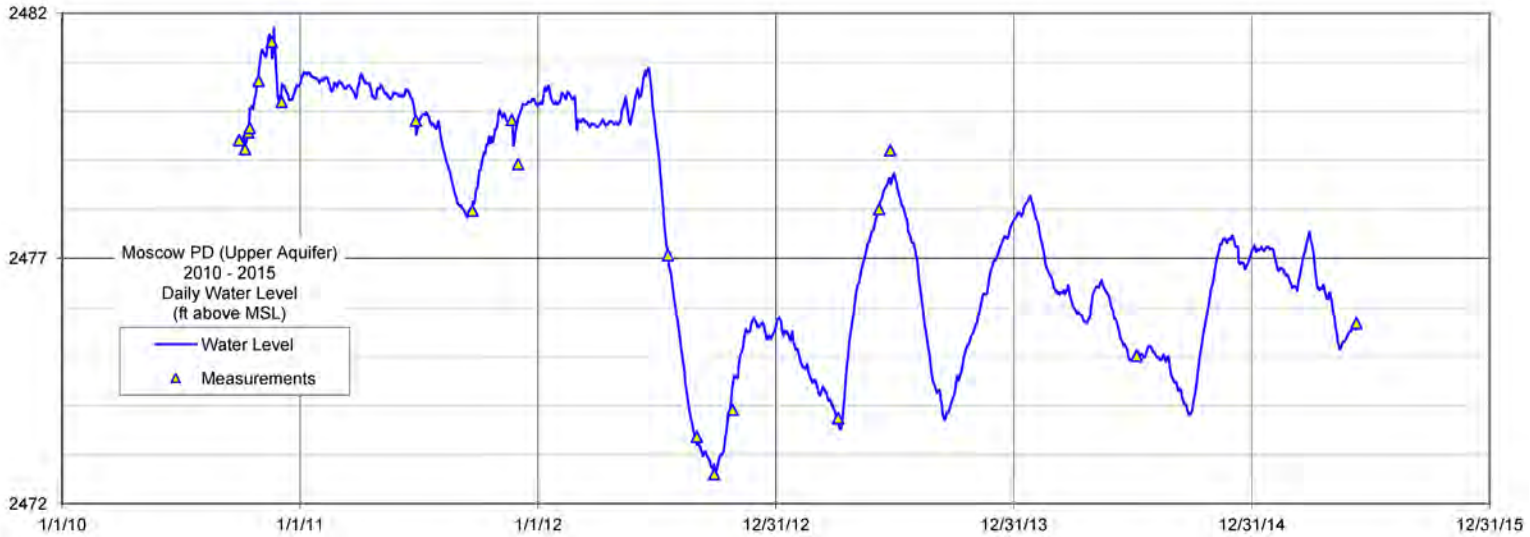
Item 3 – 2014 Palouse Ground Water Basin Water Use Report

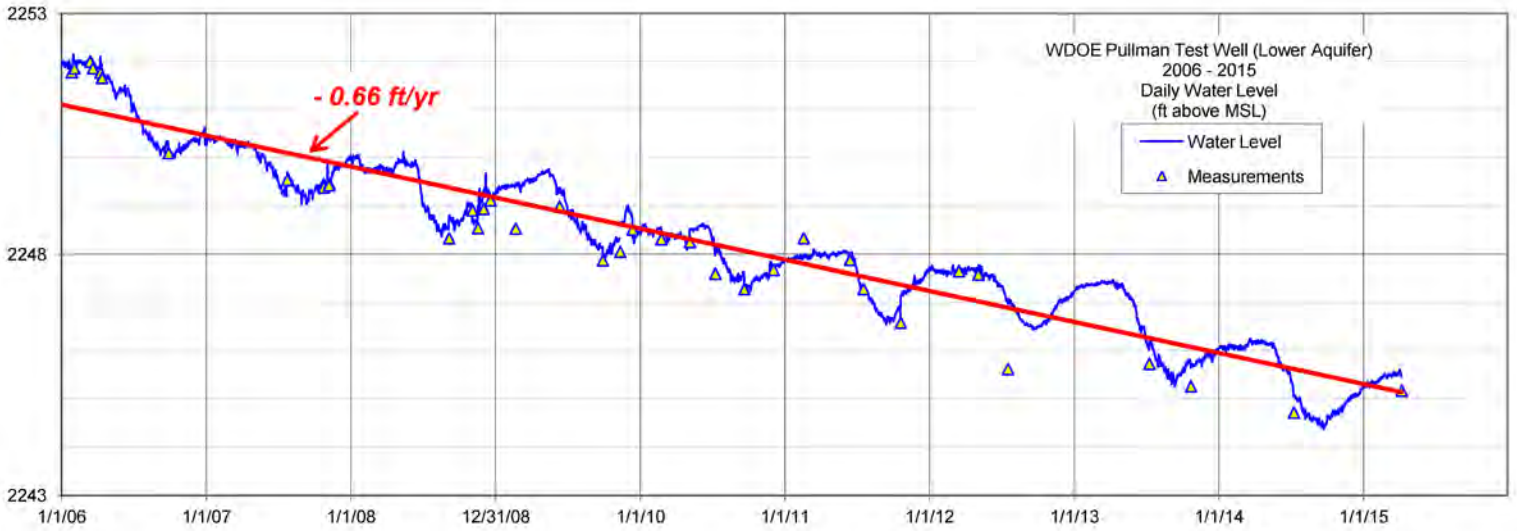


PALOUSE GROUND WATER BASIN

2014 Water Use Report







Water level hydrographs for 3 Palouse Basin monitoring wells

EXECUTIVE SUMMARY

Ground water is the drinking water supply for over 60,000 residents of Whitman County (Washington) and Latah County (Idaho) within the Palouse Ground Water Basin.

The Palouse Basin Aquifer Committee (PBAC) is a voluntary, cooperative, multijurisdictional group with representatives from the cities, counties and universities in the basin. PBAC is charged with ensuring a long-term, quality water supply for the Palouse basin region. This task is to be accomplished through the implementation of a Ground Water Management Plan (GWMP), first enacted in 1992.

The Ground Water Management Plan and an associated Intergovernmental Agreement include requirements to report accomplishments, pumpage and water level information. The purpose of this report is to review ground water pumpage and summarize aquifer water levels and research accomplishments during 2014.

The 2014 total combined ground water pumpage by the reporting pumping entities within the basin was 2.45 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Palouse), pumpage for 2014 was approximately 1% more than in 2013, and 10.7% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from monitored lower aquifer wells for 2014 reveals a reasonably consistent decline in maximum water level of slightly more than 1 foot from 2013 levels. A network of deep and shallow monitoring wells have been instrumented and are collecting information that will provide a useful long term record of the ground water levels throughout the basin. Hydrograph records for representative wells in both the upper and lower aquifers are illustrated on the inside front cover of this report.

In 2014, PBAC participated in several projects. Sponsored research activities included a ground water/surface water interaction project near the margins of the Moscow Mountain front and an effort aimed at compiling electronic versions of well log information from throughout the basin.

The foundation of the 1992 Ground Water Management Plan is a set of goals. As of 2015, PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2025.

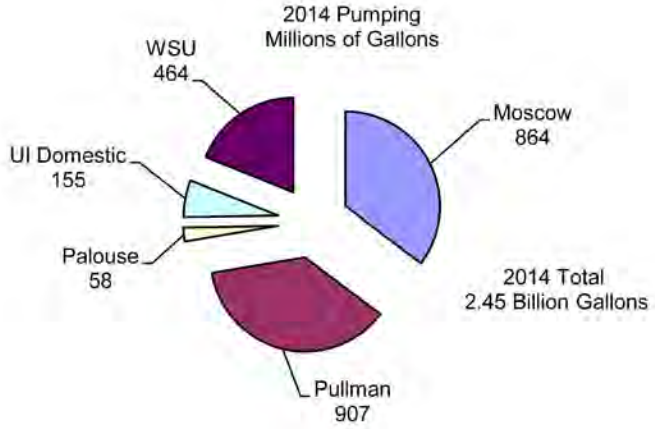


Figure 1 : 2014 Ground Water Pumping

ANNUAL WATER USE REPORT

The report that follows includes water use and water level information for the period from 1992 through 2014. To provide up to date information where available, data are included for portions of 2015. Water use reports for earlier years can be viewed at the PBAC web site: **www.webpages.uidaho.edu/PBAC.**

INTRODUCTION

THE PALOUSE BASIN AQUIFER COMMITTEE

Ground water is pumped in the basin by five major water suppliers (Pullman, Moscow, Colfax, Washington State University and the University of Idaho), several smaller cities and towns, and many businesses and rural residents residing in the unincorporated areas of Whitman County, Washington and Latah County, Idaho. Ground water levels in the deep aquifer system have been declining since measurement began in the late 19th century. Growth in the area following World War II led to increased pumping from the aquifer system, and by the late 1950's a serious decline in water levels was recognized by the cities, state institutions and regulatory agencies. Concerns regarding long term water supplies in the area led to the 1967 formation of an informal committee, known then as the Pullman-Moscow Water Resource Committee (PMWRC), to study the problem and make recommendations to the administrative and elected representatives of the major pumping entities. In time membership in the committee was expanded to include Whitman and Latah counties and then Colfax, Washington. In 1998, to reflect its expanded membership and the regional nature of the resource, the committee name was changed to the Palouse Basin Aquifer Committee (PBAC). Although not a formal PBAC member, since 2006 the City of Palouse has contributed funding toward the administration of the Committee. Colfax withdrew its membership in PBAC in October 2014. PBAC member contact information is detailed on page 8.

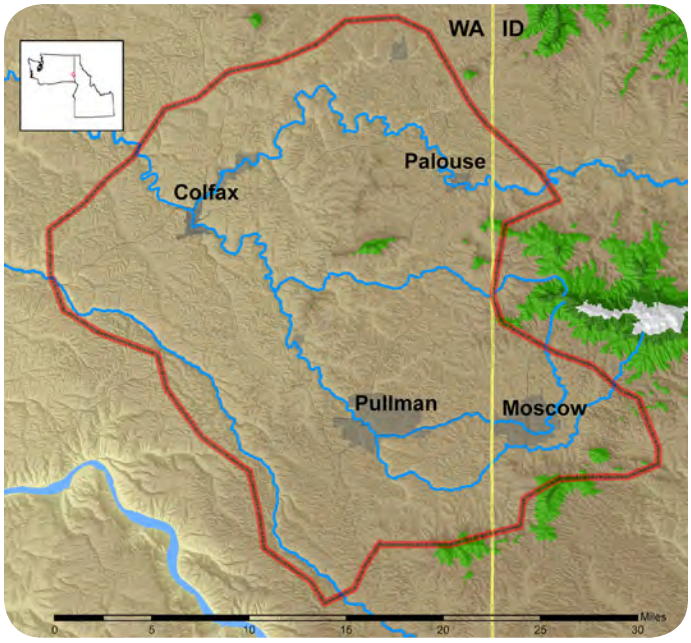


Figure 2 : Working Boundary for the Palouse Ground Water Basin

THE GROUND WATER MANAGEMENT PLAN

In 1992, the PMWRC, with the support of Washington and Idaho state regulatory agencies, enacted a Ground Water Management Plan (GWMP) for the basin. The Plan is authorized by an Intergovernmental Agreement between the (then 4 - now 6) member entities and an Interagency Agreement between the Washington Department of Ecology and the Idaho Department of Water Resources. The plan details the governance structure of the committee and lays out specific goals for the pumping entities. Since 1992, the goals have been periodically reviewed and updated by PBAC.

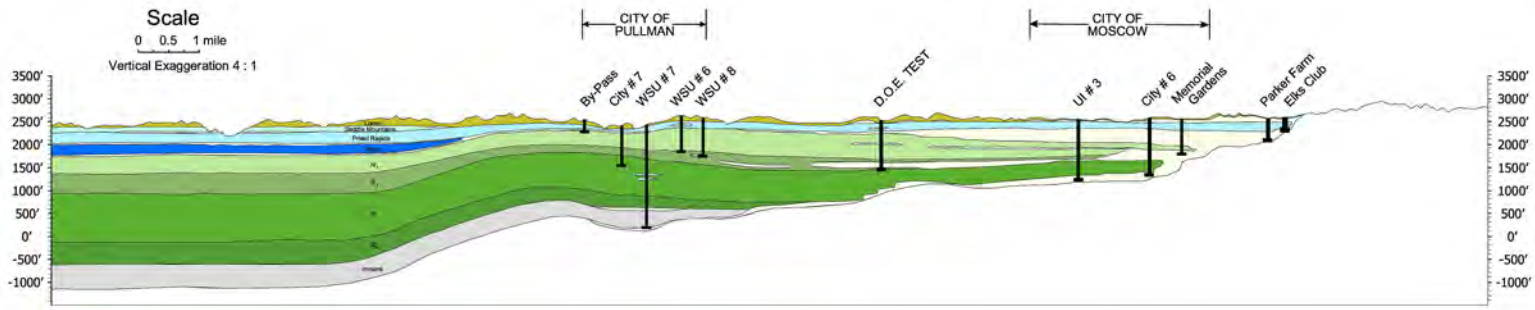


Figure 3 : E-W Schematic Cross Section (Bush, Garwood, 2005)

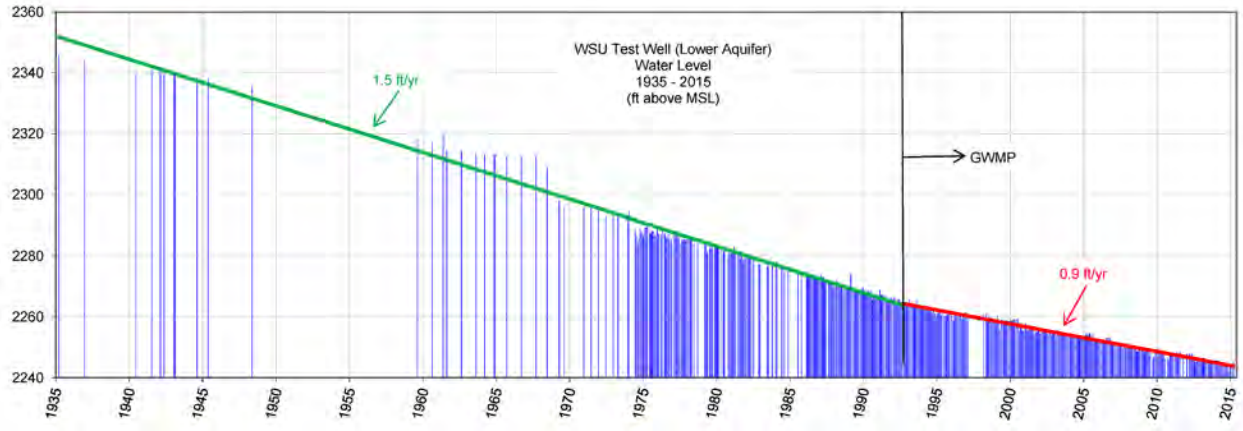


Figure 4 : Static Water Level, WSU Test Well (Lower Aquifer), 1935 -2015

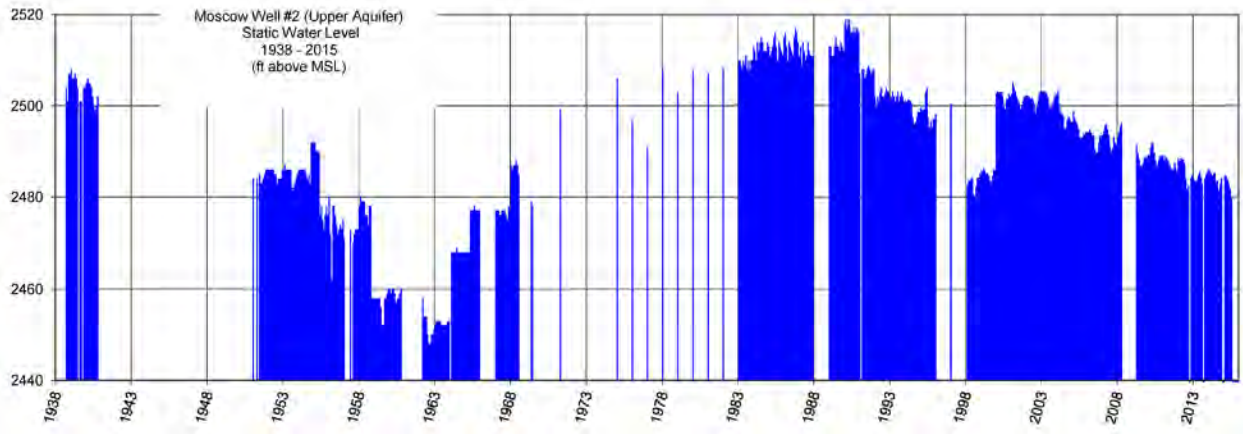


Figure 5 : Static Water Level, Moscow Well #2 (Upper Aquifer), 1938-2015

BASIN DESCRIPTION

The precise boundaries of the basin have not been delineated, but the current working boundary appears as shown in Figure 2. Ground water in the basin is pumped primarily from two aquifer systems: the upper Wanapum and the lower Grande Ronde. The Wanapum and Grande Ronde Formations are part of the Columbia River Basalt Group, which consists of thousands of feet of lava flows that covered much of eastern Washington, northern Oregon, and portions of western Idaho during eruptions that occurred between 17 and 6 million years ago.

The nature of the emplacement of the basalts over time resulted in significant differences in geology from west to east across the basin. The eastern end of the basin is characterized by thick sedimentary interbeds that thin west of Moscow. The Grande Ronde basalts are thicker beneath Pullman. An exaggerated schematic east-west cross section of the basin is shown in Figure 3.

The primary municipal drinking water source in the basin is the lower Grande Ronde aquifer system. In Pullman, all of the municipal residents obtain their drinking water from the Grande Ronde. Rural basin residents in Whitman County pump from both the upper and lower aquifers. In Moscow, 27% of the 2014 supply came from the upper Wanapum, and many of the rural residents in Latah County also tap the upper aquifer. In general, the Grande Ronde wells are more productive and contain higher quality water than those in the Wanapum.

Water levels in the Grande Ronde have historically declined at a rate of between 0.9 and 1.5 feet per year for 70 or more years (Figure 4). More recent data (since 2006) indicate the average annual rate of decline has decreased to 0.66 feet per year. Water levels in the upper aquifer dropped drastically in the late 1950s and early '60s, but recovered in the 1970s and '80s when much of the pumping switched to the lower aquifer (Figure 5). Although absolute values are still uncertain, it is thought that there is limited recharge to both the Wanapum and the Grande Ronde aquifer systems.

GROUND WATER PUMPAGE AND WATER LEVELS

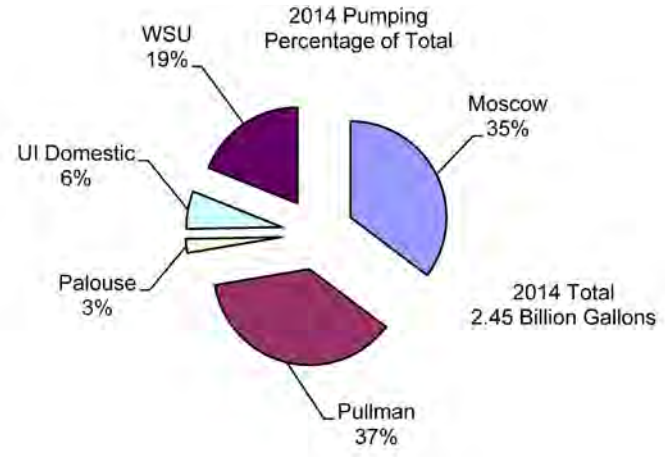


Figure 6 : Ground Water Pumping – Percentage of Total - 2014

The total combined ground water pumpage by the three cities (Pullman, Moscow, Palouse) and two universities (WSU and UI) for the year 2014 was 2.45 billion gallons (7,514 acre-feet). In aggregate, this was 1% more than was pumped in 2013 (2.42 billion gallons), and 10.7% less than was pumped in 1992 (2.74 billion gallons), the first year the Ground Water Management Plan took effect.

In 2014, Pullman and Moscow each pumped slightly more than 1/3 of the total (37% and 35% respectively), followed by WSU at 19%. UI pumped 6%, and Palouse pumping accounted for 3% of the combined total (Figure 6). By entity, comparisons to 2013 pumping are shown in Figure 7.

Moscow pumped 27% (233 million gallons) of its water from the upper Wanapum aquifer system in 2014. The other pumping entities all pump solely from the lower Grande Ronde system. As a percentage of the combined pumping total, the 2014 Moscow Wanapum contribution amounted to 9.5%.

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2014, an estimate of the baseline pumping was calculated as the average of the pumping levels for the months of January, February, November, and December. Pumping above this average level can be considered non-baseline usage. As a percentage of total pumping, the 2014 non-baseline usage for the five pumping entities ranged from 21.8% for UI to 45% for Palouse (Figure 8). (Note: In the figure the UI non-baseline use is presented both with and without inclusion of the 83 million gallons of reclaimed water utilized in 2014).

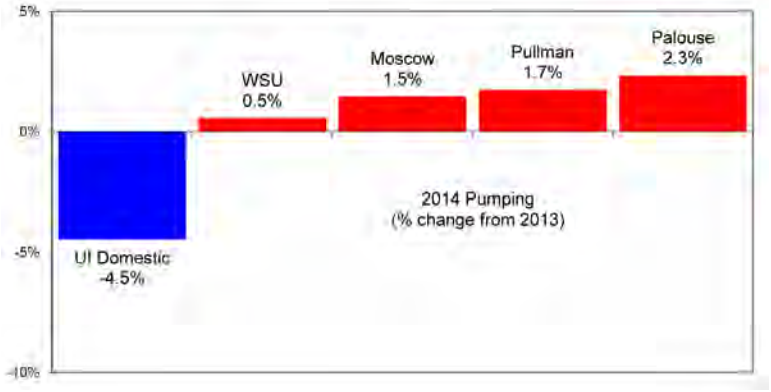


Figure 7 : 2014 Pumping – Change from 2013

Non-baseline usage varies with the weather conditions experienced during the year. In 2014, the months of April through July were warmer than the 5-year trailing average. In addition, April through June and September were drier than the trailing average. Weather conditions during September 2014 alone played a major role in the 1% annual pumping increase detailed earlier. Compared to 2013, warmer-drier conditions in September 2014 resulted in an 18.5% increase in pumping for the month. Charts of 2014 and first half 2015 monthly pumping compared to the 2009-2013 averages are shown in Figures 10-14 on pages 6 and 7. Figures 19-23 (pages 11 and 12) illustrate monthly pumping for the period between 2010 and mid 2015.

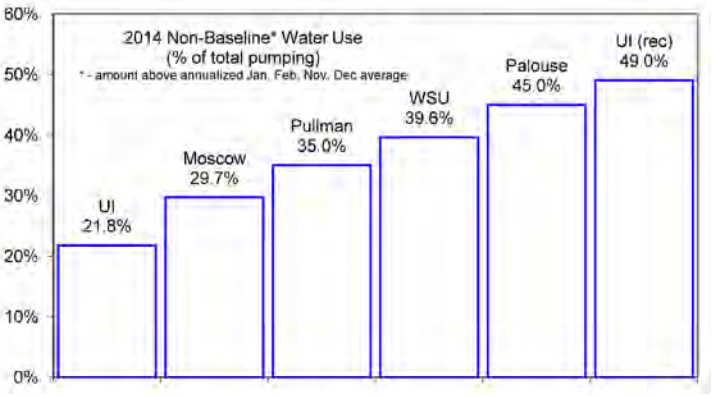


Figure 8 : Non-Baseline Water Use – 2014

As part of the Ground Water Management Plan, each pumping entity has agreed to voluntary pumping limitation goals. Pullman, Moscow, and the universities have agreed to attempt to limit annual pumping increases to 1% of the 1986-1990 average pumping amount. In addition, Pullman, Moscow and the universities agreed to keep total pumping below 125% of the 1981-1985 average pumping amount. An aggregation of the limitation goals for the GWMP pumping entities (Pullman, Moscow, WSU, UI) is shown in Figure 9. The limitation goals for individual GWMP pumping entities are illustrated in Figures 15-18 (pages 9 and 10) Note that no charts are shown for Palouse as they were not a signatory to the Ground Water Management Plan, and are not subject to the pumping targets.

PBAC maintains a network of monitoring wells throughout the basin. A map illustrating monitoring well locations and hydrographs can be accessed on the PBAC web site **www.webpages.uidaho.edu/pbac.**

Water level hydrographs for 3 of the wells in the monitoring network are presented on the inside front cover of this report.

Inspection of the hydrograph for the DOE Pullman Test monitoring well (bottom figure on inside front cover) reveals variation in year to year water level declines. The decline in annual maximum between 2013 and 2014 was 1.2 feet. In contrast, the maximum water level in 2013 declined only 0.3 feet from that of 2012. A regression line for the years 2006 through mid 2015 indicates an average annual decline over the period of approximately 0.66 ft/yr.

In the upper Wanapum aquifer, a marked decline in water level in 2012 can be seen in the hydrograph of the Moscow PD well (middle figure, inside front cover). This was likely the result of increased pumping of the upper aquifer by the City of Moscow to meet summer demand while working to repair the main lower aquifer production Well 9. When Well 9 was brought back on line in early 2013, the City reduced pumping in the upper aquifer and a portion of the decline has since been recovered.

Comparing the Moscow PD hydrograph to that of the IDWR 1 monitoring well (upper figure, inside front cover), which is completed above the Wanapum basalt in the Sediments of Bovill, it appears that water levels in the IDWR well exhibit seasonal variation but were not impacted by the increased pumping by the City in 2012.

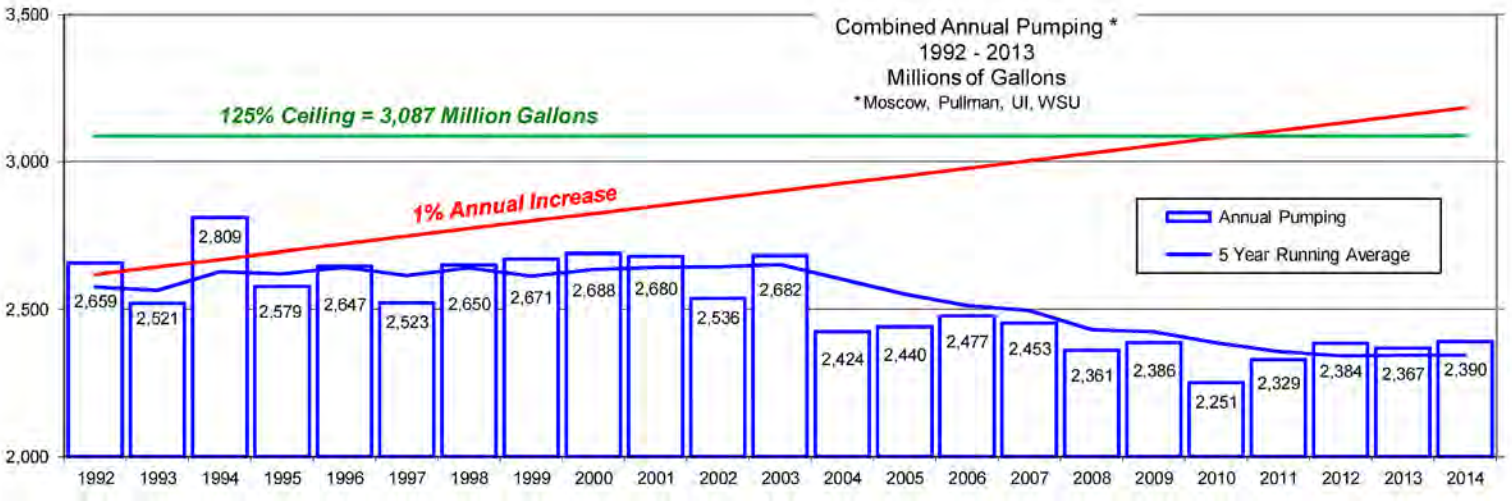


Figure 9 : Pumping Limitation Goals, 4 Major Entities Combined, 1992 - 2014

MONTHLY PUMPING COMPARED

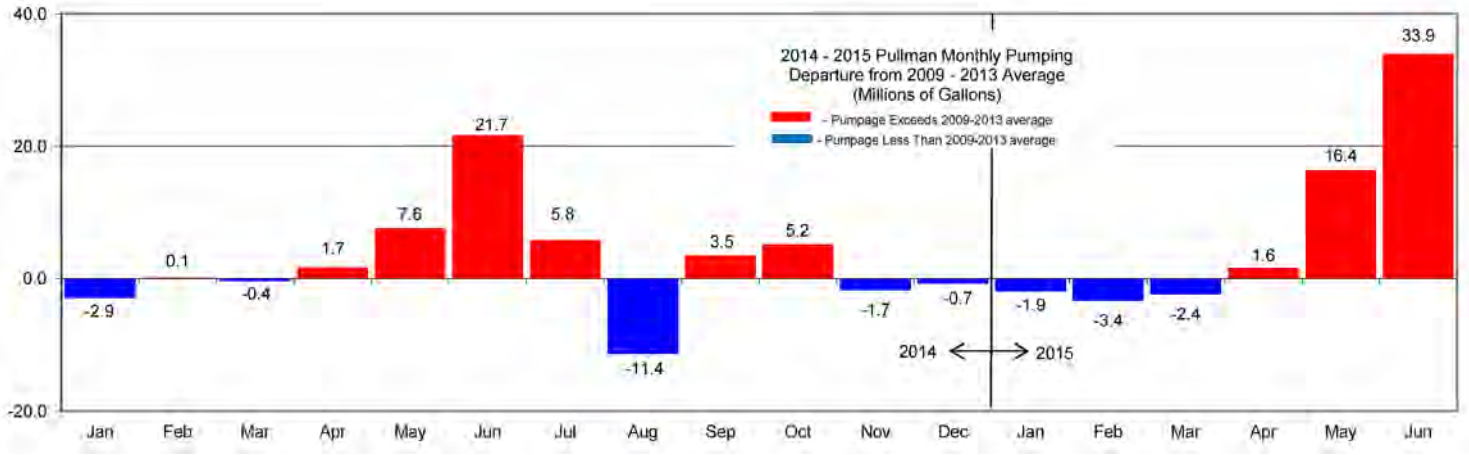


Figure 10 : Pullman Monthly Pumping, Departure from 5-year Average, 2014-2015

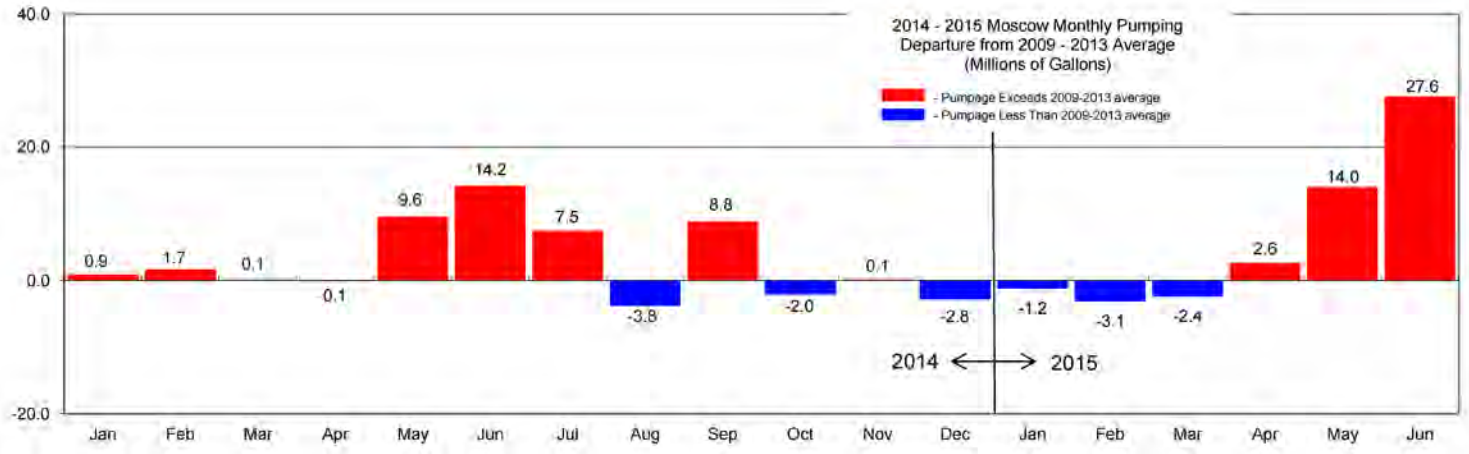


Figure 11 : Moscow Monthly Pumping, Departure from 5-year Average, 2014-2015

TO 5 YEAR AVERAGE

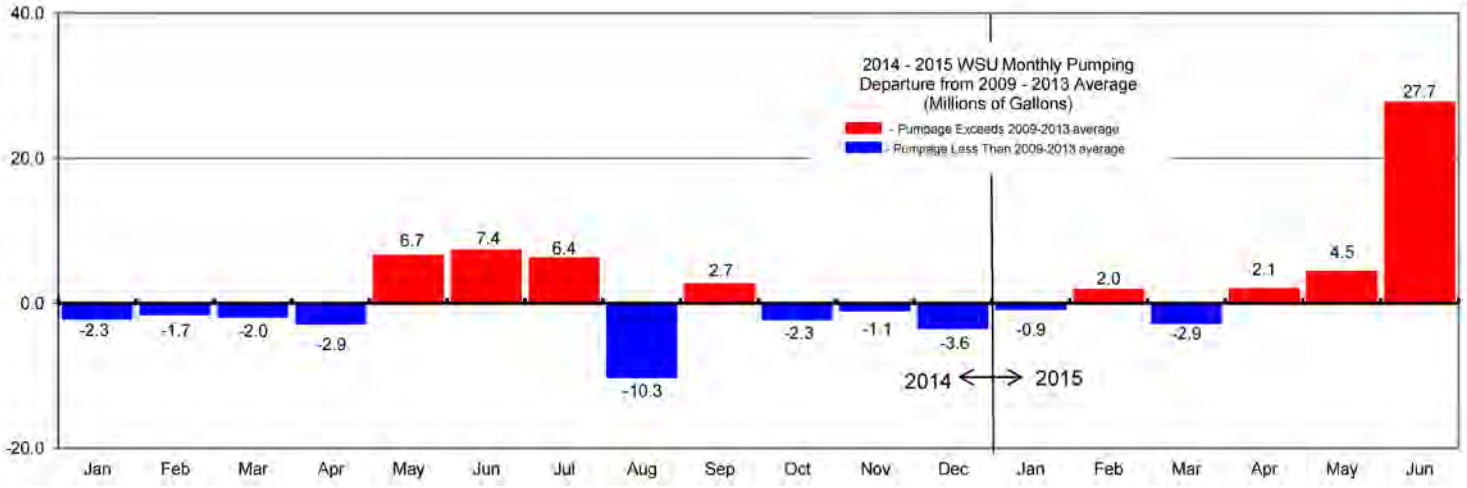


Figure 12 : WSU Monthly Pumping, Departure from 5-year Average, 2014-2015

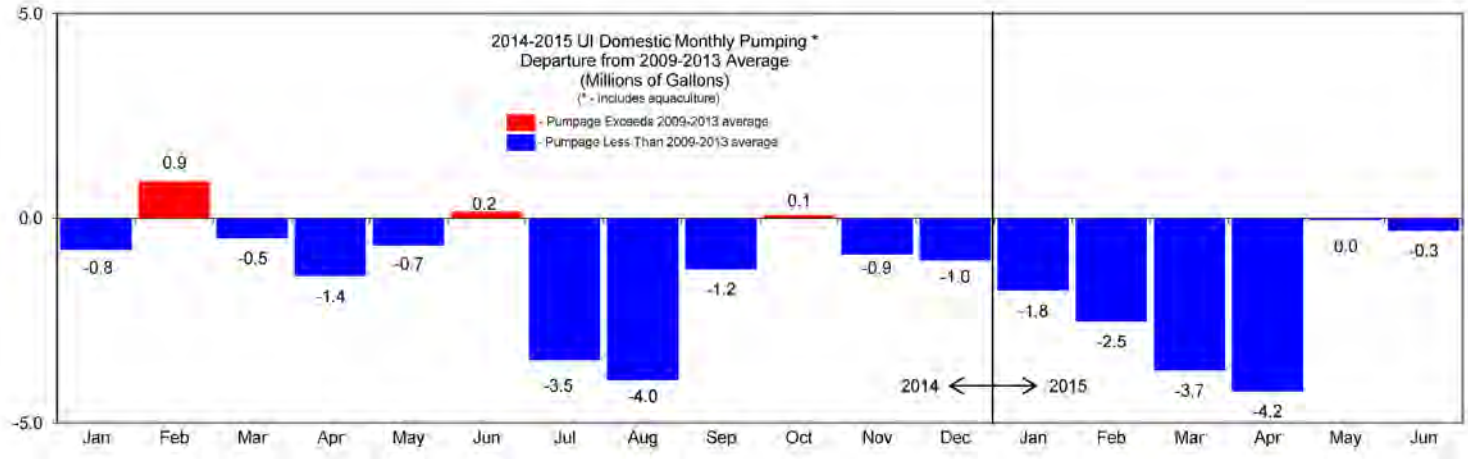


Figure 13 : UI Monthly Pumping, Departure from 5-year Average, 2014-2015

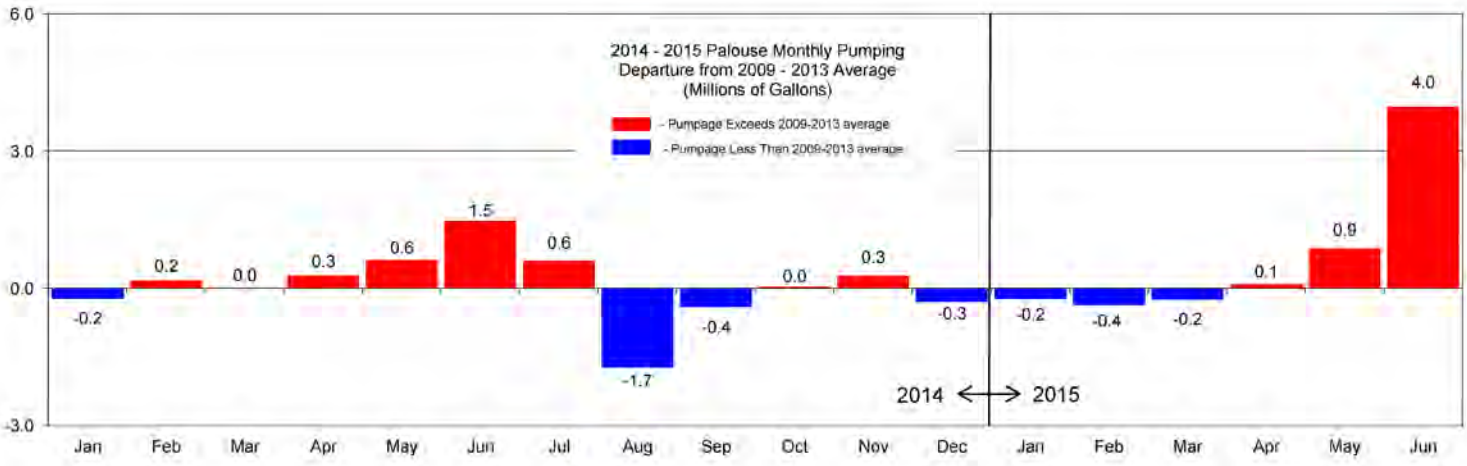


Figure 14 : Palouse Monthly Pumping, Departure from 5-year Average, 2014-2015

RESEARCH ACCOMPLISHMENTS 2014

PBAC initiated a new 2-year research project during 2012, led by UI principal investigator Erin Brooks The project is comparing time-based light stable isotope signatures (18O and 2H) from ground water wells and surface water at several locations near the margins of the Moscow Mountain front. Wells exhibiting signatures similar to those of the surface water could be evidence of the presence of a hydrologic connection.

PBAC also continued to support an ongoing project aimed at compiling electronic copies of all well logs in the basin with the goal of ultimately creating a "clickable" well log map. The output of this project will serve as a supplement to a portion of the 2011 Framework project that compiled electronic versions of nearly 400 technical documents into a searchable database. These two products will enable future researchers to more effectively access hydrogeologic information about the basin.

GOALS, PLANS AND ONGOING EFFORTS OF THE COMMITTEE

The foundation of the Ground Water Management Plan (GWMP) consists of a set of goals. Each member entity crafts its water resource management action plan(s) to support the goals. The goals are periodically reviewed and updated by PBAC.

In 2014, PBAC completed its review of the GWMP, and in the spring of 2015 issued a GWMP Informational Update available on the PBAC web site. As part of the update, each PBAC entity reviewed and updated its individual action plan(s) to better reflect current conditions in the basin.

In 2014, PBAC participated in the tenth (modern) Palouse Water Summit. The 2014 Summit continued to provide information and avenues for dialogue through networking opportunities and presentations related to the basin's common ground water resource. PBAC will support and participate in the eleventh Summit, scheduled for October 2015.

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PUMPING GOALS

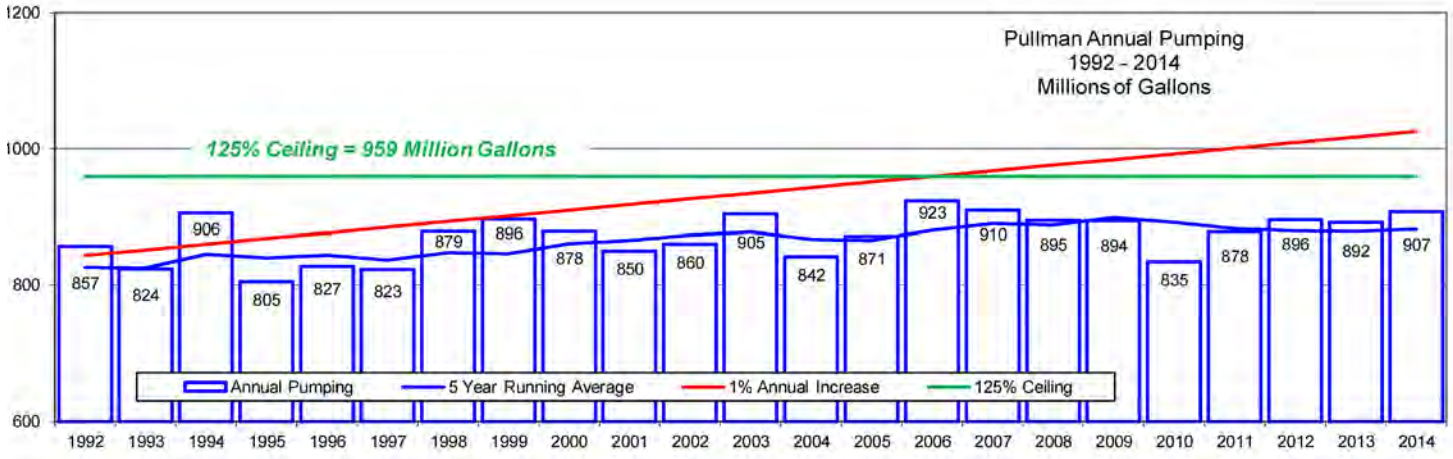


Figure 15 : Pumping Limitation Goals, Pullman, 1992-2014

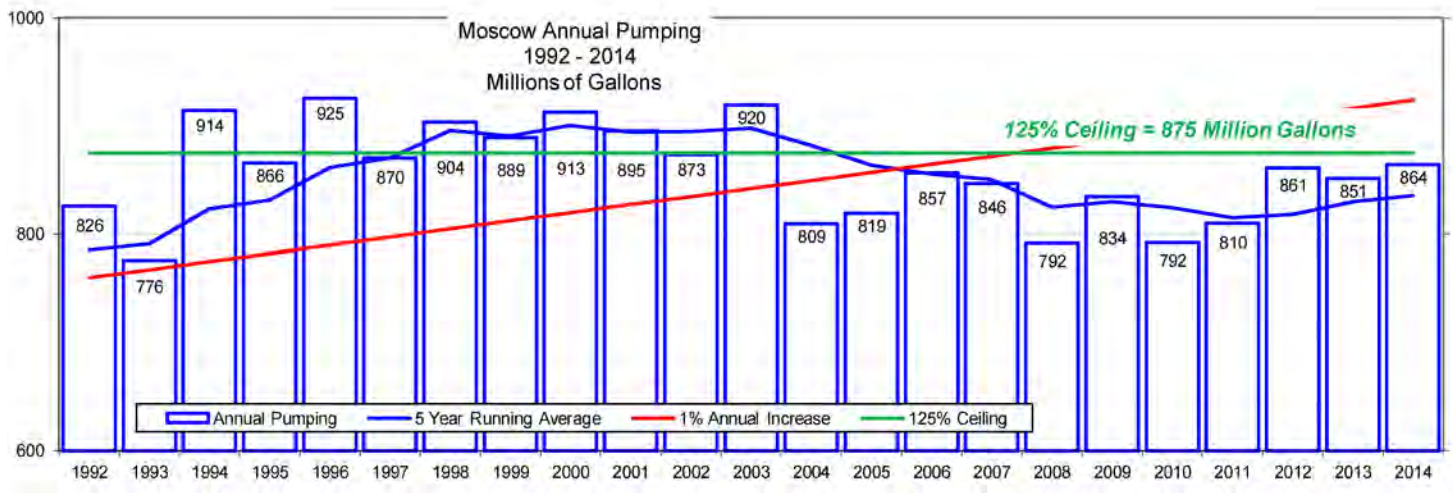


Figure 16 : Pumping Limitation Goals, Moscow, 1992-2014

PUMPING GOALS

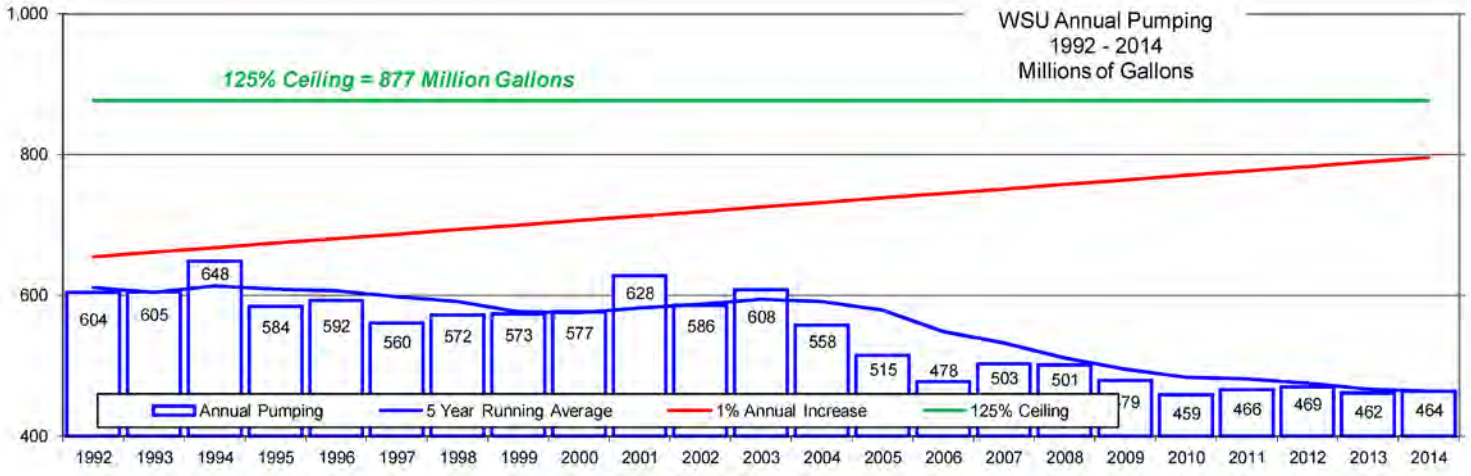


Figure 17 : Pumping Limitation Goals, WSU, 1992-2014

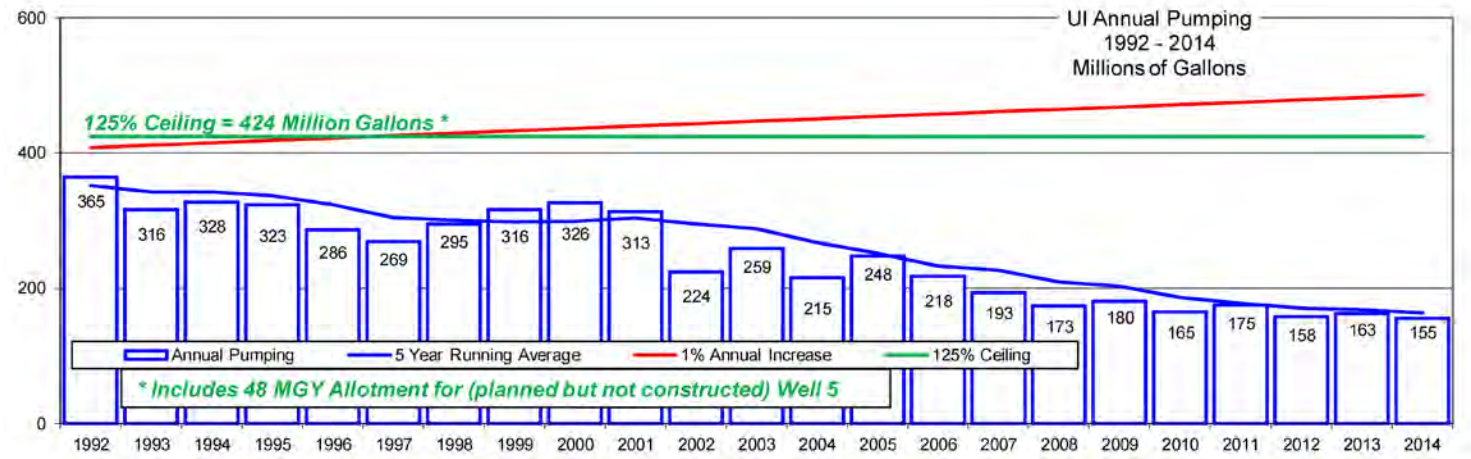


Figure 18 : Pumping Limitation Goals, UI, 1992-2014

MONTHLY PUMPING

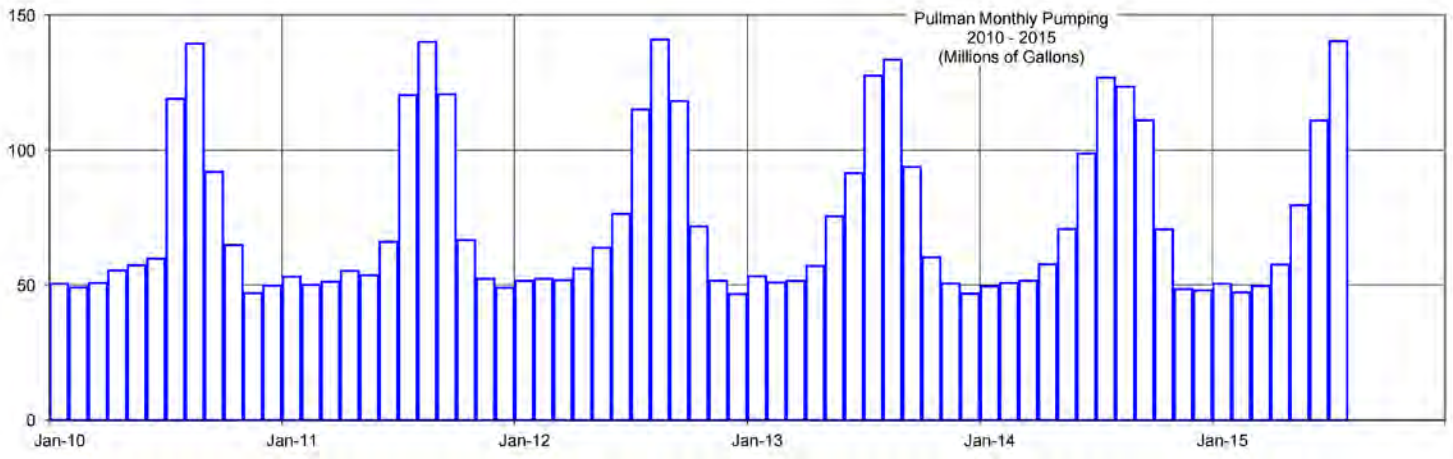


Figure 19 : Monthly Pumping, Pullman, 2010-2015

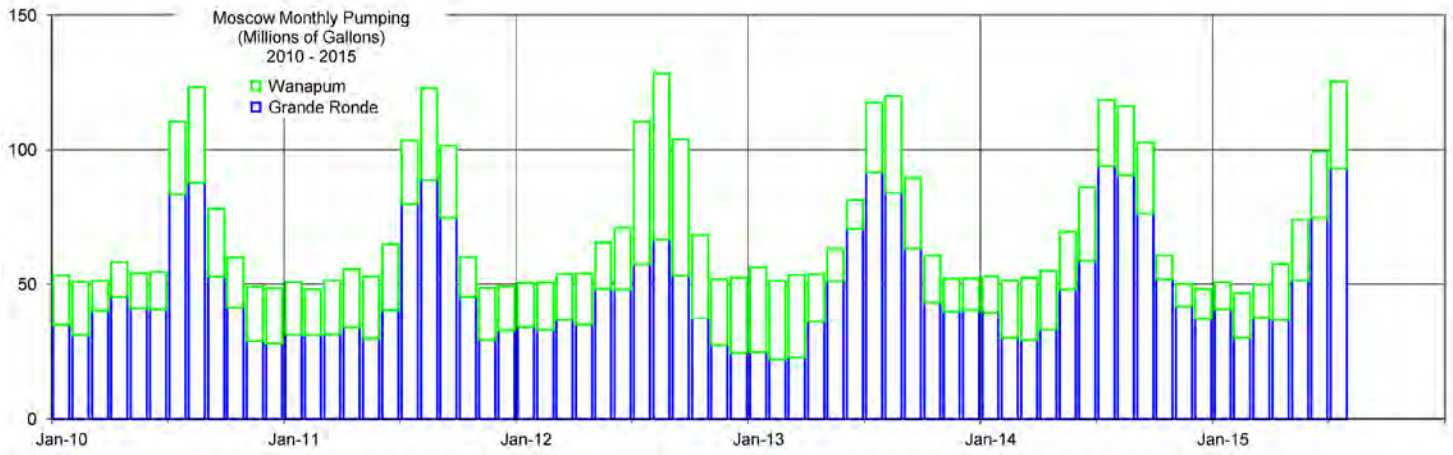


Figure 20 : Monthly Pumping, Moscow, 2010-2015

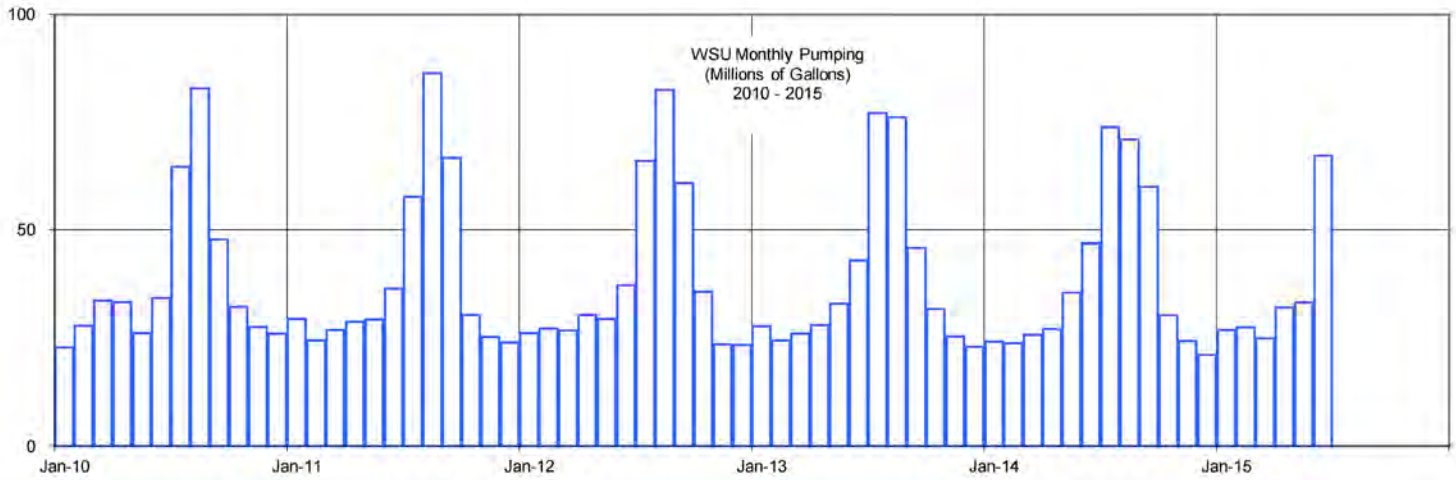


Figure 21 : Monthly Pumping, WSU, 2010-2015

MONTHLY PUMPING

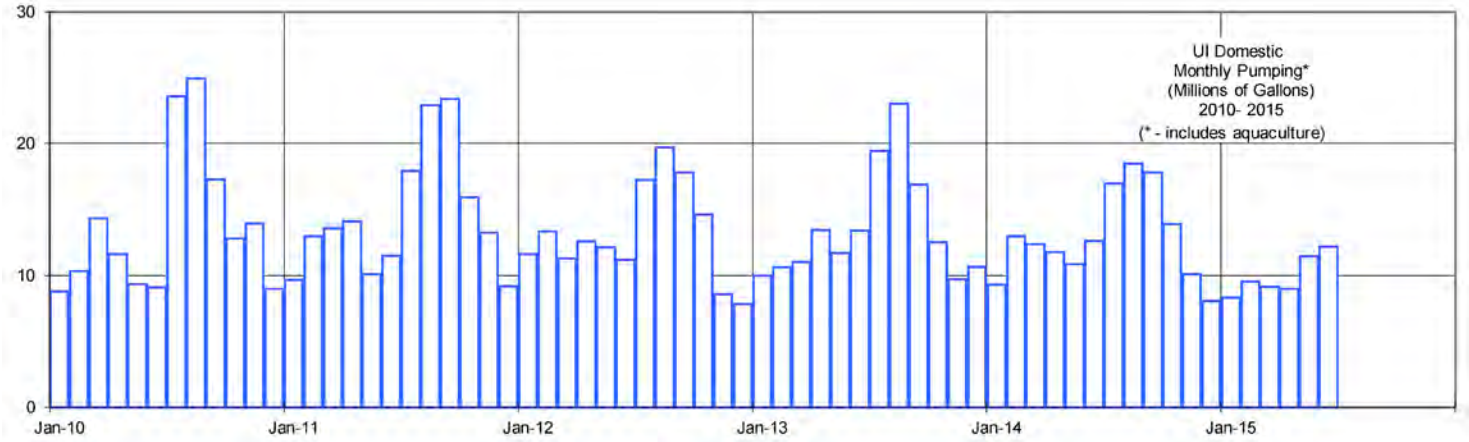


Figure 22 : Monthly Pumping, UI, 2010-2015

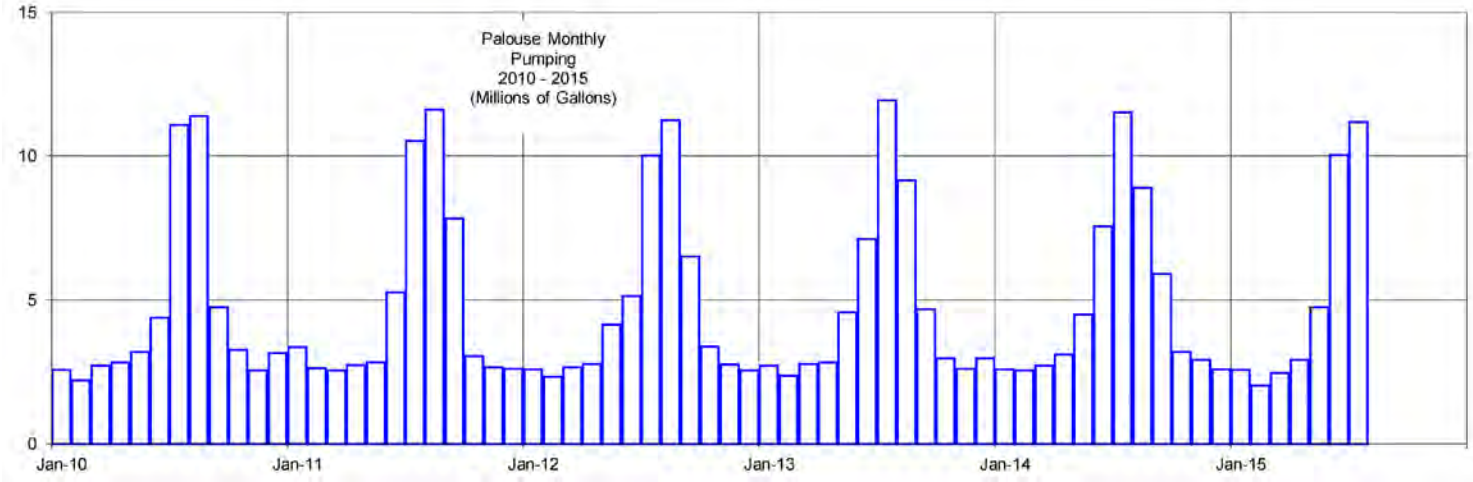
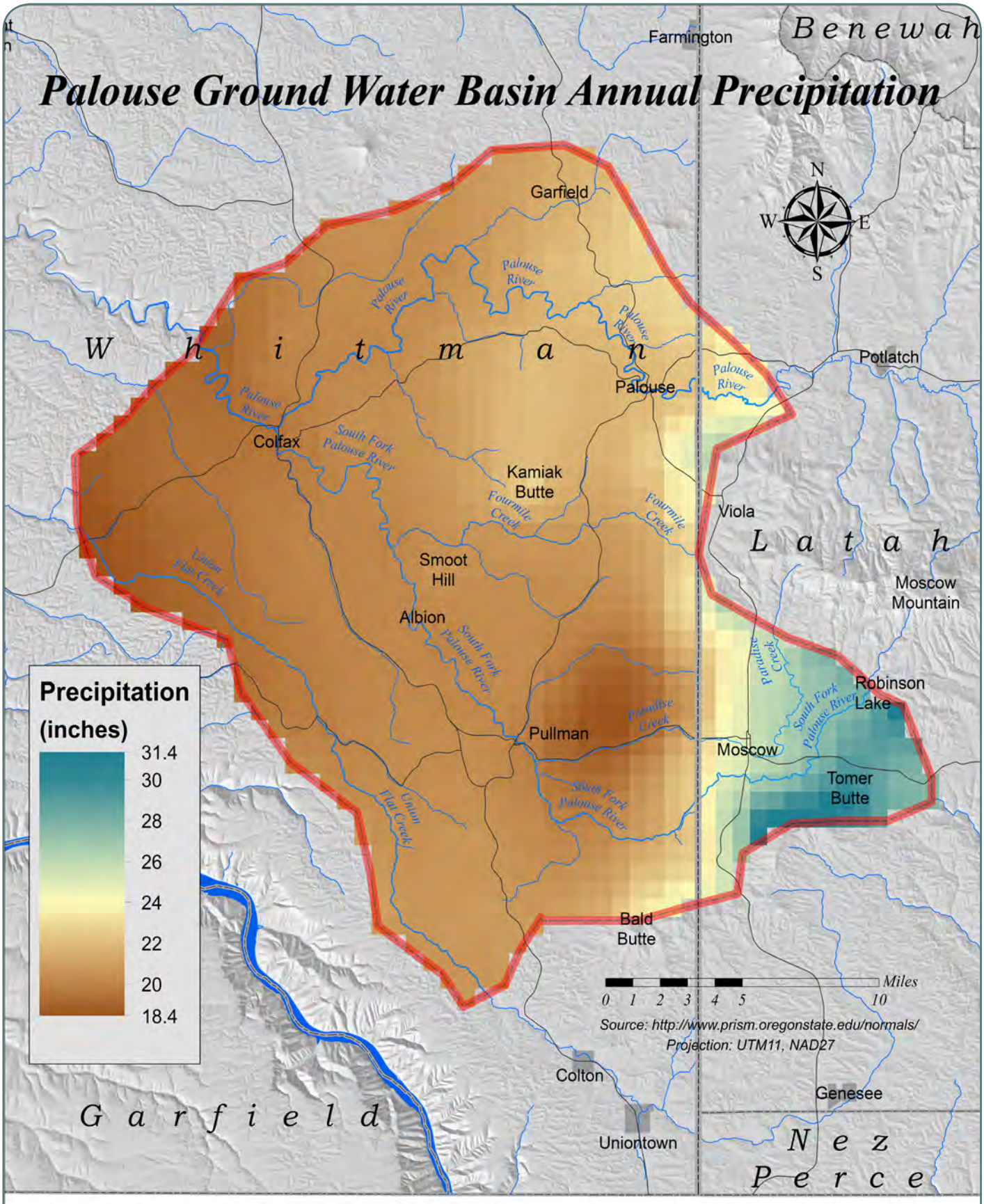
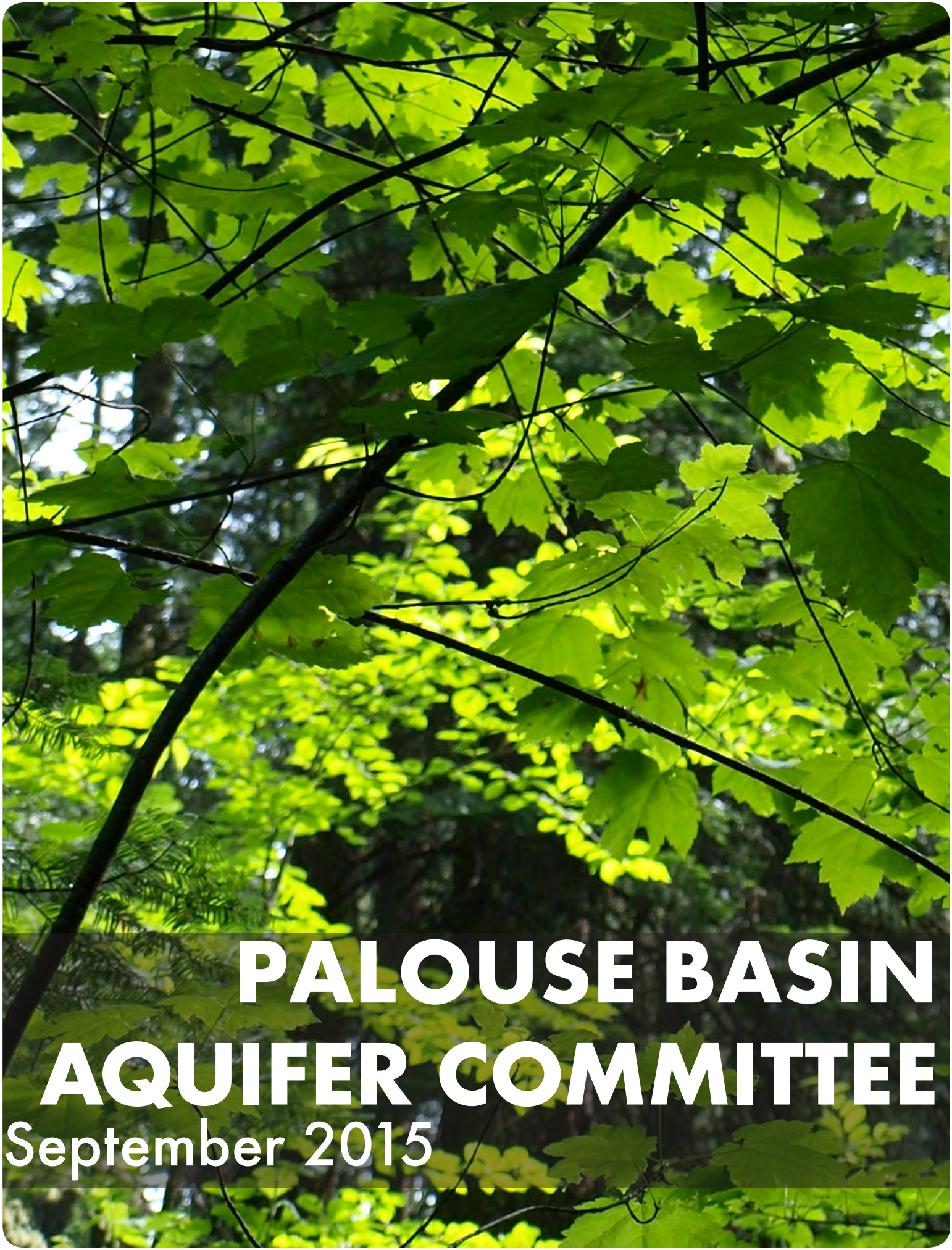


Figure 23 : Monthly Pumping, Palouse, 2010-2015



(1981 - 2010) Mean Annnual Basin Precipitation = 21.2 inches (PRISM 2012).
Estimated Annual Recharge (Grande Ronde Aquifer) = 0.2 inches (Moran 2011).
Estimated Annual Basin Grande Ronde Pumping = 0.25 inches (PBAC 2014).



PALOUSE BASIN AQUIFER COMMITTEE

September 2015

APPENDIX A

Item 4 – PBAC 2011 Mission and Goals

Palouse Basin Aquifer Committee
(PBAC)
2011 Mission and Goals

Mission:

To ensure a long-term, quality water supply for the Palouse Basin region.

Goals:

- Consistent with the Palouse Basin Groundwater Management Plan, develop and Implement a balanced basin wide Water Supply and Use Program by 2025.
    - Create and maintain an action plan for aquifer system sustainability, enhancement and/or alternate water supply development.
    - Direct research and implement pilot projects necessary to understand the basin hydrogeology in a manner sufficient to support the Water Supply and Use Program and the affiliated supply projects.
    - Encourage and facilitate entities in meeting their specific pumping, conservation, efficient use, water recycling and other goals.

- Review the Palouse Basin Groundwater Management Plan.

- Educate entities and the public on the state of the basin water supply and the status of PBAC's mission and goals.

- Maintain harmonious and effective working relationships across the state line to fairly meet the needs of all entities.

- Revisit the goals and mission statement annually.

APPENDIX A

Item 5 – WSU Action Plan from the 1992 GWMP

Washington State University Action Plan

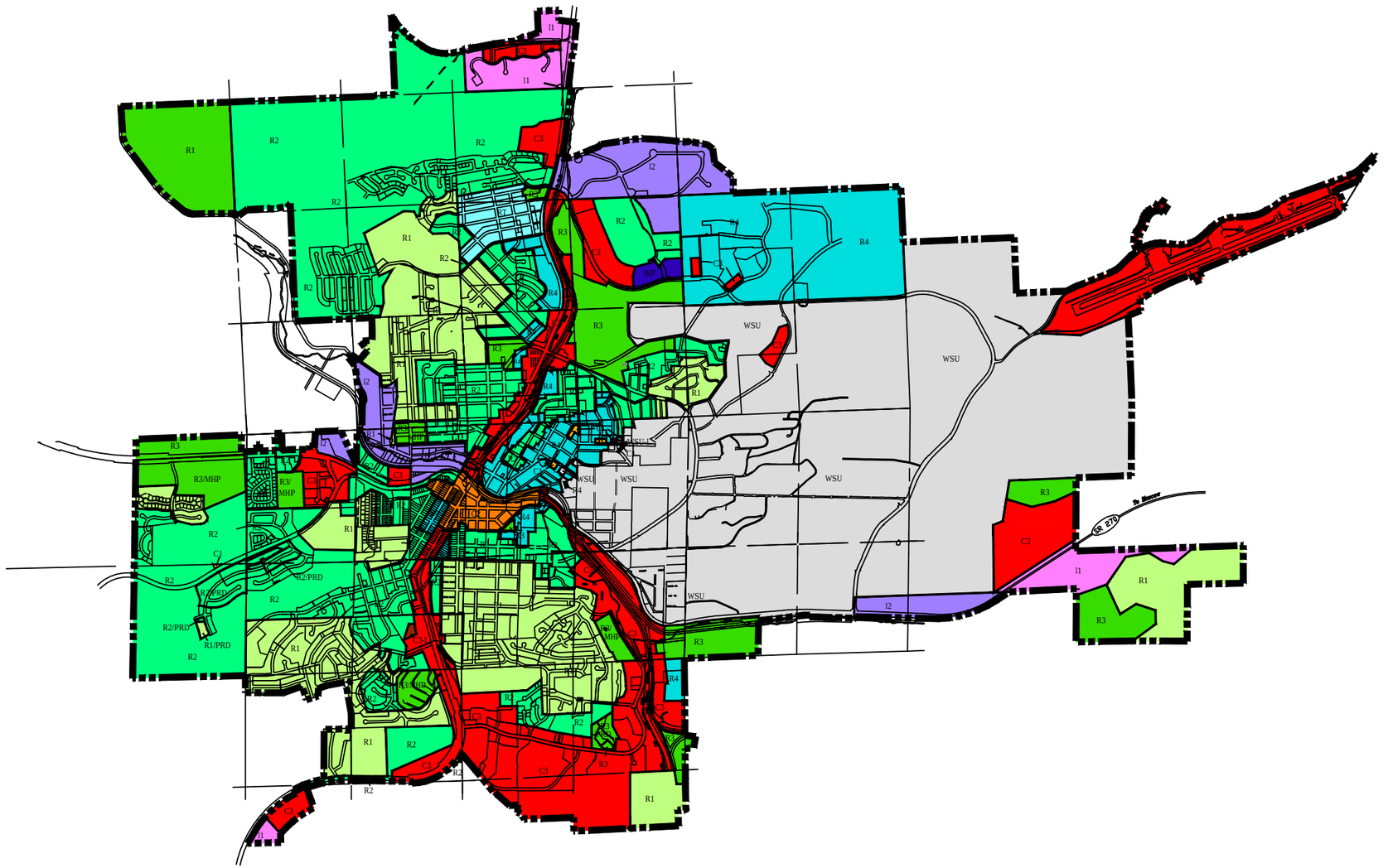
from September 1992 Groundwater Management Plan

1. Attempt to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy). At no time shall the accumulated total pumping exceed 125 percent of the 1981 to 1985 average (increase from 702 to 877 mgy).
2. Convert irrigation to computer controlled automatic systems on 70 to 90 percent of all turf within 10 years.
3. Eliminate 20 GPM of cooling water to the drain within three years.
4. Financially support the COMMITTEE activity.
5. Install water meters on its major water users.
6. Supplement the Committee's education program with distribution of appropriate information on campus.
7. Report all appropriate water data to the COMMITTEE for analysis.
8. Set a goal of no increase in withdrawal rate for the next two years to test the model with actual data.
9. Protect the groundwater quality by:
    a. Maintaining good landscape practices and reviewing chemical use;
    b. Monitoring and/or eliminating all underground storage tanks containing chemicals;
    c. Continued monitoring of the old hazardous waste site;
    d. Monitoring sewer systems and correcting any deficiencies (leaks, cross connections, ext.) noted;
    e. Monitoring existing septic tanks systems and properly siting future systems;
    f. Insuring that proper well construction procedures are followed;
    g. Complying with all State and Federal regulations pertaining to groundwater and surface water quality.

APPENDIX A

Item 6 – City of Pullman City Zoning Plan (used courtesy of Anchor QEA)

Mar 14, 2014 12:55pm drice I:\Projects\City of Pullman\2013 Water System Plan Update\CAD\0928-FG-3_1-2_Zoning Plan.dwg City Zoning Plan (2013)



LEGEND

- CITY LIMITS
- R1 - SINGLE FAMILY RESIDENTIAL DISTRICT
- R2 - LOW DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R3 - MEDIUM DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R4 - HIGH DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- C1 - NEIGHBORHOOD COMMERCIAL DISTRICT
- C2 - CENTRAL BUSINESS DISTRICT
- C3 - GENERAL COMMERCIAL DISTRICT
- C3-L - GENERAL COMMERCIAL DISTRICT
- I1 - LIGHT INDUSTRIAL DISTRICT
- I2 - HEAVY INDUSTRIAL DISTRICT
- IRP - INDUSTRIAL RESEARCH PARK DISTRICT
- WSU - WASHINGTON STATE UNIVERSITY
- WSU-L - WASHINGTON STATE UNIVERSITY

SOURCE: CITY OF PULLMAN
ENGINEERING DIVISION (2013)

0 3000
Scale in Feet

ANCHOR QEA

Exhibit 3-1
City Zoning Plan (2013)
2013 Comprehensive Water System Plan
City of Pullman

APPENDIX A

Item 7 – Pullman-Moscow Regional Airport Water Service Agreement with Amendment No. 1

AMENDMENT NO. 1 TO
WATER SERVICE AGREEMENT
WSU CONTRACT #9680

THIS AMENDMENT NO. 1 to that certain Water Service Agreement dated June 7, 1989 (the "Agreement ") between Washington State University (hereafter referred to as the "Purveyor" or "WSU") and the Pullman-Moscow Regional Airport Board (hereafter referred to as the "User"), is made and entered into by and between Purveyor and User.

RECITALS:

WHEREAS, Purveyor and User executed the Agreement to set forth the terms and conditions governing Purveyor's supply of potable water to User for use at User's terminal facility; and

WHEREAS, Purveyor and User have determined that the rights and obligations of the parties under the Agreement should be further clarified and expanded, and to that end, the parties execute this Amendment thereto.

NOW, THEREFORE, the parties agree to amend the Agreement as follows:

1. Section 2: Section 2 is hereby modified by striking certain language and adding new underlined language as follows:

> "User" at no cost to "Purveyor" other than as previously set forth in the "Agreement", shall install~~, maintain, repair,~~ and own the water main line, service line, and other facilities used to transport water from the "point of delivery" to the "area of usage". The design and construction thereof shall meet American Water Works Association (AWWA) standards; and, plans therefore shall be submitted to "Purveyor" for review and approval by its Facilities Operations Department prior to construction. "User" shall be responsible for all maintenance, repairs, replacement, and testing/calibration of the water system (including but not limited to piping, valves, PRVs, meters, and backflow preventers), and all associated costs, from the "point of delivery."

2. Section 3: Section 3 is hereby stricken in its entirety and replaced with the following:

> Each connection to "Purveyor's" water system for water service to facilities and/or grounds owned by or under the control of "User" shall have a shutoff valve, a water meter, and a backflow preventer when required. The cost of installing and upgrading water services supplied from "Purveyor's" water system, including the hardware specified herein, shall be the sole responsibility of "User".

3. Section 4: Section 4 and the referenced attached fee schedule are hereby stricken in their entirety and replaced with the following:

> "Purveyor" shall bill "User" monthly for each water service connected to the "Purveyor's" water system. Billing(s) shall be based on the current City of Pullman water rate as applied to each service size and water consumption level, using the City of Pullman rate tables in effect on the date of use as the basis for billing.

RECEIVED
FEB 06 2007
FACILITIES OPERATIONS

4. Section 5: The last sentence of Section 5 is hereby modified by striking certain language as follows:

> ...."Purveyor" will include water, so consumed, in its ~~bi~~-monthly billing as established in Item 4, above.

5. Section 8: Section 8 is hereby stricken in its entirety and replaced with the following:

> Water meter accuracy shall be tested by "User" in accordance with AWWA standards and frequency. Meters not accurate to within manufacturer design and specification tolerances across their flow range shall be repaired or replaced by "User". The new/rebuilt meter shall be tested by "User" for accuracy during installation. "User" shall promptly submit testing reports for the required meter and backflow prevention testing to the Director of Maintenance and Utilities, WSU Facilities Operations as such testing is accomplished. WSU Facilities Operations can provide these testing services on a recharge basis.

6. New Sections 13, 14 and 15: The following new sections 13, 14 and 15 shall be added at the end of the Agreement:

> 13. Prior to adding any water service connections to "Purveyor's" water system, or increasing the size of existing water services supplied from "Purveyor's" water system, "User" shall submit a written request to "Purveyor" at least ninety (90) days prior to the request for funding or project approval noting the desired additions/upgrades, estimated annual increase in water usage, etc. "Purveyor" will evaluate the request, determine if the increased service can be accommodated, and respond in writing.
>
> 14. "User" shall be responsible for providing access during normal business hours to "Purveyor's" personnel who will be reading the meters monthly or at other times as may be necessary.
>
> 15. "User" shall adhere to all regulations contained in the WSU Safety Policies and Procedures Manual S70.15, Drinking Water.

6. Remainder of Agreement Unchanged. The remainder of the Agreement shall remain unchanged and in full force and effect.

WASHINGTON STATE UNIVERSITY

By: _____
Title: Assoc. VP, Facilities Operations
Date: 2/6/07

By: _____
Title: Vice President, Business Affairs
Date: FEB 06 2007

RECEIVED
FACILITIES OPERATIONS

PULLMAN-MOSCOW REGIONAL AIRPORT BOARD

By: _____
Title: AIRPORT BOARD CHAIR
Date: 1/31/07

By: _____
Title: SECRETARY
Date: 1/31/07

WATER SERVICE AGREEMENT

THIS AGREEMENT, made and entered into this 7th day of June, 1989, by and between Washington State University, (hereinafter referred to as the "Purveyor") and the Pullman-Moscow Regional Airport Board (hereinafter referred to as the "User").

RECITALS

WHEREAS, the parties hereto, among others, during June of 1987 entered into an agreement entitled "Pullman-Moscow Regional Airport Supplemental Cooperation Agreement For Sharing Costs Of New Terminal Facility" (hereinafter referred to as the "Agreement"); and,

WHEREAS, the aforementioned new terminal facility is presently in an early stage of development; and,

WHEREAS, useful development of the aforementioned new terminal facility will require the availability of adequate potable water for use at the new terminal facility as defined and contemplated in the "Agreement"; and,

WHEREAS, "Purveyor" is willing to supply to "User" potable water for use at the new terminal facility as defined and contemplated in the "Agreement" under the following terms and conditions; now, therefore,

OPERATIVE PROVISIONS

IT IS HEREBY AGREED AS FOLLOWS:

1. "Purveyor" will supply potable water to "User" at a connection west of "Purveyor's" water well No. 5 located in the NE1/4 SW 1/4 Sec. 34 - T15N - R45 E, WM, hereinafter referred to as the "point of delivery" for use at the new terminal facility as defined and contemplated in the "Agreement" for use in carrying out normal activities at the new terminal facility only as it will be configured when accepted in the future by "User" as complete (hereinafter referred to as the "area of usage").

2. "User" at no cost to "Purveyor" other than as previously set forth in the "Agreement", shall install, maintain, repair, and own the water main line, service line, and other facilities used to transport water from the "point of delivery" to the "area of usage". The design and construction thereof shall meet American Water Works Association (AWWA) standards; and, plans therefore shall be submitted to "Purveyor" for review and approval by its Department of Physical Plant prior to construction.

3. "User" at its expense will install, repair, and maintain a water meter on the water service line.

4. "Purveyor" shall bill "User" bi-monthly for water consumed. Billings shall be based on the attached fee schedule established by "Purveyor". "Purveyor" shall review and may adjust the fee schedule on a biannual basis starting July 1, 1991. Increases in the fees shall not exceed the inflation rate for the past biennium plus a prorated share of any documented increase in purveyor's operating cost.

5. "User" at its own expense will provide portable meters to be used at fire hydrants located in the "area of usage". " User" shall obtain purveyor approval prior to using water from a fire hydrant located within the "area of usage" for purposes other than firefighting, inspection, or maintenance. User shall measure water used from a fire hydrant and report amount to Purveyor within thirty calendar days thereafter. "Purveyor" will include water, so consumed, in its bi-monthly billing as established in Item 4, above.

6. "Purveyor" neither represents nor guarantees that the availability of water at the "point of delivery" or at any point within the "area of usage", will satisfy minimum required fire flows: nor shall "Purveyor" be liable for any damages which "User" may experience due to the interruption of water service. "Purveyor" agrees to give "User" prior notice of planned maintenance interruptions when it is practical to do so.

7. "User" shall indemnify and hold harmless "Purveyor", its successors, and assigns, from any and all claims, damages, and causes of action of any nature, including the cost of defending any such claims or actions for injury to property or to persons, including death, arising out of or in any way connected with its activities under this Agreement.

8. "User" will conduct annual pressure tests of system integrity from the "point of delivery" to the water meter on the water service main line and submit a written report of the results of these tests to "Purveyor".

9. "Purveyor" will be responsible for the water rights application to accommodate "User's" needs as defined in this Agreement; and "User" will be responsible for obtaining necessary permits for the construction or repair of the water lines and facilities.

10. TERM: The term of this Agreement shall be from the 1st day of June, 1989, through the 31st day of May, 2020, and shall be extended for such periods as are reasonable and mutually agreeable in order to provide "User" with sufficient potable water within the "area of usage" to satisfy the needs of "User" according to the terms of this Agreement.

11. EXTENT OF AGREEMENT: This Agreement contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or to bind either of the parties hereto.

12. MODIFICATION: No change or addition to this Agreement shall be valid or binding upon either party unless such change or addition is in writing and executed by both parties.

PURVEYOR:
Washington State University

By _____
G. A. Hartford, Jr.
Vice President
Business and Finance

USER:
Pullman-Moscow Regional Airport Board

By _____
Chairperson

ATTEST:

_____
Vice Chairperson

W.S.U. WATER: FEE SCHEDULE

1. Min. Monthly charges $25.00 (includes up to 3,000 C.F./Mo.)

2. Additional charges: $0.51/100 C.F. (for water used over and above 3,000 C.F./Mo.)

Above rates are effective through June 30, 1991.

APPENDIX A

Item 8 – Washington State University/City of Pullman Memorandum of Understanding

WASHINGTON STATE UNIVERSITY/CITY OF PULLMAN
MEMORANDUM OF UNDERSTANDING

PURPOSE

The purpose of this Memorandum of Understanding is to define the responsibility for maintenance and improvement of streets, sanitary sewers, storm drains, and water lines within or adjacent to the Washington State University (WSU) campus in Pullman.

A. STREETS

WSU's Responsibilities

It is the responsibility of the University to provide street maintenance and improvements within the boundaries of WSU including street cleaning, sanding, snow removal, pavement patching, traffic control signing and striping, sidewalk maintenance, and traffic signal maintenance and operation, including all parts and labor for controllers, displays, and loops, as well as intersection approach signing and striping on the following streets and intersections specifically listed below, and as identified on attached exhibit "A".

1. Thatuna Street (exclusive of intersection at C Street)
2. Spokane Street
3. College Street - from Railroad service track at Power Plant to Stadium Way
4. Washington Street
5. Columbia Street
6. Idaho Street
7. Nevada Street
8. Tacoma Street
9. Stadium Way - Orchard Drive to Main Street (SR 270) including turn lanes
10. Linden Street - Thatuna to east right of way of "B" Street
11. Colorado Street - "D" Street to Stadium Way
12. Flag Lane
13. Campus Avenue - Spokane Street to Thatuna Street
14. Reaney Way - southeast of Gray Lane
15. Oak Street - cul-de-sac at Albrook Lab
16. Traffic signals at the Stadium Way intersections of Orchard Drive, Grimes Way, and Wilson Road
17. All other streets within the area identified as WSU on attached exhibit "A"

City's Responsibilities

It is the responsibility of the City to provide street maintenance and improvements outside the boundaries of WSU including street cleaning, sanding, snow removal, pavement patching, traffic control signing and striping, sidewalk maintenance, and traffic signal maintenance and operation, including all parts and labor for controllers, displays, and loops, as well as intersection approach signing and striping on the following streets and intersections specifically listed below, and as identified on attached exhibit "A".

1. Stadium Way - N. Grand to Colorado Street
2. Orchard Drive
3. Valley Road
4. Merman Drive
5. Terre View Drive - N. Grand to Northwood Drive
6. Campus Avenue - west of Spokane Street
7. Gray Lane - south of Reaney Way
8. All other streets in the City of Pullman
9. Traffic signal at the intersection of Stadium Way and Main Street (SR 270)

B. SANITARY SEWERS

WSU's Responsibilities

It is the responsibility of the University to provide maintenance and improvement of the sanitary sewers, manholes, and appurtenances located within the area identified as WSU on attached exhibit "B".

WSU shall design all proposed new sanitary sewer connections and sewer line replacements in accord with the City of Pullman design standards and shall submit plans for all proposed new sanitary sewer connections to the City for review and approval prior to awarding any construction contracts for the proposed sewer connections.

WSU shall submit applications to the City for all proposed "significant industrial discharges" to the sanitary sewer system in accordance with Section 10.16.100 of the Pullman City Code.

It is also the responsibility of the University to comply with all City and State regulations regarding discharges to the sanitary sewer system.

City's Responsibilities

It is the responsibility of the City to provide maintenance and improvement of the sanitary sewers, manholes, and appurtenances located within the area identified as City on attached exhibit "B". This responsibility for improvement is subject to the Interlocal Agreement entered into by the City and WSU in 1979 regarding the proration of capital and operating costs of the Pullman Sewage Treatment Plant.

C. STORM DRAINS

WSU's Responsibilities

It is the responsibility of the University to provide maintenance and improvement of all the storm drains and appurtenances including catch basins and manholes within the area identified as WSU on attached exhibit "B".

WSU shall design all proposed new storm drain connections to existing systems in accord with the City of Pullman design standards and shall submit plans for all new storm drain connections to the City for review and approval.

City's Responsibilities

It is the responsibility of the City to provide maintenance and improvement of all the storm drains and appurtenances including catch basins and manholes within the area identified as City on attached exhibit "B".

D. DOMESTIC WATER SYSTEM

WSU's Responsibilities

It is the responsibility of the University to provide maintenance and improvement of all water lines and appurtenances within the area identified as WSU on attached exhibit "B".

City's Responsibilities

It is the responsibility of the City to provide maintenance and improvement of all the water lines and appurtenances within the area identified as City on attached exhibit "B".

DURATION

This memorandum shall be effective until revised by mutual consent of the City and WSU.

FINANCIAL IMPLICATIONS

No new financial arrangements are required because of this memorandum. Each party will finance its activities in accordance with its policies and procedures.

ADMINISTRATION

It is understood that any improvement of the facilities covered by this memorandum will be the responsibility of the agency identified as responsible for maintenance except as established by any other agreement.

Signatures:

WASHINGTON STATE UNIVERSITY

Director of Physical Plant

12-12-94

Date

CITY OF PULLMAN

James J. Hudak

Director of Public Works

12/12/94

Date

APPENDIX A

Item 9 – WSU – City of Pullman Intertie Agreement

RESOLUTION NO. R-71 -01

A RESOLUTION AUTHORIZING THE EXECUTION OF AN INTERTIE AGREEMENT BETWEEN THE CITY OF PULLMAN AND WASHINGTON STATE UNIVERSITY FOR PROVISION OF A CONTINUED WATER SUPPLY UNDER EMERGENCY CONDITIONS.

WHEREAS, the City Council for the city of Pullman has before it an Agreement entitled Water System Intertie Agreement which is attached hereto and marked as Exhibit "A"; and,

WHEREAS, this Council believes it to be in the best interests of the city of Pullman to authorize the execution of said Agreement; now, therefore,

IT IS HEREBY RESOLVED that the Mayor and the finance director be and they are hereby authorized and directed to execute the Agreement.

IT IS FURTHER RESOLVED that the Mayor and finance director are each hereby authorized and directed to take such further action as may be appropriate in order to effect the purpose of this Resolution and the Agreement authorized thereby.

ADOPTED by the City Council of the city of Pullman at a regular meeting held on the 2nd day of October, 2001.

DATED this 3rd day of October, 2001.

Mayor

ATTEST:

Finance Director

CITY OF PULLMAN
AND
WASHINGTON STATE UNIVERSITY

WATER SYSTEM INTERTIE AGREEMENT

In order to provide for a continued water supply under emergency conditions, the City of Pullman ("City") and Washington State University ("University"), agree as follows:

1. **Purpose**. Four emergency interties are provided between the water systems for the City and for the University. These are located at the intersection of: (1) Valley Road and Hillside Drive; (2) on Valley Road approximately 800 feet west of Hillside Drive; (3) at the south end of Duncan Lane; and (4) at the southeast end of Oak Street. The interties may be used by either party in an emergency situation only. The determination of whether a situation constitutes an emergency is left to the sole discretion of the party that wants to use the intertie. Each party shall notify the other prior to operating the manual valves between the systems. For the City, the person to be notified shall be the Public Works Department Maintenance and Operations Superintendent and/or Maintenance Supervisor. For the University, notification shall be made to the Department of Facilities Operations via Whitcom 911 Center. Charges for water used during an emergency will be negotiated between the parties and shall be reasonable. If the parties are unable to agree to a reasonable charge, the parties will follow the dispute resolution process in paragraph four (4) of this agreement. The interties may be used by either party as long as an emergency condition exists and the intertie use does not have a detrimental effect on the water system from which water is being drawn. The determination of whether intertie use has a detrimental effect is left to the sole discretion of the party from whose water system the water is being drawn.

2. **Compliance With Laws**. Each party accepts responsibility for its compliance with applicable federal, state, and local laws. No waiver of any law is contemplated by this Agreement.

3. **Indemnification**. The University shall indemnify and hold harmless the City (including its elected and appointed officers, agents, and employees) from all claims, costs, damages, or expenses, including attorneys' fees, arising out of the negligence of the University in using the interties. Likewise, the City shall indemnify and hold harmless the University (including its elected and appointed officers, agents, and employees) from all claims, costs, damages, or expenses, including attorneys' fees, arising out of the negligence of the City in using the interties. In the case of negligence of both the University and the City, any damages allowed shall be levied in proportion to the percentage of negligence attributable to each party.

4. **Disputes**. Any dispute involving the interpretation or application of this agreement shall be subject to dispute resolution by following these steps. First, the parties shall meet, discuss, and attempt to resolve the dispute themselves. If this step fails, the parties shall each appoint one representative. These two representatives shall mutually appoint a third representative. These

three representatives shall evaluate the facts, agreement terms, and applicable statutes and rules and decide the dispute at no cost to the parties. The decision shall be final and binding on the parties.

5. **Non-Assignment**. Neither party shall assign any rights hereunder to any other person or entity, governmental or otherwise, without the prior written approval of the other party.

6. **Modification/Amendment**. This Agreement embodies the entire Agreement between the City and the University regarding use of the interties. No alteration or variation of terms of this Agreement shall be valid unless made in writing and signed by the parties hereto. Oral understanding or agreements not incorporated herein shall not be binding.

7. **Interpretation.** The parties acknowledge that this Agreement shall be deemed and construed to have been prepared mutually by each party and it shall be expressly agreed that any uncertainty or ambiguity existing therein shall not be construed against any party.

8. **Severability**. If any of the provisions of this Agreement shall be declared to be invalid by a court of competent jurisdiction, then the intent of the parties is that the remainder of the provisions herein shall remain in full force and effect.

9. **Effective Date**. This Agreement is effective as of the latest date noted below.

City of Pullman:

Mitchell D. Chandler
Mayor

Date: Oct. 3, 2001

Attest:

John D. Tonkovich
Finance Director
Date: Oct. 3, 2001

Washington State University:

Gregory P. Royer
Vice President for Business Affairs

Date: 8/30/01

APPROVED AS TO FORM:

Asst. Atty. Gen.

30th day of August, 2001

APPENDIX A

Item 10 – Water Program Consistency Statements

Washington State Department of Health
Division of Environmental Health, Office of Drinking Water

Local Government Consistency Review Checklist

Water System Name: Washington State University PWS ID: 93200Q

Planning/Engineering Document Title: 2015 Water System Plan Update Plan Date: 7/7/2015

Local Government with Jurisdiction: City of Pullman

WAC 246-290-108 Consistency with local plans and regulations:
Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted land use and zoning within the applicable service area.	Pgs. 4-9 (Chapter 1)	Yes
b) The six-year growth projection used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Pgs. 4-13 (Chapter 2)	Yes
c) Applies to cities and towns that provide water service: All water service area policies of the city or town are consistent with the utility service extension ordinances of the city or town.	N/A	N/A
d) Service area policies for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	Pg. 9 (Chapter 1)	Yes
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.	Pgs. 15-18 (Chapter 4)	Yes

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Pete Dickinson
Signature

7/16/15
Date

Pete Dickinson, Planning Director, City of Pullman
Printed Name, Title, & Jurisdiction

Washington State Department of Health

Local Government Consistency Review Checklist

Water System Name: Washington State University PWS ID: 93200Q

Planning/Engineering Document Title: 2015 Water System Plan Update Plan Date: 7/7/2015

Local Government with Jurisdiction: Whitman County

WAC 246-290-108 Consistency with local plans and regulations:
Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted land use and zoning within the applicable service area.	Pgs. 4-9 (Chapter 1)	YES
b) The six-year growth projection used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	Pgs. 4-13 (Chapter 2)	YES
c) Applies to cities and towns that provide water service: All water service area policies of the city or town are consistent with the utility service extension ordinances of the city or town.	N/A	N/A
d) Service area policies for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	Pg. 9 (Chapter 1)	YES
e) Other relevant elements related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.	Pgs. 15-18 (Chapter 4)	YES

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Alan L. Thomson 7/8/15

Signature Date

ALAN L. THOMSON, COUNTY PLANNER, WHITMAN COUNTY.

Printed Name, Title, & Jurisdiction

Consistency Review Guidance

For Use by Local Governments and Municipal Water Suppliers

This checklist may be used to meet the requirements of WAC 246-290-108. When using an alternative format, it must describe all of the elements; 1a), b), c), d), and e), when they apply.

For **water system plans (WSP)**, a consistency review is required for the retail service area and any additional areas where a municipal water supplier wants to expand its water right's place of use.

For **small water system management programs**, a consistency review is only required for areas where a municipal water supplier wants to expand its water right's place of use. If no water right place of use expansion is requested, a consistency review is not required.

For **engineering documents**, a consistency review is required for areas where a municipal water supplier wants to expand its water right's place of use (water system plan amendment is required). For non-community water systems, a consistency review is required when requesting a place of use expansion. All engineering documents must be submitted with a service area map per WAC 246-290-110(4)(b)(ii).

A) Documenting Consistency: Municipal water suppliers must document all of the elements in a consistency review per WAC 246-290-108.

1 a) Provide a copy of the adopted **land use/zoning** map corresponding to the service area. The uses provided in the WSP should be consistent with the adopted land use/zoning map. Include any other portions of comprehensive plans or development regulations that are related to water supply planning.

1 b) Include a copy of the **six-year growth projections** that corresponds to the service area. If the local population growth rate projections are not used, provide a detailed explanation on why the chosen projections more accurately describe the expected growth rate. Explain how it is consistent with the adopted land use.

1c) Include water service area policies and show that they are consistent with the **utility service extension ordinances** within the city or town boundaries. This applies to cities and towns only.

1 d) Include all **service area policies** for how new water service will be provided to new customers.

1 e) **Other relevant elements** related to water supply planning as determined by the department (DOH). See Local Government Consistency – Other Relevant Elements, Policy B.07, September 2009.

B) Documenting an Inconsistency: Please document the inconsistency, include the citation from the comprehensive plan or development regulation, and provide direction on how this inconsistency can be resolved.

C) Documenting Lack of Consistency Review by Local Government: Where the local government with jurisdiction did not provide a consistency review, document efforts made and the amount of time provided to the local government for their review. Please include: name of contact, date, and efforts made (letters, phone calls, and e-mails). In order to self-certify, please contact the DOH Planner.

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

- (3) Emergency wells (Wells No. 1,3 & 5)
- (4) Reservoirs
- (1) Transfer pump station with two pumps
- A network of distribution lines form 6" to 12" diameter with approximately 4,215 service connections as calculated by DOH on the Water Facility Inventory (see Appendix A-1)
- Manual and pressure actuated valves
- Fire hydrants
- Gas chlorination at each active well
- Flow meters at each pump house

1.4 Related Plans

As a member of PBAC, WSU is impacted by the Ground Water Management Plan (GWMP) for the aquifer (see Appendix A-2). The Pullman-Moscow Water Resources Committee became PBAC. The PBAC committee is comprised of seven entities: WSU; University of Idaho; Cities of Pullman & Colfax, Washington; City of Moscow, Idaho; Whitman County, Washington; and Latah County, Idaho. The committee was created and the plan drafted in response to the declining aquifer levels in the basin. There is a set of committee goals as well as an action plan for each entity which are presented in Chapter 6 of the GWMP. The GWMP was first published in 1992 and slightly updated in 1997. PBAC's goals were updated in 2006 (see Appendix A-4) and WSU's 1992 Action Plan is listed in Appendix A-5. Both committee goals and the WSU Action Plan are considered during the design and review of all new projects. The committee also publishes an annual report each year. The purpose of this report is to tabulate water usage of the entities and monitor the progress of the committee towards its goals as well as provide an update of local water issues. A copy PBAC's most recently published report (2013) is in Appendix A-3.

1.5 Existing Retail Service Area

The 2015 retail water service area for the WSU Water System contains approximately 1,400 acres (see Exhibit 1-4 and Appendix A-11 for a 24" x 36" map) and, except for the land in the vicinity of the Research Park, includes all of the contiguous University owned land in and adjacent to the City of Pullman, Washington. It also includes the Pullman-Moscow Regional Airport Terminal Facility and the Residence Inn along North Fairway Drive.

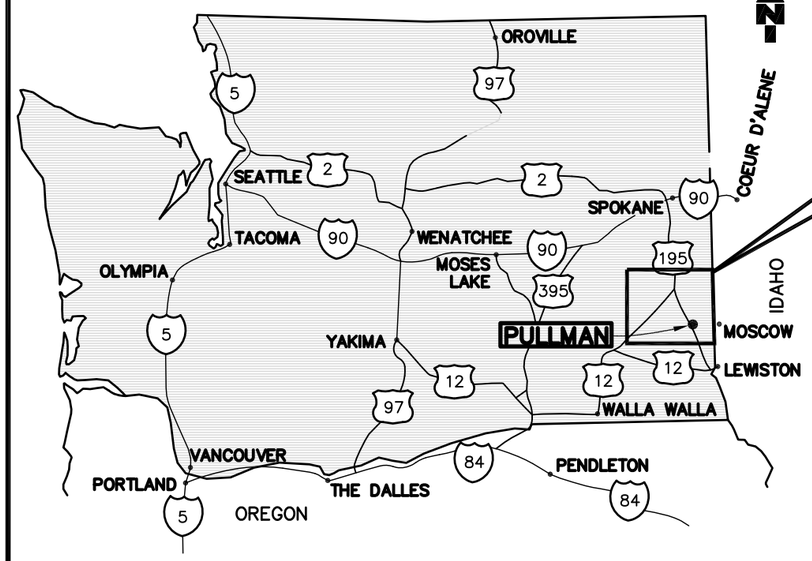
There are not established regulations for proposed construction on the campus as to the type of land or water use with the exception of the "airport approach zone". This is an area of land west of the airport and east of the Recreation Center that is designated to have no academic or residential facilities. This area is currently occupied Paradise Ridge Golf Course.

The City of Pullman's zoning and land use map is included in Appendix A-6 (provided courtesy of HDR, Inc.).

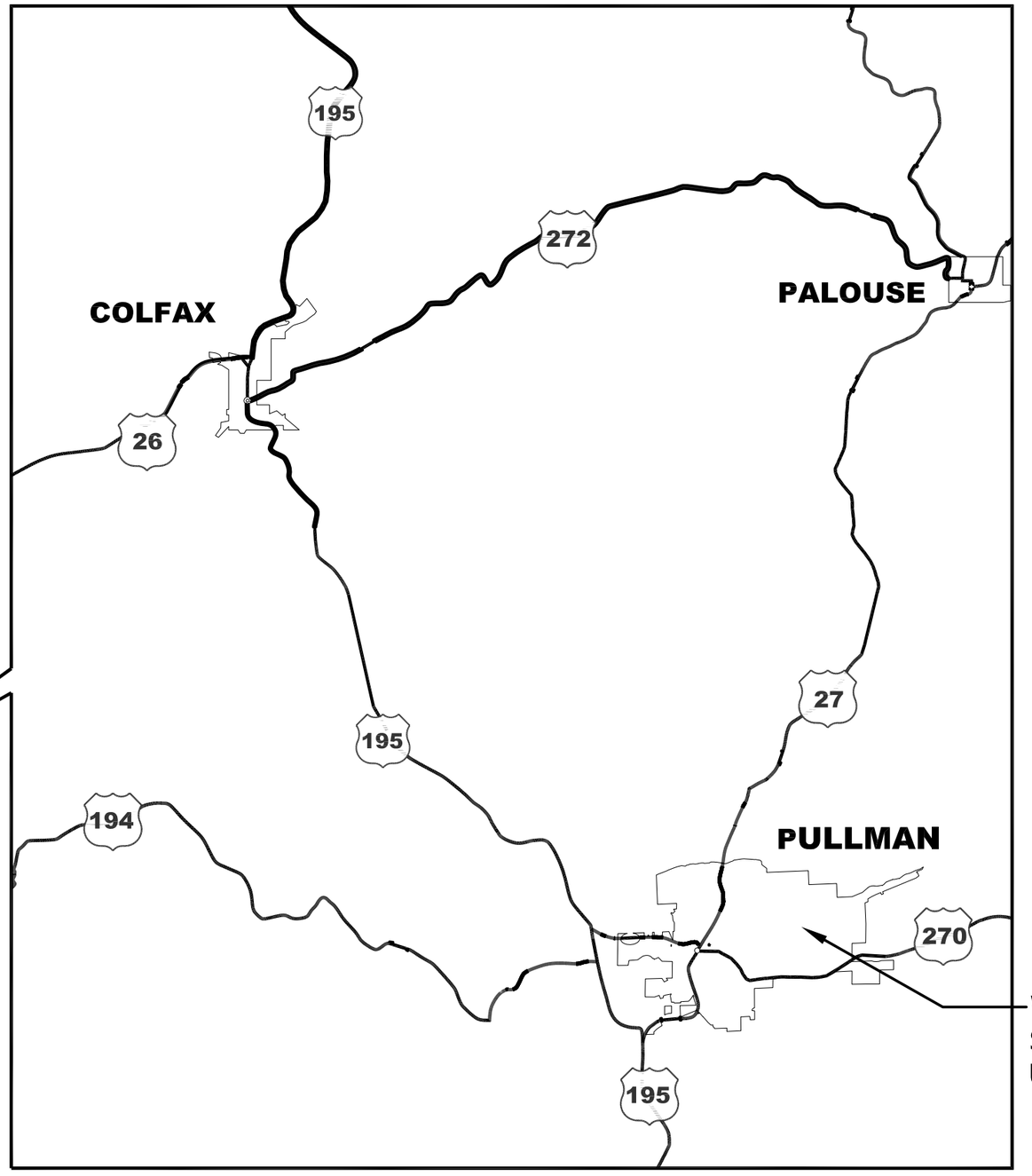
1.6 Future Retail Service Area

No future expansion of the retail water system service area is anticipated at this time or within the next 20 years.

WASHINGTON STATE



VICINITY MAP



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NORTH

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CHECKED BY: AJT

DATE: 12/08/14

LOG NO. 0

WASHINGTON STATE UNIVERSITY

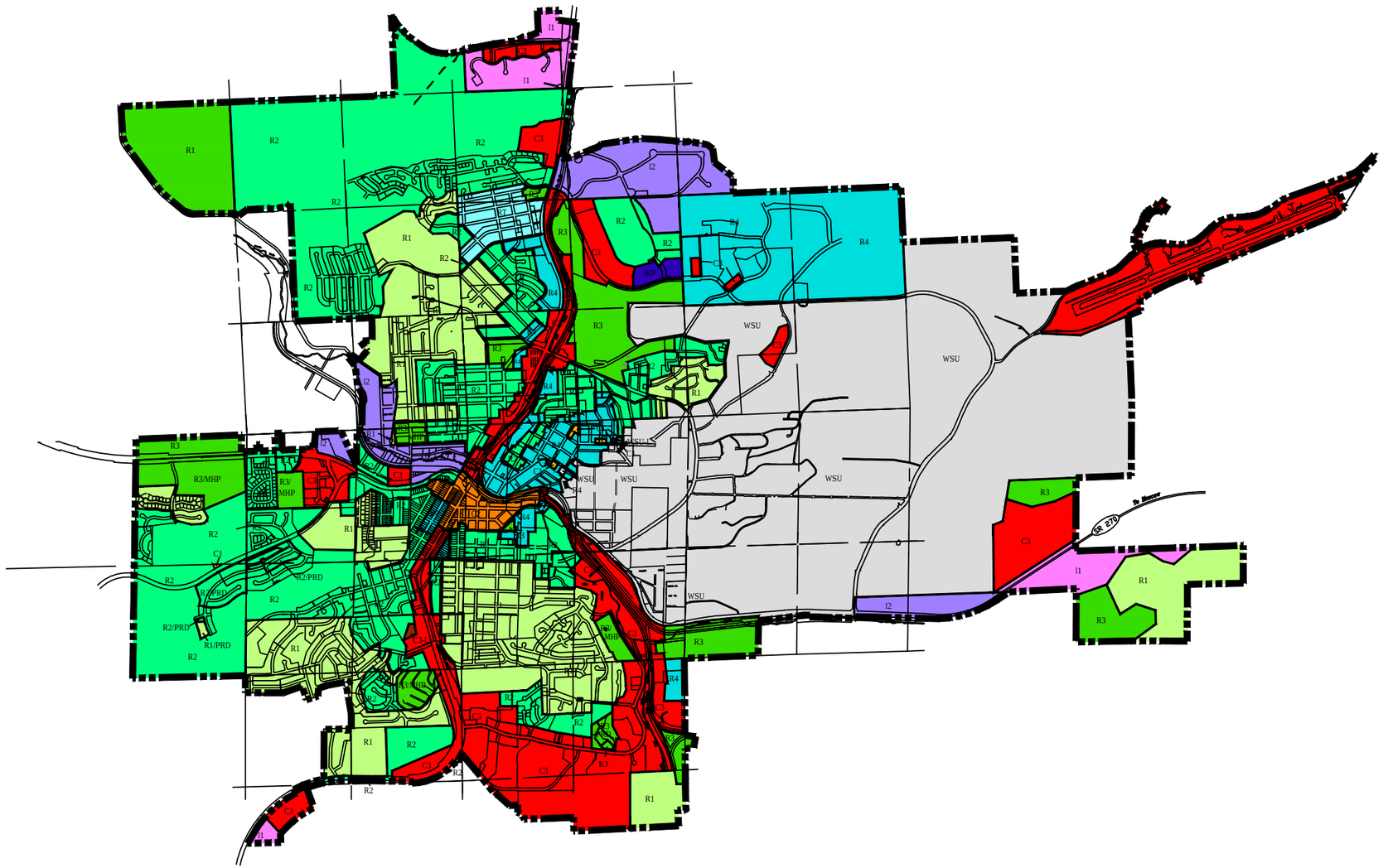
Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

2015 WATER SYSTEM PLAN UPDATE

VICINITY MAP

EXHIBIT 1-1



LEGEND

- CITY LIMITS
- R1 - SINGLE FAMILY RESIDENTIAL DISTRICT
- R2 - LOW DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R3 - MEDIUM DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- R4 - HIGH DENSITY MULTI-FAMILY RESIDENTIAL DISTRICT
- C1 - NEIGHBORHOOD COMMERCIAL DISTRICT
- C2 - CENTRAL BUSINESS DISTRICT
- C3 - GENERAL COMMERCIAL DISTRICT
- C3-L - GENERAL COMMERCIAL DISTRICT
- I1 - LIGHT INDUSTRIAL DISTRICT
- I2 - HEAVY INDUSTRIAL DISTRICT
- IRP - INDUSTRIAL RESEARCH PARK DISTRICT
- WSU - WASHINGTON STATE UNIVERSITY
- WSU-L - WASHINGTON STATE UNIVERSITY

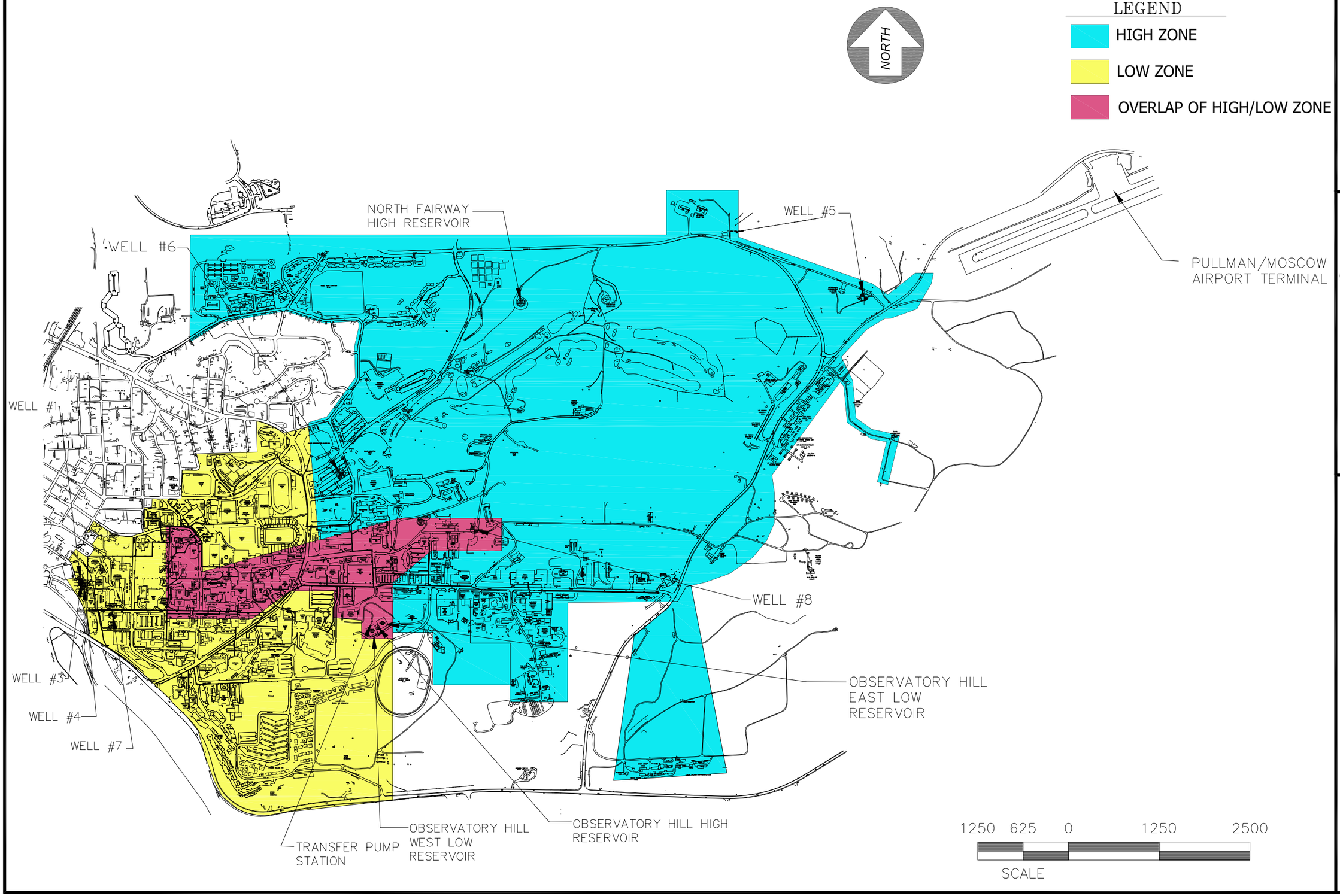
SOURCE: CITY OF PULLMAN
ENGINEERING DIVISION (2013)

0 3000
Scale in Feet

Mar 14, 2014 12:55pm drice I:\Projects\City of Pullman\2013 Water System Plan Update\CAD\0928-FG-3_1-2_Zoning Plan.dwg City Zoning Plan (2013)

ANCHOR QEA

Exhibit 3-1
City Zoning Plan (2013)
2013 Comprehensive Water System Plan
City of Pullman



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DATE: 12/08/14

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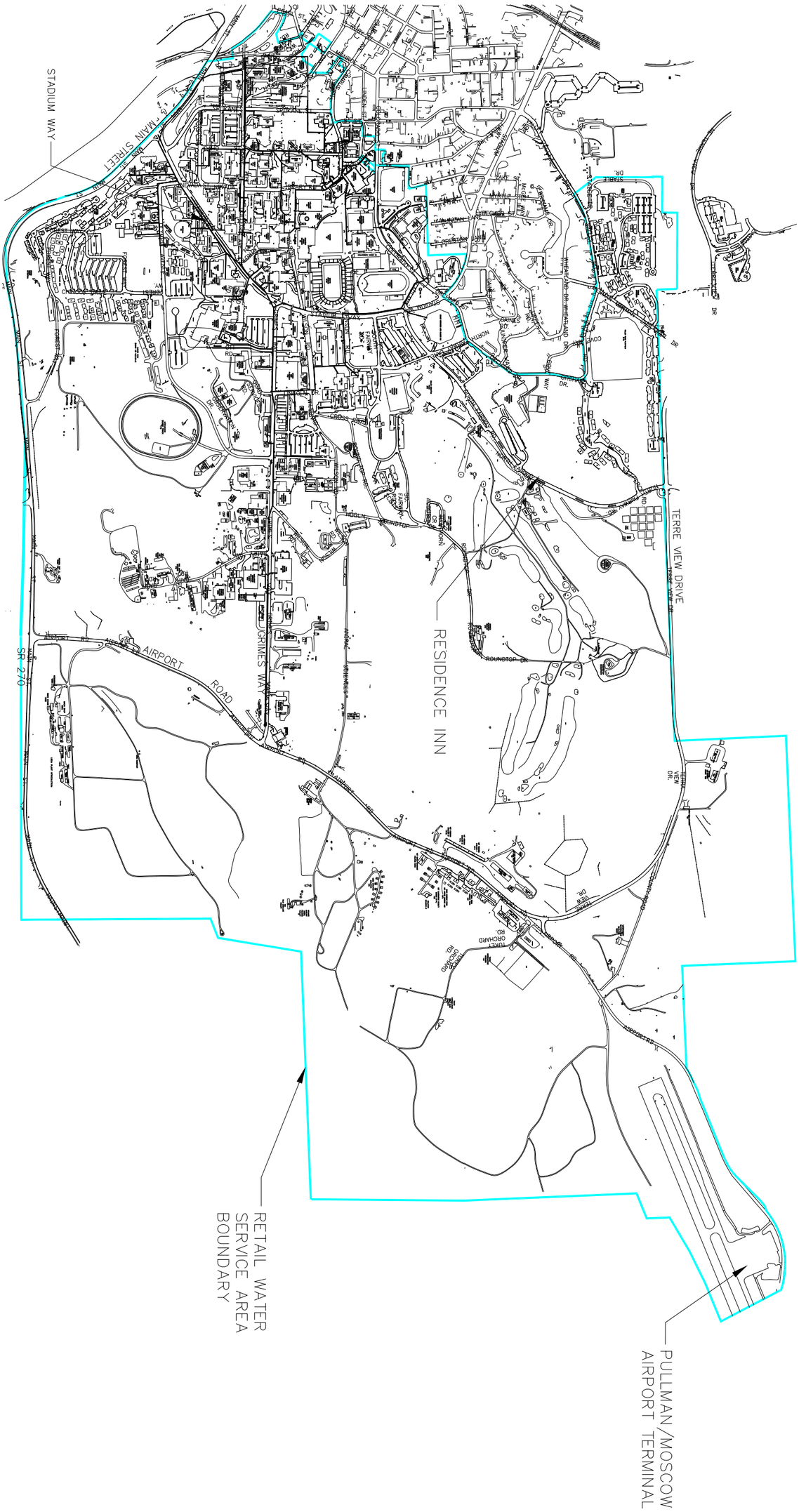
2015 WATER SYSTEM PLAN UPDATE

WATER SYSTEM COMPONENTS

EXHIBIT 1-3



SCALE: 1" = APPROX. 1,250'

DOMESTIC WATER SYSTEM

RETAIL WATER SERVICE AREA

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
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DATE: 12/2014

LOG NO. 0

EXHIBIT 1-4

1.7 Service Area Agreements

WSU provides water to the Pullman-Moscow Regional Airport under a water service agreement established June 7, 1989 between WSU and the Airport Board with Amendment No. 1 dated February 6, 2007. A copy of this agreement and the amendment is included in Appendix A-7a.

WSU provides water to the Residence Inn at the City of Pullman water rates through the lease agreement Contract C# 20070 in Appendix A-7b. This hotel included a zone change from the WSU Zone to the City of Pullman C3 Zone in order for the hospitality business to be built and operated. However, since WSU water is the only available source in this area of campus it wasn't possible to tie into City of Pullman supply for the hotel.

While not binding, the memorandum copy in Appendix A-8 outlines the services provided by the City of Pullman and WSU. An intertie agreement between WSU and the City of Pullman was adopted for emergency water service. A copy is of this agreement is included in Appendix A-9.

1.8 Service Area Policies

The airport terminal and Residence Inn are the only non-WSU consumer that WSU invoices for monthly water use (the others are on campus: Student Book Store, WSU Campus Housing and the Student Recreation Center). The airport is responsible for any modifications necessary to WSU's water system for increased demand beyond the original configuration when the service agreement was adopted. There have been no significant demand changes at the airport terminal.

The only other established service area policy is the Cross-Connection Control Program (see Appendix G-4). Under this program, Facilities Operations has the authority and responsibility for inspection and maintenance of backflow prevention assemblies. The WSU Cross-Connection Control Specialists are responsible for review of all proposed remodel and new construction for backflow prevention assembly acceptability.

1.9 Conditions of Service

WSU does not intend to provide any additional water service beyond its campus boundaries. The only anticipated future services are WSU related facilities. There are no established conditions of service for WSU facilities.

1.10 Local Government & Watershed Consistency

In accordance with the Municipal Water Law, documentation of consistency with local adopted plans, regulations and polices is required by DOH. The local government consistency statement checklists (DOH attachment 5) have been signed by the City of Pullman and Whitman County and are included in Appendix A-10.

Per Revised Code of Washington (RCW) 90.03.386, this WSP must be "not inconsistent" with the Watershed Plan of the WRIA 34 planning unit. This WRIA 34 Watershed Plan was finalized on November 29, 2007. A review of the Watershed Plan was conducted for consistency with this WSP. The actions identified in this WSP related to supply, conservation and other water management measures are consistent with the Watershed Plan.

Table 2-3 Major Campus Developments (DRAFT)			
Current Project Title	**Approx. Square Footage**	**Current Capital Plan Forecast**	**Comments**
Clean Technology Lab	100,000	2013-15	New Facility
Global Scholars Hall	250 Beds	2015	New Facility
Baseball Clubhouse	12,000	2015-17	New Facility
Bookie Renovation	85,803	2015-17	Renovation
Chief Joseph Village Apartments	138,000	2015-17	Renovation and New Building
Dairy Research / teaching Milking Parlor	TBD	2015-17	Renovation / Addition
Digital Classroom	75,000	2015-17	New Facility
Food Science/Human Nutrition Addition	18,000	2015-17	Renovation / Addition
Fountain	2,500	2015-17	New Facility
Indoor Practice Facility	109,000	2015-17	Renovation / Addition
Multicultural Center	16,000	2015-17	New Facility
Police Building	17,000	2015-17	New Facility
Troy Hall Renovation	40,000	2015-17	Renovation / Addition
Animal Diagnostic/Research	75,000	2017-19	New Facility / Addition
Plant Science Building (REC 5)	100,000	2017-19	New Facility
Plant Growth Facilities Phase 1	25,000	2017-19	New Facility
Wilmer Davis	100,000	2017-19	Renovation / Addition
WSU Art Museum Addition Phase 1	15,000	2017-19	Renovation and New Addition
Agricultural Animal Health Research Facility	TBD	2019-21	Renovation / Addition
ARS Building (REC 3)	90,000	2019-21	New Facility
Carson College of Business Facility	150,000	2019-21	New Facility
Computational & Data Science Building	TBD	2019-21	New Facility
Fulmer Hall Renovation	40,000	2019-21	Renovation / Addition
Greenhouse Replacement	92,000	2019-21	New Facility
Holland Library Renovation	203,475	2019-21	Renovation / Addition
Infrastructure Improvements / Road Replacement		2019-21	Renovation / Addition
Kamiak Apartments	64,624	2019-21	Replacement
Murrow Hall Renovation	45,318	2019-21	Renovation
Terrace Apartments	63,629	2019-21	Replacement
Advance Energy Technology Lab	100,000	2021-23	Renovation / Addition
Eastlick Hall Renovation	110,428	2021-23	Renovation
Plant Biosciences Annex and Johnson Hall Demolition (REC 6)	100,000	2025-27	Renovation / Addition / Replacement
Bio Engineering Lab (REC 7)	100,000	2025-27	New Facility

SOURCE: WSU Capital Planning and Development, February 2015

2.1.5 Demographic Projections

Table 2-4 shows the historical and projected demographics from 2006 to 2034. This data was provided by WSU Institutional Research for historical data and the Washington State Office of Financial Management (OFM) for future projections. Forecasted demographics were developed using numbers provided by the OFM for headcounts for a four-year system. Demographic data is comprised of three key elements: headcount of resident students (RS), headcount of off-campus students (OCS) and headcount of faculty and staff (FS). Exhibit 2-2 shows this information graphically.

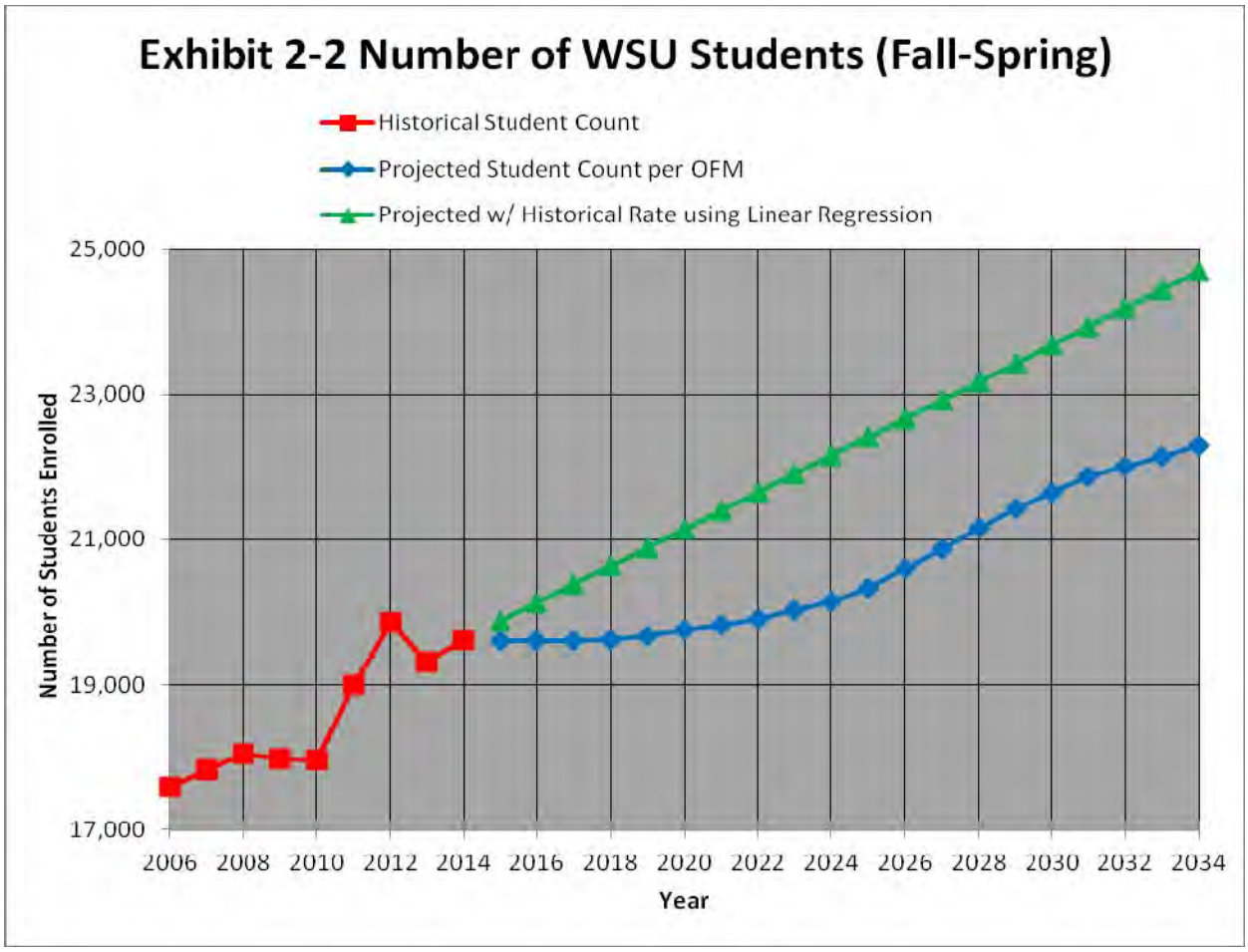
The actual number of students in 2014 is 19,613 (RS + OCS), 2015 is estimated at 19,605 students and the population is anticipated to increase to 19,760 by the end of the 6-yr planning period in 2020 and increase to 22,289 by the end of the 20-yr planning period in 2034. The resulting average annual growth rates during the 6-yr and 20-yr planning periods are 0.13% per year and 0.64% per year, respectively.

Table 2-4
WSU Historical and Projected Demographics

		Demographics						
		Fall and Spring Terms (274 days)				Summer Term (91 Days)		
Calendar Year	Plan Year	Headcount Resident Student (RS)[1]	Off Campus Student Headcount (OCS)[1]	Headcount of Faculty & Staff (FS)[2]	Growth Rate[3]	Headcount of Resident Students (RS)[1]	Off Campus Students Headcount (OCS)[1]	Head count Faculty & Staff (FS)[2]
2006	n/a	5,880	11,697	5,678	1.0094	1,700	3,735	4,206
2007	n/a	5,312	12,512	5,813	1.0164	1,740	3,531	4,306
2008	n/a	5,796	12,254	4,507	0.9474	1,648	3,004	4,080
2009	n/a	5,801	12,168	4,278	0.9864	1,626	2,734	4,024
2010	n/a	5,452	12,498	4,199	0.9964	1,620	2,843	4,010
2011	n/a	6,265	12,720	4,085	1.0421	1,688	2,911	4,178
2012	n/a	6,451	13,409	4,123	1.0399	1,756	2,653	4,345
2013	n/a	6,336	12,976	4,283	0.9823	1,725	3,440	4,268
2014	n/a	6,298	13,315	4,481	1.0217	1,762	3,688	4,361
2015	1	6,295	13,310	4,479	0.9996	1,761	3,686	4,359
2016	2	6,293	13,304	4,477	0.9996	1,761	3,685	4,357
2017	3	6,294	13,306	4,478	1.0001	1,761	3,685	4,358
2018	4	6,300	13,319	4,482	1.0010	1,763	3,689	4,362
2019	5	6,317	13,355	4,494	1.0027	1,767	3,699	4,374
2020	6	6,345	13,415	4,515	1.0045	1,775	3,716	4,394
2021	7	6,366	13,458	4,529	1.0032	1,781	3,727	4,408
2022	8	6,394	13,517	4,549	1.0044	1,789	3,744	4,427
2023	9	6,432	13,598	4,576	1.0060	1,800	3,766	4,454
2024	10	6,469	13,677	4,603	1.0058	1,810	3,788	4,479
2025	11	6,528	13,800	4,644	1.0090	1,826	3,822	4,520
2026	12	6,612	13,980	4,705	1.0130	1,850	3,872	4,578
2027	13	6,702	14,170	4,769	1.0136	1,875	3,925	4,641
2028	14	6,795	14,367	4,835	1.0139	1,901	3,979	4,705
2029	15	6,882	14,549	4,896	1.0127	1,925	4,030	4,765
2030	16	6,954	14,702	4,948	1.0105	1,946	4,072	4,815
2031	17	7,021	14,845	4,996	1.0097	1,965	4,112	4,862
2032	18	7,066	14,940	5,028	1.0064	1,977	4,138	4,893
2033	19	7,111	15,036	5,060	1.0064	1,990	4,164	4,924
2034	20	7,157	15,132	5,092	1.0064	2,003	4,191	4,956

NOTES:
1. Data source for years 2006-2014: WSU Institutional Research - Student Data Warehouse and Housing and Bob Tattershall of WSU Housing Services.
2. Data source for years 2006-2014: WSU Institutional Research.

3. Calculated years 2006-2014 for RS + OCS in Fall & Spring Terms; years 2015-2031 based on Washington State Office of Financial Management (OFM) - *Table 1 Public Two- and Four-Year Fall Headcount and FTE Projections years* 2008-2031.



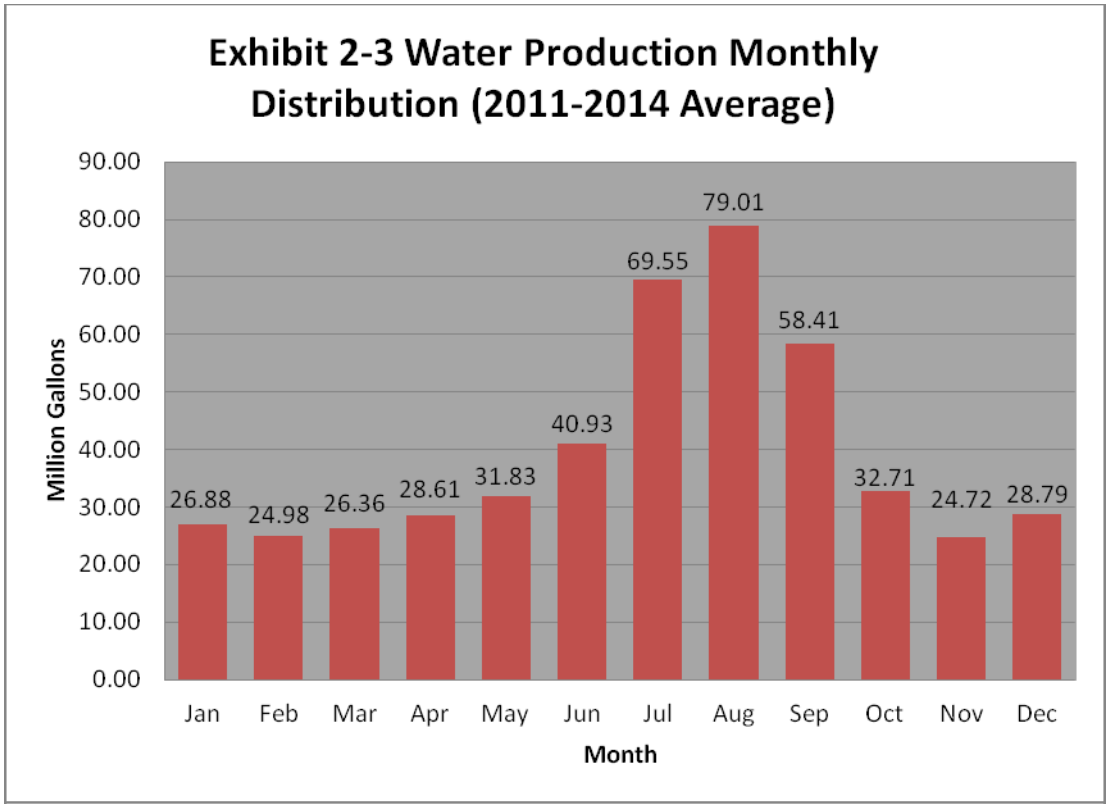
A review of the historical data, the projected student count using linear regression and the OFM student count indicates that the projected student count using linear regression may be overestimated. Over the past five years the statewide enrollment growth had some minor changes with a significant increase between 2010 and 2012. Since 2012, the growth rate has been less pronounced and the projections generated by OFM over the coming five year period are more realistic of the growth patterns in the future. Since this is the only student projection available, these OFM figures are used to generate the water demand forecasts below.

2.2 Current Water Use

WSU currently produces water from four wells; Wells No. 4, 6, 7 & 8. Table 2-5 shows the average production, by well and by month, over the last three years. The majority of water comes from Wells 7 & 8, with only a small percentage of the total being produced from Wells 4 and 6. As is typical with most water utilities, production peaks in the summer months of June through September. Exhibit 2-3 shows this production information graphically.

Table 2-5 Average Water Production 2011 -2014 (mg)						
Month	Well #4	Well #6	Well #7	Well #8	Total	Percent
Jan	0.64	0.30	12.34	13.59	26.88	5.7%
Feb	0.00	1.66	11.25	12.07	24.98	5.3%
Mar	0.19	0.18	12.01	13.98	26.36	5.6%
Apr	0.14	0.09	13.16	15.22	28.61	6.1%
May	0.26	0.66	10.56	20.35	31.83	6.7%
Jun	0.16	1.54	13.68	25.55	40.93	8.7%
Jul	0.24	1.45	22.99	44.88	69.55	14.7%
Aug	0.13	1.38	27.94	49.55	79.01	16.7%
Sep	0.64	0.56	23.57	33.65	58.41	12.4%
Oct	1.34	0.26	14.53	16.57	32.71	6.9%
Nov	0.23	2.51	12.48	9.50	24.72	5.2%
Dec	0.00	4.02	12.03	12.74	28.79	6.1%
Total	3.98	14.61	186.54	267.65	472.78	
Percent	0.8%	3.1%	39.5%	56.6%		

Data Source: WSU Facility Operations



Data Source: WSU Facility Operations

The annual production data and peaking factors from 2007 to 2014 are shown in Table 2-6. The annual growth rate has ranged from -5.3% to 4.2%. The peaking factor (peak day/average day) has ranged from 3.02 to 4.63, and has averaged 3.61 for the listed period.

Table 2-6
Total Water Production Summary

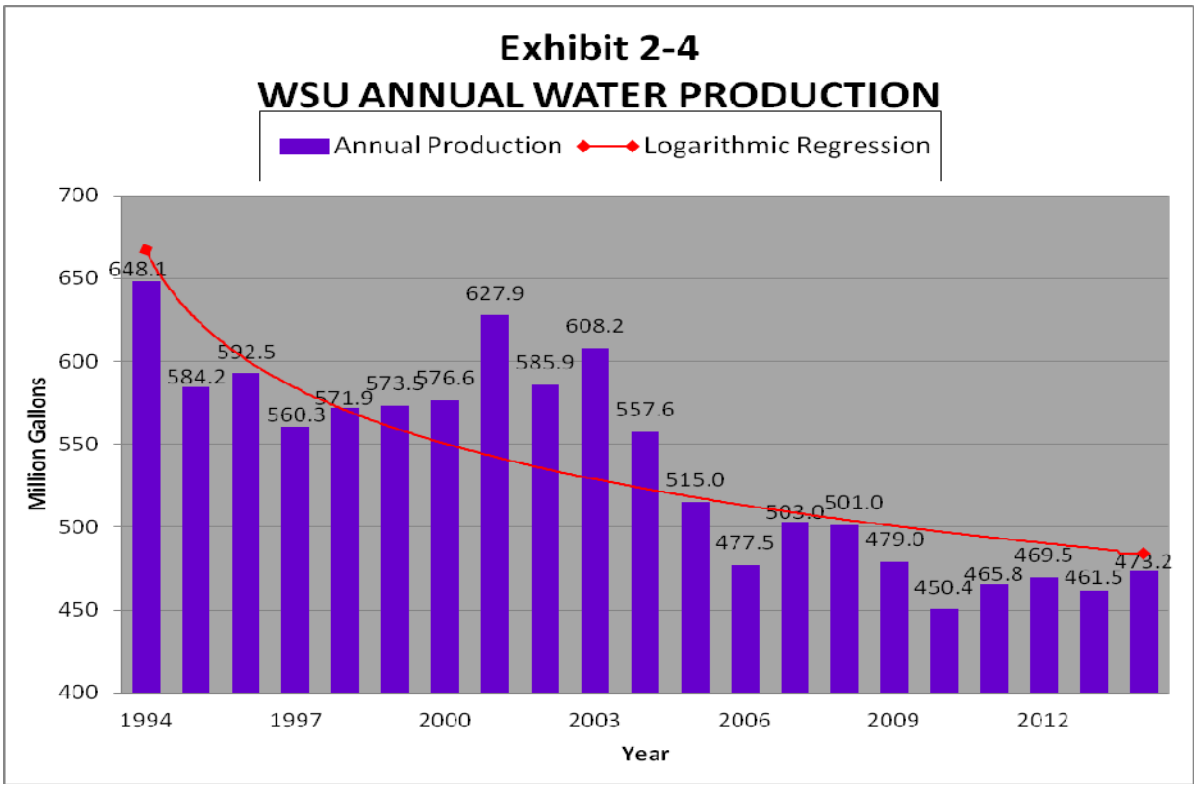
Year	Annual Production (mg)	Annual Student Growth Rate[1]	Average Day Demand (mg)[2]	Peak Day		Peaking Factor
				(mg)	Date	
2007	503	n/a	1.38	4.43	8/3/2007	3.21
2008	501	1.6%	1.37	4.14	9/16/2008	3.02
2009	479	-5.3%	1.31	5.16	8/4/2009	3.93
2010	450	-1.4%	1.23	5.7[3]	6/1/2010	4.63
2011	466	-0.4%	1.28	4.67	8/1/2011	3.66
2012	469	4.2%	1.28	4.39	8/2/2012	3.42
2013	462	4.0%	1.27	5.03	7/27/2013	3.97
2014	473	-1.8%	1.30	3.92	7/31/2014	3.02
2007-2014 Avg	475	0.15%	1.30	4.68	n/a	3.61

Data Source: WSU Facility Operations
1. See Table 2-4
2. Annual Production / 365
3. Second highest peak day used due to unusually high and uncharacteristic peak day of 8.7 mg seen on 10/1/2010. It was assumed that the highest peak day included a manual reading error.

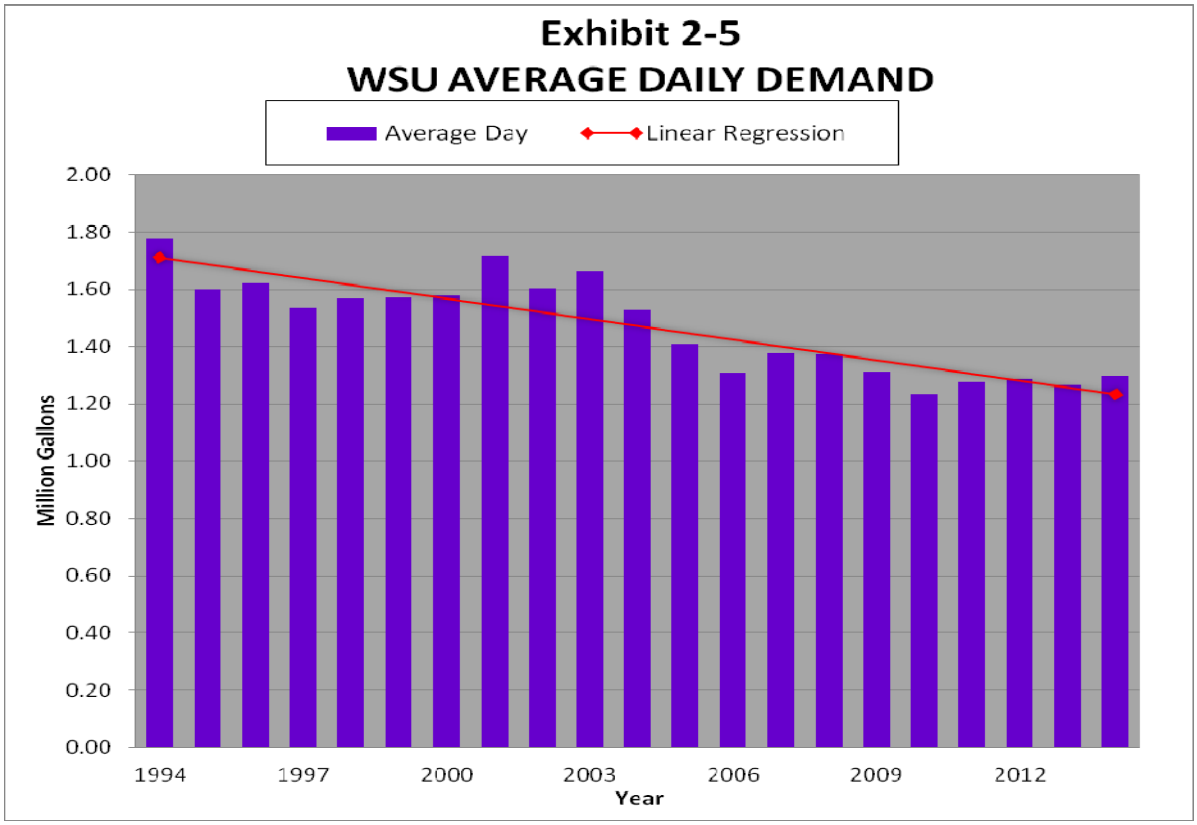
Exhibit 2-4 shows the total annual production from all wells combined from 1994 thru 2014. The total water pumped has generally declined during these years from 648.1 mg to 473.2 mg for a total decrease of almost 27%. Additionally, a decline in water usage is seen between the years 2007-2014 with the exception of a few slight increases. This is a net reduction of approximately 6%. Overall, there is a general reduction in water usage, but the rate of that reduction appears to be lessening as seen by the logarithmic regression line in Exhibit 2-4. The water usage decline will level off even if growth and conservation continue to increase.

Furthermore, the overall campus water use has decreased over the last 20 years. Exhibit 2-5 shows the last 20 years of average daily demand with linear regression. The downward slope of the linear regression confirms the overall downward tend of water use at WSU.

See Appendix B-3 for monthly and annual source production totals by source for the years 1987-2014.



Data Source: WSU Facility Operations



Data Source: WSU Facility Operations

2.2.1 Water Balance, Non-Revenue, and Leakage

As stated earlier, the majority of water consumption on the WSU campus is not metered. Without accurate metered water use data for the different water uses, it is not possible to generate customer categories for water use or to make projections for any specific categories, such as non-revenue and non-residential water use. A required conservation measure, as listed in Chapter 4, is to have the entire campus metered by the year 2017. A plan has been put together that provides the remaining meters to be installed by January 2017 and is included in Appendix D-3. Currently, 46 meters are installed with a total of 229 proposed. The remaining 80% of meters will be installed over the years 2015, 2016, and 2017.

A further challenge posed by the lack of metered data is estimating the amount of water leakage on the system. As noted above, the total water production on campus has decreased from 2007-2014. During this same period, Facilities Operations has repaired numerous services and waterlines as listed in the Water System Repair Log in Appendix B-2. Some of these repairs could account for the decrease in production with an estimate 209,000 gallons being accounted for and numerous unknown quantities. Nonetheless, it is still anticipated that there are water leaks in the system. A conservative amount of 10% is added to the water demand forecast described below.

2.3 Water Demand Forecasting

2.3.1 Demand Forecast

As discussed earlier, 80% of WSU's main campus is not metered and an accurate waterbalance is not possible. Therefore a methodology is required to generate a water demand forecast. The approach widely used and accepted by the Department of Health (DOH) is traditional demographics described in section 2.1.5 above. Water use factors are used from DOH guidelines (see footnotes of Exhibit 2-6). Irrigation, a major water component of the overall campus water use, has also been added to the equations. Kappy Brun, the Grounds Supervisor for Facilities, provided the overall irrigated acreage excluding the Palouse Ridge Golf Course as 105 acres. The past year, irrigation totals were 34 mgy prior to all systems being controlled by the Calsense Irrigation controllers to conserve water. Additionally, the overall campus irrigated acres are shown using aerial images and AutoCAD (see Appendix B-1). This calculated area of irrigable green space will decrease in the future as the amount of developable space on campus becomes exhausted.

The Palouse Ridge Golf Course opened in 2008 and uses between 36 and 50 million gallons (average of 45 million gallons) of water a year over 120 acres (300,000 to 417,000 gallons per acre) (per WSU Capital Planning). However, the actual irrigation volume is much less than the previously thought 56 million gallons. The course utilizes drought resistant grasses and a computerized irrigation system that relies on up to date weather information evaporation rates and microclimate information to conserve water. Additionally, the course is set up to connect to a water reuse system when that system is constructed and extends to the site (Source: www.palouseridge.com/courseco-management/environmental-approach). Therefore, Palouse Ridge Golf Course is dealt with separately in Exhibit 2-6 from the other landscaping.

Heating and cooling facilities, although a major water user (approx. 30 mgy), are not listed individually but contained within the water use factors for the students and faculty. It should also be noted that the amount of water used for heating and cooling has decreased since the east chilled water facility was upgraded with reverse osmosis at the cooling towers in 2009. In

2008 a retrofit to the deionized water plant was completed which also reduced water quantities. It is estimated that the reduction in water usage by heating and cooling facilities has decreased by 50% from 65 mgy to approximately 30 mgy.

If the projected campus improvements listed in Table 2-3 are converted directly to increases in water usage based on additional square footage, the amount of new water required should not increase significantly. The campus improvements that have been constructed over the last 10 years have not increased the volume of water pumped especially since the volume of water pumped over the past few years has decreased (see Exhibit 2-4). Therefore, it is clear that increases in usable space do not equate to equivalent percentage increases in water usage.

The actual 2014 total water production of 473.2 mg is used as a target rate for the total water consumption. Using the above described methodology, the calculated total water use for 2014 is 473.2 mgy which is at the actual metered production from the wells. Exhibit 2-6 details the demand forecast in average day demand (ADD), maximum day demand (MDD) and annual totals. MDD is the ADD multiplied by a peaking factor of 3.61 as described in Section 2.2 above.

The ADD is expected to rise from 1,296,103 gallons per day (gpd) to 1,303,507 gallons per day from 2015 to 2020 over the 6-yr planning period and increase to 1,423,865 gpd by the end of the 20-yr planning period in 2034. The MDD is expected to increase from 4,678,931 gpd in 2015 to 4,705,662 gpd by the end of the 6-yr planning period in 2020 and increase to 5,140,152 gpd by the end of the 20-yr planning period in 2034. The annual total is expected to increase from 473,077,486 gallons in 2015 to 475,780,199 gallons by the end of the 6-yr planning period in 2020 and increase to 519,710,618 gallons by the end of the 20-yr planning period in 2034. This is a 9.3% increase in annual demand from the year 2015 to 2034

Table 2-7 summarizes the demand forecast for the 6- and 20- year planning periods 2015-2020 and 2015-2034, including conservation efforts at a 2.5% water savings as discussed in Chapter 4. Exhibits 2-7 & 2-8 show this information graphically, including the actual production data (2007-2014) and forecasted data (2015-2034).

Table 2-7 6 and 20 Year Water Demand Forecast (mg)								
					Conservation Impact[2]			
Year	Student[1] Enrollment	Annual Demand	ADD	MDD	Annual Demand	ADD	MDD	Savings
2015	19,605	473.08	1.30	4.68	467.07	1.26	4.56	0.6%
2016	19,597	472.95	1.30	4.68	463.94	1.25	4.53	1.3%
2017	19,600	473.00	1.30	4.68	460.99	1.25	4.50	1.9%
2018	19,619	473.33	1.30	4.68	458.32	1.26	4.56	2.5%
2019	19,672	474.25	1.30	4.69	456.24	1.27	4.57	2.5%
2020	19,760	475.78	1.30	4.71	463.89	1.27	4.59	2.5%
2021	19,824	476.90	1.31	4.72	464.97	1.27	4.60	2.5%
2022	19,911	478.41	1.31	4.73	466.45	1.28	4.61	2.5%
2023	20,030	480.47	1.32	4.75	468.46	1.28	4.63	2.5%
2024	20,146	482.48	1.32	4.77	470.42	1.29	4.65	2.5%
2025	20,328	485.65	1.33	4.80	473.51	1.30	4.68	2.5%
2026	20,592	490.23	1.34	4.85	477.97	1.31	4.73	2.5%
2027	20,872	495.10	1.36	4.90	482.72	1.32	4.77	2.5%
2028	21,162	500.13	1.37	4.95	487.62	1.34	4.82	2.5%
2029	21,431	504.81	1.38	4.99	492.19	1.35	4.87	2.5%
2030	21,656	508.72	1.39	5.03	496.00	1.36	4.91	2.5%
2031	21,866	512.36	1.40	5.07	499.55	1.37	4.94	2.5%
2032	22,006	514.79	1.41	5.09	501.92	1.41	5.09	2.5%
2033	22,147	517.23	1.42	5.12	504.30	1.42	5.12	2.5%
2034	22,289	519.71	1.42	5.14	506.72	1.42	5.14	2.5%

NOTES:
1. Based on RS + OCS in Table 2-4
2. See section 4.3.4

Exhibit 2-6
WSU Water Demand Forecast 2012 - 2033

Calendar Year	Plan Year	Demographics[1]						Irrigation[2]				Water Use Factors							Demand										
		Fall & Spring Terms (274 days)			Summer Term (91 days)														Average Day Demand (ADD gpd)										
		Headcount of Resident Students (RS)	Off Campus Students Headcount (OCS)	Headcount of Faculty & Staff (FS)	Headcount of Resident Students (RS)	Off Campus Students Headcount (OCS)	Headcount of Faculty & Staff (FS)	Landscape (AC)	Golf Course (AC)[7]	Orchards (AC)	Crop (AC)	Per RS[3] (gpd/Headcount)	Per OCS[4] (gpd/Headcount)	Per FS[5] (gpd/Headcount)	Landscape Irrigation[6] (gpd/AC)	Golf Course Irrigation[7] (gpd/AC)	Orchard Irrigation[8] (gpd/AC)	Crop Irrigation[9] (gpd/AC)	Resident Students[10]	Off Campus Students[11]	Faculty & Staff[12]	Landscape Irrigation[13]	Golf Course Irrigation[14]	Orchard Irrigation[15]	Crop Irrigation[16]	Irrigation Subtotal[17]	Water Loss (10%)[18]	Total[19,23]	Annual Total (gallons)[20,22]	Maximum Day Demand[21] (MDD gallons per day)
2012	n/a	6,451	13,409	4,123	1,756	2,653	4,345	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	520,121	268,184	62,675	93,450	125,000	35,100	76,500	330,050	118,103	1,299,133	474,183,586	4,689,871
2013	n/a	6,336	12,976	4,283	1,725	3,440	4,268	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	510,854	264,963	64,189	93,450	125,000	35,100	76,500	330,050	117,006	1,287,062	469,777,755	4,646,295
2014	n/a	6,298	13,315	4,481	1,762	3,688	4,361	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,963	272,871	66,765	93,450	125,000	35,100	76,500	330,050	117,865	1,296,515	473,227,841	4,680,418
2015	1	6,295	13,310	4,479	1,761	3,686	4,359	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,724	272,765	66,736	93,450	125,000	35,100	76,500	330,050	117,828	1,296,103	473,077,486	4,678,931
2016	2	6,293	13,304	4,477	1,761	3,685	4,357	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,559	272,646	66,707	93,450	125,000	35,100	76,500	330,050	117,796	1,295,758	472,951,791	4,677,688
2017	3	6,294	13,306	4,478	1,761	3,685	4,358	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	508,637	272,683	66,720	93,450	125,000	35,100	76,500	330,050	117,809	1,295,900	473,003,460	4,678,199
2018	4	6,300	13,319	4,482	1,763	3,689	4,362	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	509,124	272,952	66,781	93,450	125,000	35,100	76,500	330,050	117,891	1,296,799	473,331,542	4,681,443
2019	5	6,317	13,355	4,494	1,767	3,699	4,374	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	510,498	273,690	66,961	93,450	125,000	35,100	76,500	330,050	118,120	1,299,319	474,251,382	4,690,541
2020	6	6,345	13,415	4,515	1,775	3,716	4,394	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	512,764	274,922	67,271	93,450	125,000	35,100	76,500	330,050	118,501	1,303,507	475,780,199	4,705,662
2021	7	6,366	13,458	4,529	1,781	3,727	4,408	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	514,456	275,798	67,481	93,450	125,000	35,100	76,500	330,050	118,778	1,306,563	476,895,597	4,716,693
2022	8	6,394	13,517	4,549	1,789	3,744	4,427	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	516,719	277,011	67,779	93,450	125,000	35,100	76,500	330,050	119,156	1,310,714	478,410,773	4,731,679
2023	9	6,432	13,598	4,576	1,800	3,766	4,454	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	519,792	278,668	68,182	93,450	125,000	35,100	76,500	330,050	119,669	1,316,362	480,472,081	4,752,066
2024	10	6,469	13,677	4,603	1,810	3,788	4,479	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	522,784	280,288	68,583	93,450	125,000	35,100	76,500	330,050	120,171	1,321,876	482,484,620	4,771,971
2025	11	6,528	13,800	4,644	1,826	3,822	4,520	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	527,547	282,808	69,195	93,450	125,000	35,100	76,500	330,050	120,960	1,330,561	485,654,612	4,803,324
2026	12	6,612	13,980	4,705	1,850	3,872	4,578	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	534,341	286,498	70,102	93,450	125,000	35,100	76,500	330,050	122,099	1,343,090	490,227,921	4,848,556
2027	13	6,702	14,170	4,769	1,875	3,925	4,641	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	541,614	290,394	71,055	93,450	125,000	35,100	76,500	330,050	123,311	1,356,425	495,095,039	4,896,693
2028	14	6,795	14,367	4,835	1,901	3,979	4,705	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	549,131	294,428	72,040	93,450	125,000	35,100	76,500	330,050	124,565	1,370,213	500,127,792	4,946,469
2029	15	6,882	14,549	4,896	1,925	4,030	4,765	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	556,157	298,161	72,950	93,450	125,000	35,100	76,500	330,050	125,732	1,383,050	504,813,225	4,992,810
2030	16	6,954	14,702	4,948	1,946	4,072	4,815	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	561,977	301,295	73,723	93,450	125,000	35,100	76,500	330,050	126,704	1,393,749	508,718,270	5,031,433
2031	17	7,021	14,845	4,996	1,965	4,112	4,862	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	567,395	304,228	74,438	93,450	125,000	35,100	76,500	330,050	127,611	1,403,721	512,358,187	5,067,433
2032	18	7,066	14,940	5,028	1,977	4,138	4,893	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	571,031	306,172	74,914	93,450	125,000	35,100	76,500	330,050	128,217	1,410,385	514,790,393	5,091,489
2033	19	7,111	15,036	5,060	1,990	4,164	4,924	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	574,669	308,136	75,392	93,450	125,000	35,100	76,500	330,050	128,825	1,417,072	517,231,227	5,115,629
2034	20	7,157	15,132	5,092	2,003	4,191	4,956	105	100	27	50	98.5	25	15	890	1,250	1,300	1,530	578,395	310,106	75,871	93,450	125,000	35,100	76,500	330,050	129,442	1,423,865	519,710,618	5,140,152

NOTES:

1. See Table A-1 for details on how these numbers were generated.
2. Acres provided by Kappy Brun, WSU Grounds Supervisor, and from Aerial photography estimates.
3. The DOH Water System Design Manual's guide for non-residential water demand provides a range of 75-100 gpd per resident student water use.
4. The DOH Water System Design Manual's guide for non-residential water demand provides a range of 15-25 gpd per off campus student water use.
5. The DOH Water System Design Manual's guide for non-residential water demand provides 15 gpd per faculty or staff worker water use.
6. Landscape irrigation water use is based on average of 34 milllion gallons per yer in 2014 (per Kappy Brun - WSU Grounds Supervisor).
7. Golf course irrigation meter averages 45 million gallons per year for 120 acres (WSU Capital Planning).
8. Orchard irrigation is metered at approximately 10 - 12 million gallons per year (per WSU Facilities).
9. Crop irrigation water use is based on an assumed amount of approximately 30 million gallons or approximately 2" per acre per week for 11 weeks.
10. The average daily student count of resident students and their families for the fall/spring and summer terms multiplied by the water use per resident student. The method used is ((# of fall/spring students X # days in fall/spring/365 days per year)+(# of summer students X # days in summer/365 days per year)).
11. The average daily student count of off campus students for the fall/spring and summer terms multiplied by the water use per off campus student. See #10 above for method.
12. The average daily count of faculty and staff workers for the fall/spring and summer terms multiplied by the water use per faculty and staff worker. See #10 above for method.
13. Landscape acreage multiplied by the landscape irrigation water use per acre.
14. Golf course acreage multiplied by the golf course irrigation water use per acre.
15. Orchard acreage multiplied by the orchard irrigation water use per acre.
16. Crop acreage multiplied by the crop irrigation water use per acre.
17. The subtotal of the landscape, golf course, orchard and crop irrigation demands.
18. The amount of overall system water loss is unknown so an estimate of 10% is assumed.
19. The subtotal of the resident students, off campus students, faculty & staff and irrigation daily demands.
20. The average day demand multiplied by 365 days per year.
21. The total average day demand multiplied by a peaking factor of 3.61, which is the 2007-2014 average peaking factor (see section 2.2).
22. Trial & error utilized with whole numbers for the Peaking Factors to best match the 2014 total production of 473.2 mg .

Clotheswashers

WSU will continue efforts to replace all clotheswashers with more efficient front loading models. Currently, housing and dining has 33 washers to replace with efficient units and approximately 6 older units remain from other WSU entities. A total of 40 washers will be replaced, bringing the campus to full service by efficient clotheswashers. These 40 washers are estimated to save an additional 0.7 million gallons per year.

Reclaimed Water

As mentioned elsewhere, WSU is eager to implement a reclaimed water initiative to use reclaimed wastewater to irrigate major green spaces and potentially for process water in the Grimes Way steam plant and other industrial operations. It is estimated that such an effort would take approximately 2-4 years to become operational; however funding has not yet been secured. As mentioned in the Landscape Management section, WSU would like to irrigate the golf course with reclaimed water and has built a detention pond on the course for this purpose.

Although there has not been strong capital funding by the State Legislature in the past, in July of 2007 the legislature passed Bill E2SSB 6117 to support the use of reclaimed water in Washington. The legislation calls for the State to expand both direct financial support and financial incentives for capital investments in reclaimed water. WSU, in the most recent biennium, promoted the reclaimed water project as a high priority. The City of Pullman and WSU are still in negotiations about how to proceed with promoting the reclaimed water project and get funding for the project. That being said, reclaimed water is a future aspiration, but isn't a reality yet.

4.3.3. Estimated Savings and Budget

The estimated savings and direct costs of the conservation program are shown in Table 4-3. At full program implementation at the end of 2020, the program is estimated to save 18 million gallons per year. The proposed program has a total cost over the six year planning period of $3.0 million, which is an average annual cost of approximately $500,000. The program will be funded primarily through WSU's capital and operating budget, depending upon appropriations by the State Legislature. Funding for Housing and Dining Services is dependant upon student enrollment. Additional budget and implementation detail is provided in Chapter 9. The savings achieved by the program, and the corresponding progress towards reaching WSU's goal of saving 18 million gallons per year by the end of 2020, will be estimated by tracking the metered usage for agricultural irrigation, the number of clotheswashers replaced, and by tracking the acreage of area served by efficient irrigation equipment or converted to artificial turf.

Table 4-3 Estimated Savings and Direct Costs of the Conservation Program					
Program	Savings (at full implementation)		Capital Costs[1]		
	Gallons per Year	% of Total	Total Over Plan Period	Avg. Annual	% of Total
1. Source Meters	Not Quantified		$0	$0	0%
2. Service Meters	Not Quantified		$2,750,000(2)	$1,375,000(2)	91%
3. System Leak Detection and Repair	Not Quantified		N/A(3)		
4. Technical Studies	Not Quantified		$252,000(4)	$42,000(4)	8%
5. Landscape Management	Not Quantified		$0	$0	0%
6. Agricultural Management	17,309,100(5)	96%	N/A[6]		
7. Upgrades to Plumbing Fixtures	Not Quantified		N/A[6]		
8. Reduction/ Elimination of Water Cooled Equipment	Not Quantified		N/A[6]		
9. Education	Not Quantified		N/A[7]		
10. Clotheswashers	705,851(8)	4%	$29,200(9)	$29,200(9)	1%
11. Reclaimed Water	Not Quantified		N/A[10]		
Total	18,014,951	100%	$3,031,200	$1,375,000	100.00%

1. These are estimates of the capital costs. They do not include Operation and Maintenance costs. The implementation of the proposed conservation program is dependant upon funding.

2. These are preliminary numbers. WSU estimates cost to range from $1.5 – 4 million over 2 years. However, the deadline for full meter installation is two years away in January 2017, therefore only 2 years are included rather than 6.

3. WSU continues to monitor and fix leaks, as they are identified. However, an average annual cost is not available for estimating purposes.

4. Based on anticipated annual contributions of $40,000 to PBAC and $2,000 to the Water Summit.

5. Savings based on water usage estimates from 2008 of 27,533,100 gallons per year at Tukey Orchard, as provided by WSU on 6/13/2007 and actual metered usage averages from 2012 to 2014 of 10,224,000 as provided by WSU on 4/21/2015. Drip irrigation or microsprinklers will continue to be installed as new plots are expanded and old systems are replaced.

6. WSU will incur costs for these measures; however the costs have not yet been determined.

7. Certain components of the Technical Studies measure also serve an educational function. However, none of the costs are assigned to Education since those components are a small portion of the Technical Studies activities.

8. Based on 5.2 gallons per person per day savings if campus-wide washers are water efficient, 40 machines left to be replaced, 6,298 people living in residence halls/single student housing/family housing during the school year and 1,760 people in the summer. With 8% of

the total number of campus washers left to replace this equates to approximately 8% of the savings calculated in the 2008 Water System Plan update of 8,705,500 gallons.

9. Based on $730 per clotheswasher (WSU's recent actual replacement cost) and replacing the remaining 40 inefficient clotheswashers the year of 2015.

10. Numbers have not been included here because although the savings potential and costs are very large, the certainty of whether reclaimed water will come to fruition during this six year planning period is low. The cost of completing the proposed reclaimed water project is currently estimated at approximately $20 million. There has not been strong capital funding by the State Legislature at the time of writing, however Bill E2SSB 6117 was passed in July 2007 requiring the State to expand direct financial support and financial incentives for capital investments in reclaimed water. The City of Pullman and WSU are currently deciding the direction they will go on this prospect.

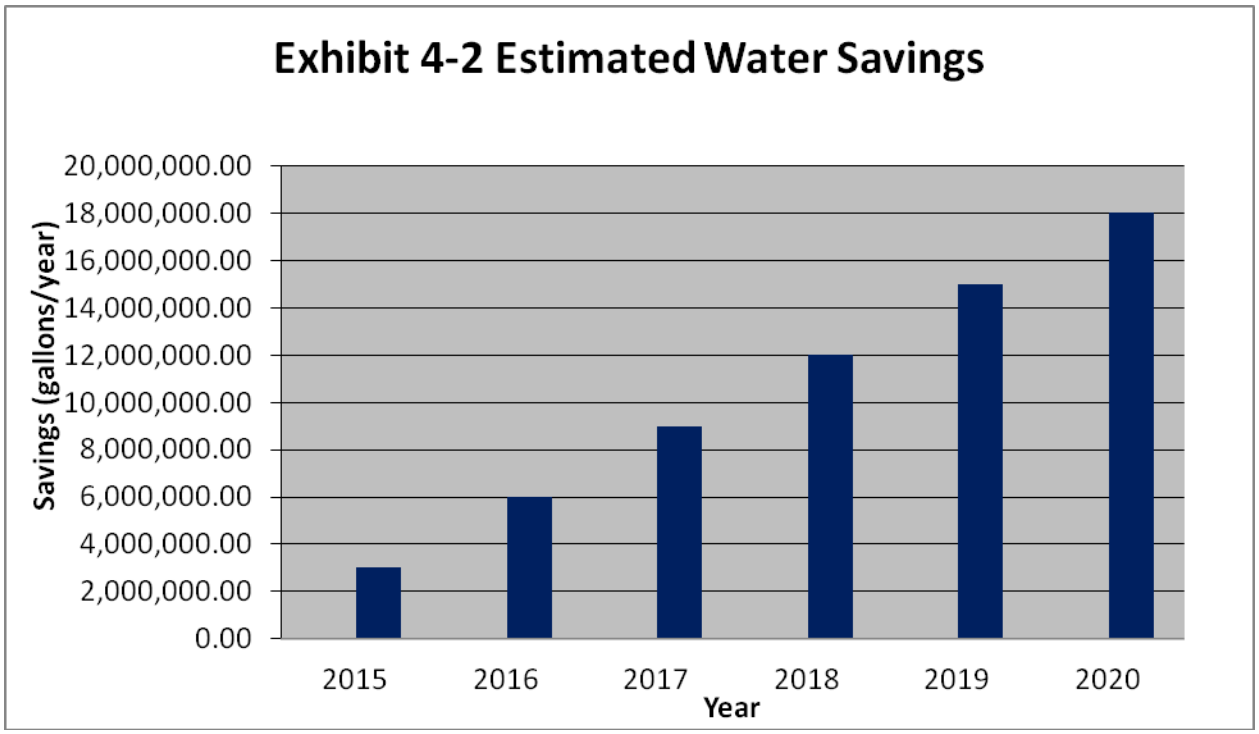
4.3.4. Impact on Demand Forecast

The conservation program is anticipated to be implemented over the six year planning period, meaning that one-sixth of the total savings can be added each year. The estimated annual savings are provided in Table 4-4 and are shown graphically in Exhibit 4-2.

Table 4-4
Savings Schedule and Impact on Demand

Year	Projected Water Demand without Conservation (gallons/year)	Projected Water Demand with Conservation (gallons/year)	Estimated Annual Savings (gallons/year)	Savings as % of Demand
2015	473,077,486	470,074,994	3,002,492	0.6%
2016	472,951,791	466,946,807	6,004,984	1.3%
2017	473,003,460	463,995,985	9,007,475	1.9%
2018	473,331,542	461,321,575	12,009,967	2.5%
2019	474,251,382	459,238,923	15,012,459	2.5%*
2020	475,780,199	457,765,248	18,014,951	2.5%*

*Savings was not increased beyond 2.5%. 2.5% was set as a realistic goal by WSU in 2007.

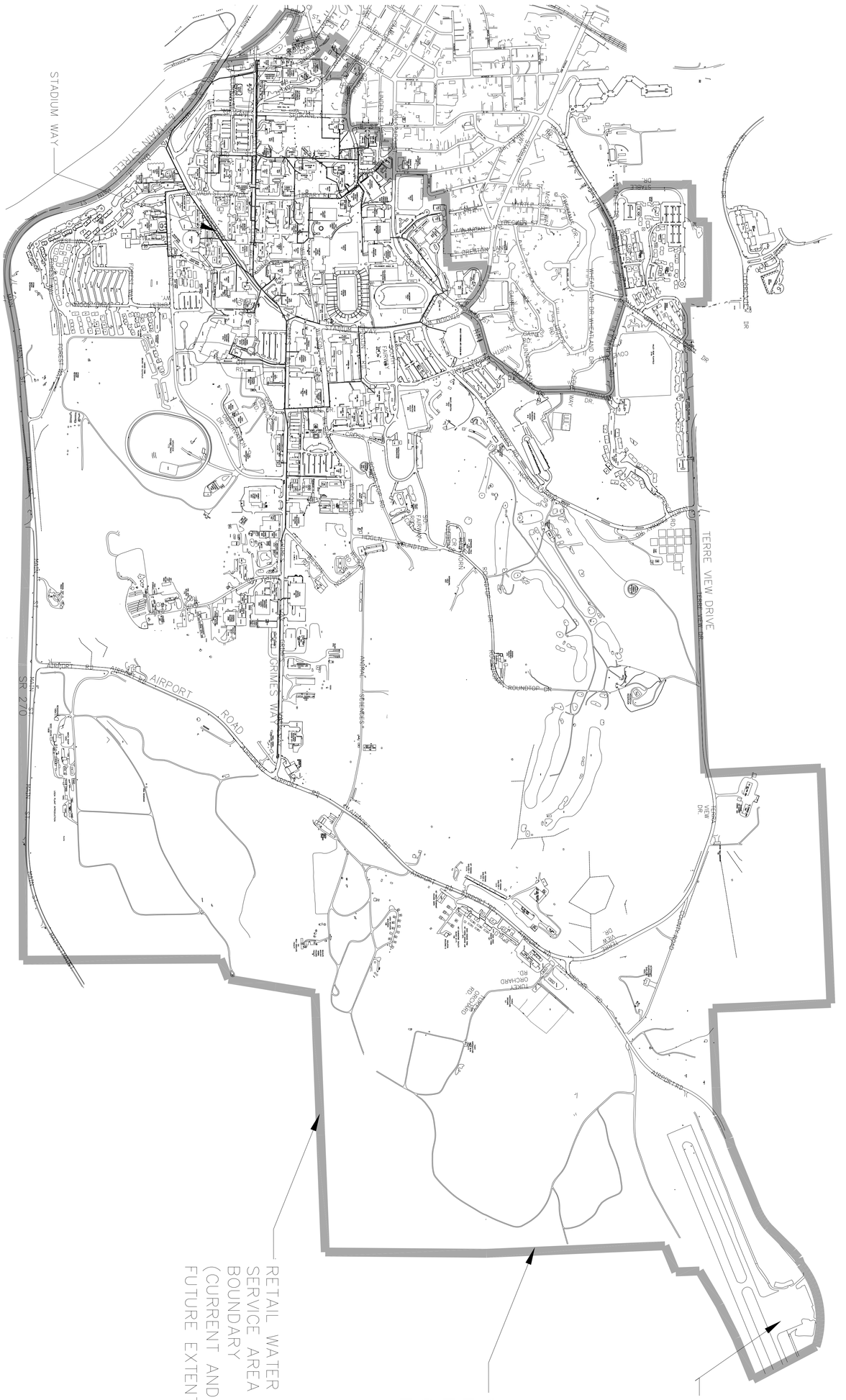


WSU's demand will be reduced by the expected savings from the conservation program. The demand forecast presented in section 2.3.1 includes two forecasts: one without additional conservation and one reflecting the savings from the conservation program. For the conservation-adjusted forecast, the estimated savings for years 2015-2020 have been subtracted from the demand forecast.

While the conservation program outlined above is only for the next six years, it is anticipated that WSU will continue to implement a conservation program in the future. Therefore, continued conservation savings are applied to the conservation-adjusted demand forecast. The demand for years 2021-2034 has been reduced by 2.5 % rounded to the nearest percent. This was the previously agreed upon conservation percentage that was deemed attainable for continued growth within the university.

APPENDIX A

Item 11 – Retail Water Service Area Map



DOMESTIC WATER SYSTEM

RETAIL WATER SERVICE AREA

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

DRAWN BY: AJT

CHECKED BY: AJT

DATE: 03/24/16

LOG NO. 0

EXHIBIT 1-4

APPENDIX A

Item 12 – Residence Inn Water Service Agreement and Lease Agreement

0

REID # 38-1850-002

WSU Contract No. 20070

Return Name and Address:
Real Estate Office PO Box 641045 Pullman, WA 99164-1045

713727
Lease Rec Fee: $ 113.00
10/22/2012 01:56 PM Page: 1 of 42
Eunice L. Coker, Whitman County Auditor

Document Title: Ground Lease & Amendment No. 1-Lease A
Grantor(s)(Last name first, first name, middle initials): 1. Washington State University 2. 3. 4. Additional names on page ____ of document.
Grantee(s)(Last name first, first name, middle initials): 1. Pullman Suites, LLC 2. 3. 4. Additional names on page ____ of document.
Legal description (abbreviated: i.e., lot, block, plat or section, township, range, qtr/qtr.) A portion of the SW ¼ Sec 33, T15N, R45E, Willamette Meridian, situated in the City of Pullman, County of Whitman, State of Washington Additional legal is on page 34 of document.
Reference Number(s) of documents assigned or released: Additional numbers on page ___ of document.
Assessor's Property Tax Parcel/Account Number: (MUST HAVE 15 DIGITS) 8-1525-99-01-00-0004 Additional parcel numbers on page ____ of document.
The Auditor/Recorder will rely on the information provided on the form. The staff will not read the document to verify the accuracy or completeness of the indexing information.

713727
Lease Rec Fee: $ 113.00
10/22/2012 01:56 PM Page: 2 of 42
Eunice L. Coker, Whitman County Auditor

ORIGINAL

WSU C# 20070

Lease A

GROUND LEASE

THIS GROUND LEASE AGREEMENT (hereinafter referred to as the "Ground Lease") is entered into this 16th day of July, 2012 (the "Effective Date"), by and between Washington State University, an institution of higher education and agency of the state of Washington (hereinafter referred to as "WSU" or the "Lessor") and Pullman Suites, LLC, a Colorado limited liability company with a principal place of business at 9100 E. Panorama Drive, Suite 300, Englewood, Colorado 80112 (hereinafter referred to as the "Lessee"). Lessor and Lessee may be individually referred to herein as a "Party" or collectively referred to as the "Parties."

RECITALS

A. **WHEREAS**, Lessor is the owner of an undeveloped parcel of land located in Pullman, Washington, as described and roughly shown in Exhibit "A" to this Ground Lease ("Hospitality Parcel");

B. **WHEREAS**, Lessor issued a Request for Proposals ("RFP") for the purpose of soliciting bids from private developers interested in financing, building, and operating a hotel and related uses and activities, on the Hospitality Parcel; and

C. **WHEREAS**, Lessee, responded to the RFP with a proposal dated March 21, 2012, ("Proposal"), which Proposal included a plan to develop a portion of the Hospitality Parcel in connection with securing a long-term ground lease thereon from Lessor, and Lessee was selected by Lessor as the successful bidder based on its Proposal; and

D. **WHEREAS**, based on the Proposal, Lessor desires to lease a portion of the Hospitality Parcel, described herein and on Exhibit "B" hereto (the "Leased Premises") to Lessee and Lessee desires to lease the Leased Premises from Lessor for said purpose and pursuant to the terms and conditions set forth in this Ground Lease.

NOW, THEREFORE, in consideration of the mutual covenants, agreements and benefits to the parties and the respective promises and obligations presented by the terms hereof, the receipt and sufficiency of which is hereby acknowledged, the parties acknowledge and agree as follows:

ARTICLE I.
PREMISES

1.1 **Legal Description of Leased Premises.** In consideration of the full and timely performance by Lessee of all the terms, conditions, covenants and provisions of this Ground Lease by it to be kept and performed, Lessor does hereby lease to Lessee, and Lessee does

hereby lease from Lessor, the Leased Premises, situated in the City of Pullman, County of Whitman, State of Washington, and legally described on Exhibit "B" attached to this Ground Lease and by this reference incorporated into this Ground Lease.

1.2 **Lessor's Title.** Lessor warrants that, as of the Effective Date of this Ground Lease, it is vested with a valid and merchantable fee title in the Hospitality Parcel, including the Leased Premises, free and clear of all liens, mortgages, unpaid taxes, leases, tenancy agreements, encroachments, or defaults in title of any nature whatsoever, and has full right, power and authority, against all others, to enter into this Ground Lease for the Leased Premises. Without the consent of Lessee and any Leasehold Encumbrancer, the Lessor shall not execute and deliver, or file for record, any mortgage, lien or other encumbrance against the Leased Premises superior to Lessee's interests in this Ground Lease.

1.3 **Covenant for Quiet Enjoyment.** Lessor further warrants to the Lessee the peaceful possession and enjoyment of the Leased Premises against disturbances of any persons whatsoever as to title or possession. Lessee shall and will upon fully observing and performing all of its obligations under the terms, conditions, covenants and provisions of this Ground Lease, quietly and peaceably possess and enjoy said Leased Premises for and during said Term, as extended, unless this Ground Lease be sooner terminated under and in accordance with any of the provisions contained in this Ground Lease.

ARTICLE II.
TERM

2.1 **Term.** Lessee shall have and hold said Leased Premises for a Term of Ninety-Nine (99) years, commencing on the Effective Date, and extending until 11:59 pm PST on the date which is 99 years thereafter (the "Term"), unless extended pursuant to Section 2.2 below.

2.2 **Options to Extend Lease.** Provided Lessee is not in Default under this Ground Lease, Lessee shall have the option to extend the Term of this Ground Lease with respect to the Leased Premises upon the same terms and conditions as those herein specified, for an additional period of five (5) years from the end of such Term by giving Lessor written notice of Lessee's exercise of said option at least three (3) months before the end of such Term, and if Lessee gives such notice, this Ground Lease shall be so extended as to the Leased Premises automatically without execution of an extension or renewal of Ground Lease (the "Extended Term"). If Lessee has exercised the preceding option to extend, Lessee shall, providing this Ground Lease is in good standing in all respects at the time of exercise, have the option to further extend the Term of this Ground Lease with respect to the Leased Premises upon the same terms and conditions as those herein specified, for an additional period of five (5) years from the end of the Extended Term by giving Lessor written notice of Lessee's exercise of said option at least three (3) months before the preceding option period ends, and if Lessee gives such notice, this Ground Lease shall be so extended with respect to the Leased Premises without execution of an extension or renewal of Ground Lease.

In the event that any leasehold mortgagee or the holder of any other encumbrance ("Leasehold Encumbrancer") given pursuant to the provisions of Article VII has not been paid in full prior to the end of the Term of this Ground Lease, as extended, then such Leasehold Encumbrancer shall

have the right to exercise in the name of the Lessee one or more of the options to extend the Term of this Ground Lease set forth in the immediately preceding paragraphs, providing that at the time of such exercise this Ground Lease is in good standing in all respects. Leasehold Encumbrancer shall have the right to exercise said option upon four (4) months' notice prior to the expiration of the Term or expiration of the option period, as the case may be.

2.3. Option to Purchase Leased Premises. Provided Lessee is not in Default under this Ground Lease, Lessee shall have the option any time to during the first 10 years of the Term to purchase the Leased Premises for $600,000. This option will expire on the tenth (10^{th}) anniversary of the Effective Date.

To exercise the option to purchase under this provision, Lessee shall provide written notice to Lessor of its intent to purchase not less than three (3) months prior to the date upon which Lessee intends to close on the purchase of the Leased Premises as provided above.

ARTICLE III.
RENTS

3.1 Base Rent. Lessee shall pay to Lessor as base rent for the Leased Premises the amounts set forth on attached Exhibit "C" ("Rent").

3.2 Effective Date. The Effective Date of this Ground Lease shall be the date set forth in the opening paragraph above.

3.3 Payment of Rent. Commencing with the Effective Date, Lessee shall pay Lessor the monthly Rent in advance on the first business day of each and every month during the Term of this Ground Lease at such place as Lessor may designate in writing. The monthly Rents shall be in the amounts and for the periods set forth on attached Exhibit "C."

3.4 Leasehold Excise Tax. The provisions of the state of Washington's Leasehold Excise Tax ("LET") as set forth in RCW 82.29A apply to this Ground Lease. This is a tax on the act or privilege of occupying or using publicly owned real or personal property through a leasehold interest. The LET rate is subject to change and is presently assessed at the rate of 12.84 percent of taxable rent, or fair market value rent if taxable rent is less than fair market value rent.

3.5. Fair Market Value. Fair market value rent for the Leased Premises has been determined to currently be $12,000 per year; therefore, LET shall be assessed in the amount of $12,000 per year. Lessee shall remit this LET amount directly to the Washington State Department of Revenue. Fair market value rent shall be reassessed every five (5) years under this Ground Lease for the purposes of calculation of LET. The assessment shall be performed by an unrelated third party appraiser who will be approved by both parties, the parties' approval not to be unreasonably withheld. The parties agree to be bound by the determination of said appraiser as to fair market value rent for the purposes of calculation of LET.

3.6 Net Lease. Rent payable under this Ground Lease shall be net to Lessor during the full Term of this Ground Lease; and pursuant to the provisions of Article IV, all costs, expenses and obligations of every kind and nature whatsoever, foreseen or unforeseen, in

relation to the Leased Premises shall be paid by Lessee or other third persons, provided that Lessor shall pay all obligations and liabilities it has directly incurred with respect to the Leased Premises, except those which Lessee is obligated to pay pursuant to this Ground Lease or against which Lessee has agreed to indemnify the Lessor. Lessee shall pay without notice, abatement, deduction or set off the Rent due under this Ground Lease, and all taxes, assessments and utility charges, costs, expenses and other payments which Lessee in any of the provisions of this Ground Lease agrees or is required to pay, with all of such amounts being either paid directly by Lessee or as additional Rent under this Ground Lease (whether or not specifically denominated as such) if said amounts cannot be paid directly by Lessee.

ARTICLE IV.
TAXES AND UTILITIES

4.1 Lessee to Pay Taxes, etc. Lessee shall pay all taxes, charges and assessments of every kind and nature which during the Term of this Ground Lease are levied, assessed or imposed upon the Leased Premises, including all installments of taxes and assessments now or hereafter levied or assessed upon said Leased Premises. Nothing in this Section 4.1 is intended nor shall it be construed to obligate Lessee to pay any income tax, profits tax or similar charge that may be payable by or chargeable to Lessor upon or with respect to the rents received by Lessor under this Ground Lease. For purposes of this Ground Lease, Lessee shall be obligated for all of the taxes on the improvements on the Leased Premises during the Term.

4.2 Personal Property Taxes. Lessee shall pay all personal property taxes levied against Lessee's personal property of any kind or nature located on the Leased Premises.

4.3 Time of Payment of Taxes and Receipts. Lessee shall pay all said taxes, charges and assessments due hereunder in each and every instance as the same become payable and before any fine, penalty, interest or costs under the laws from time to time in force may be added thereto for nonpayment, by making payment directly to the taxing body on or before the date said taxes are due. Lessee shall not be required to pay, discharge or remove any said tax, charge or assessment, except to the extent a payment of the tax, charge or assessment is required to be paid under protest in order to contest the tax, charge or assessment, if Lessee shall satisfy the following provisions and shall proceed to contest or to protest any such tax, charge or assessment by proper administrative or legal proceeding which shall operate to prevent or stay the collection thereof and to prevent the sale of the Leased Premises or any part thereof to satisfy the same. Lessee shall, not less than five days before any said tax, charge or assessment shall become delinquent, give notice to Lessor of Lessee's intention to contest or to protest the same and shall indemnify Lessor against any loss, costs, charge or expense resulting from Lessee's failure to make full payment of said tax, charge or assessment being protested or contested, upon a final decision or award. Lessee shall prosecute the protest or contest diligently and in good faith until a final decision or award is rendered, and shall promptly pay the amount, if any, required to be paid by the final decision or award. Any such contest or protest may be brought in the name of Lessor or Lessee, or both as Lessee may deem advisable; provided, however, that if any such proceeding be brought by Lessee, Lessee does hereby indemnify and agrees to save Lessor harmless against any and all loss, costs or expenses which may be imposed upon or incurred by Lessor in connection with the protest or contest, including, without limitation, reasonable attorneys' fees and expenses.

4.4 Lessee to Pay for Utilities. Lessee shall fully and promptly pay or cause to be paid all utility charges for all services furnished to or upon said Leased Premises during the full Term of this Ground Lease, including, without limitation, water, gas, electricity, sewage disposal and telephone, and shall pay or cause to be paid all installations, connection and hook-up charges for said services.

4.5 Easements. A ten inch water line serving Lessor's property runs beneath the Hospitality Parcel and the Leased Premises. Lessor will retain a twenty foot wide easement centered over the water line for continued placement and use of its water line. Notwithstanding anything herein, Lessee shall have the right to relocate said easement elsewhere on the Leased Premises, with the prior approval Lessor of the specifications and plans for doing so. Lessor will also retain an easement along the entire property line adjoining North Fairway Road from to a distance of twenty feet (20') inside of and parallel to property line, and an easement along the entire southwest property line to a distance of ten feet (10') inside of and parallel to said property line. All above-mentioned easements are for utilities serving the Lessor, including but not limited to water, electricity, natural gas, sewer, storm sewer, internet, and communications.

4.6 Water Rights. No water rights are conveyed by this Ground Lease. All water rights are retained by Lessor.

4.7 Availability of Utilities. Lessee will be permitted to connect to the Lessor's potable water system, and will pay Lessor for water at the same rates as would apply if Lessee had obtained its water from the City of Pullman. In the interests of water conservation, sustainability, and meeting Lessor's water usage goals, Lessee will take measures to minimize water usage, including using water saving features in the facility, such as low flow toilets, low flow shower heads, water re-use where feasible, Energy Star washing machines, and low water use landscaping. All other utilities necessary to operate the hotel shall be provided by and purchased from entities other than the Lessor. Lessee may connect to the Lessor's existing sanitary and storm sewer pipes that are located in North Fairway Road adjacent to the Leased Premises to assist it in obtaining City of Pullman sanitary and storm water services. If the Lessor's sewer, stormwater, and potable water pipes are not sufficient to handle Lessee's capacity, Lessee shall be responsible for enlarging the pipes at its expense. Avista electricity and natural gas lines are located in North Fairway Road adjacent to the Leased Premises.

ARTICLE V.
USE OF LEASED PREMISES

5.1 Hotel. The Leased Premises is being leased by Lessor for the sole purpose of the Leased Premises being developed and operated as a first-class hotel and ancillary uses. It is intended that Lessee (or an affiliate thereof) will develop the remainder of the Hospitality Parcel with a hotel, along with other related uses consistent with Lessor's Master Plan for the WSU-Pullman campus and as articulated in Lessor's Request for Proposals dated March 21, 2012. In particular, Lessee shall develop and construct on the Leased Premises a Residence Inn or other similar branded hotel reasonably acceptable to Lessor with approximately 127 guest suites and associated meeting space.

5.2 **Approval Required**. Lessee shall use the Leased Premises only for the above-described uses. Lessee shall comply fully with all covenants, restrictions, laws, ordinances, rules and regulations applicable to the Leased Premises. Lessee shall not use the Leased Premises for any other purpose without the prior, express, and written consent of Lessor, which consent shall not be unreasonably withheld.

5.3 **Prohibited Uses**. In any event, Lessee shall not use the Leased Premises for any activity that is or could potentially be noxious, offensive or detrimental to the use of the land in the vicinity of the Leased Premises for a university; for any activity that is or potentially would tend to create a nuisance; for any activity which would compete with or conflict with the higher education academic and research activity of the Lessor conducted on the university campus adjoining the Leased Premises; or in violation of any law, regulation or ordinance of the United States, State of Washington, or any political or governmental subdivision thereof.

5.4 **Zoning**. Lessee acknowledges that on October 20, 2010, the City of Pullman approved a zone change for the Hospitality Parcel from Washington State University to C3, and that such new zone allows development and operation of a hotel.

5.5 **Collaboration between Lessor and Lessee**. Lessee is proposing to lease the Leased Premises and develop the proposed hotel, and Lessor is willing to lease the Leased Premises for that purpose based upon the understanding that the Lessor and Lessee will work collaboratively towards the mutual success of the hotel for the purpose of enhancing the campus community and the University's ability to serve its constituents. In furtherance of that collaboration, Lessor agrees Lessee may use and market the name "Residence Inn at Washington State University" at no charge to the Lessee. Any other use of Lessor's trademarks by Lessee is subject to the prior written approval of Lessor. Lessor agrees to include the hotel name and location on official WSU maps, and where Lessor deems appropriate, on campus directional signs selected by Lessor. In addition, Lessor agrees and acknowledges that, to the extent authorized and appropriate in light of applicable law and policy, it will cooperate, in good faith, with Lessee in the development of the Leased Premises including, without limitation, the granting of necessary or desirable easements and the provision of support and assistance in the process of Lessee obtaining its licenses, permits and the like for the Leased Premises. Notwithstanding anything herein, at no time shall Lessor be required to financially contribute to the development and/or operation of the hotel.

ARTICLE VI.
IMPROVEMENTS

6.1 **Nature of Improvements.** Lessee shall construct, at its sole cost and expense, the improvements to the Leased Premises as specified in plans and specifications submitted to Lessor ("Improvements"). Lessor shall have final approval, which approval shall not be unreasonably withheld, of the Improvements, and of any expansion or remodeling of the same, as to overall design, attractiveness, suitability to site, and compatibility and harmony thereof with the surrounding structures and land features. Lessor and Lessee shall work together, in good faith, to finalize the plans for the Improvements and Lessor shall grant its final approval prior to Lessee's submission for permits from the City of Pullman.

6.2 **Permits**. On or before January 1, 2013, Lessor and Lessee shall begin the process of applying for and obtaining the necessary permits from the City of Pullman for the development of the Leased Premises and construction of the Improvements. These permits shall include, but not be limited to; site plan review, building plan review, site work permit, and/or building permit ("Permits").

6.3 **Construction of Improvements**. On or before April 1, 2013, Lessee shall commence the construction of the Improvements, shall diligently pursue construction, and Lessee shall have the Improvements completed and the Residence Inn on the Leased Premises ready for occupancy as a hotel on or before July 1, 2014. For purposes of this Section 6.3, commencement of construction shall be defined as the commencement of grading on the site.

6.4 **Requirement as to Seeding and Planting**. Lessee shall comply with the City of Pullman Landscaping & Screening Code (if applicable) and the WSU Capital Planning and Development Uniform Design & Construction Standards. Landscaping shall be approved by Lessor, which approval shall not be unreasonably withheld or delayed.

6.5 **Restriction as to Fences – Location**. Lessee shall comply with the City of Pullman Landscaping & Screening Code (if applicable) and with the following restrictions: 1) No fence shall be erected between the Leased Premises and the Student Recreation Center; 2) All other fences shall be approved by WSU Facilities Services/University Architect, which approval shall not be unreasonably withheld or delayed.

6.6 **Signage**. Lessee shall comply with the City of Pullman Sign Regulations Code (if applicable) and all signage shall be approved by WSU Facilities Services/University Architect, which approval shall not be unreasonably withheld or delayed. Lessor agrees and acknowledges that Lessee's franchisor may have certain signage requirements and Lessor agrees to reasonably cooperate with Lessee in meeting such requirements provided that the same are consistent with standards required of other similarly situated brand franchisees. Moreover, Lessor agrees and acknowledges that the prototypical signage required by Marriott for its Residence Inn Hotels is permitted.

6.7 **Lessee's Obligation to Maintain and Repair**. Lessee shall, at all times during the Term of this Lease, at its sole cost and expense, keep the Leased Premises and Improvements in first class condition and repair, ordinary wear and tear excepted, in accordance with the standards of Lessor, which shall be provided to Lessee prior to the Effective Date and which may be reasonably updated from time to time upon notice to Lessee. In addition, Lessee shall keep the Leased Premises and Improvements in compliance with any standards required by Lessee's lender and applicable franchisor and shall maintain funds for repair, replacement and upgrade of the Leased Premises as required by Lessee's lender and franchisor. Lessee's obligations hereunder include, without limitation, all necessary and reasonable maintenance, repairs and replacements of the Leased Premises or any part thereof, and any and all Improvements thereon, structural or otherwise, ordinary or extraordinary, foreseen and unforeseen, including but not limited to the exterior and interior windows, doors and entrances, signs, floor coverings, columns and partitions, lighting, heating, plumbing and sewage facilities, air conditioning equipment, or other infrastructure of the Improvements. In the event that Lessor believes that the Leased Premises and Improvements are not in compliance with this Section 6.7, Lessor shall give Lessee

written notice of such violation. A violation of this provision shall constitute a default pursuant to Section 13.1 below. Lessor shall have no obligation and shall not be required to make any repairs of any kind or nature, in, on or to the Leased Premises or Improvements during the Term of this Ground Lease.

6.8 Lessee Mortgage Rights. Lessee shall have the right to mortgage and/or otherwise encumber the Improvements to the extent of its leasehold interest only. Lessor hereby consents to the encumbrance of the leasehold interest during the Term for the purpose of construction for permanent financing of the Improvements to the Leased Premises contemplated by this Paragraph 6.8. Upon the request of a lender, Lessor will provide evidence that acknowledges lender's interest in the leasehold estate. Lessor will give lender written notice of any default by Lessee under this Lease, provided lender has given Lessor timely notice of lender and lender's contact information and timely notice of any change in lender or lender's contact information, and lender shall have a period of time after lender's receipt of the notice of default (thirty (30) days in the case of a default in the payment of any sum due hereunder; sixty (60) days in the case of all other defaults) in which to cure, or to cause to be cured, any such default, before Lessor exercises any right or remedy hereunder or as otherwise available to Lessor. Notwithstanding any other provision of this Lease, upon request from Lessee, this Lease shall be subordinate to any leasehold mortgage placed upon the Leased Premises, and Lessor shall execute and deliver to potential lenders a reasonable subordination, non-disturbance and attornment agreement, provided that such agreement contains market terms. If any lender requires recordation of this Lease, both parties hereby consent to such recordation, and either party may record the Lease in that event. Lessee shall not permit any liens to be placed against the Leased Premises, and if such liens are filed, Lessee shall cause prompt removal of such liens. Notwithstanding anything to the contrary contained herein, Lessor agrees and acknowledges that it shall reasonably cooperate with Lessee and Lessee's lender in connection with any leasehold mortgage.

6.9 No Financing By Lessor. Lessor has not and will not participate in the structuring, offering or issuance of bonds or other financing to be used to construct, renovate, or rehabilitate the Improvements and Lessor shall have no obligation with respect to the bonds or the financing of the Improvements.

6.10 As-Built Drawings. Upon completion of construction of the initial or any subsequent Improvements, Lessee shall provide to Lessor, at Lessee's sole cost and expense, "as built" drawings and plans of the Improvements.

6.11 Lessor's Consent. Nothing in this Ground Lease shall be construed as Lessor's appointment of Lessee as Lessor's agent to contract for or perform any construction on the Leased Premises.

6.12 Delivery at Termination. Lessee covenants and agrees that at the termination of this Ground Lease, by expiration of its Term or upon its earlier termination, that it will deliver possession of the Leased Premises to Lessor.

6.13 Title to Improvements Vests in Lessor at Expiration/Termination. Title to the Improvements shall initially vest in Lessee until the end of the Term, unless sooner terminated

pursuant to the terms of this Ground Lease (except in the event Lessee exercises its option to purchase the Leased Premises in which case ownership of the Improvements will remain with Lessee). Upon expiration or termination of this Ground Lease, all rights and interests of Lessee (and all persons whomsoever claiming by, under or through Lessee) in and to the Leased Premises and all Improvements thereon shall wholly cease and title to the Leased Premises and the Improvements, including but not limited to all permanent improvements, erections and additions constructed on the Leased Premises by Lessee, shall vest in Lessor without further act or conveyance, and without liability to make compensation therefore to Lessee or to anyone whatsoever, and shall be free and discharged from all and every lien encumbrance, claim and charge of any character created or attempted to be created by Lessee at any time other than pursuant to the specific terms of this Ground Lease. This provision shall not relieve Lessee from liability for having left the Leased Premises or the Improvements in unsound or unsafe condition or with encumbered title. Lessee, upon the request of Lessor, covenants and agrees to execute a quitclaim deed releasing all such rights in the Leased Premises and the Improvements in a form and substance acceptable to Lessor.

6.14 Lessor's Option to Require Removal of Improvements Upon Termination. Upon the expiration or earlier termination of this Ground Lease (other than Lessee's exercise of the Purchase Option set forth in Section 2.3 above), Lessor may, at the sole option of Lessor, notify Lessee that any or all Improvements, temporary and permanent, and fixtures, placed upon the Leased Premises by Lessee should be removed at the expiration or earlier termination of the Ground Lease, in which event Lessee shall remove such Improvements. Should Lessor so elect, Lessee shall not begin the removal or demolition of any Improvements prior to the expiration or earlier termination date, Lessor herein grants to Lessee a license to enter the Leased Premises, said license shall take effect upon the termination or expiration of this Ground Lease for the sole and exclusive purpose of removing such Improvements, said removal or demolition to occur as expeditiously as possible. Lessee's right to use said license is contingent upon Lessor's notification to Lessee that it requires the permanent Improvements shall be removed from the Leased Premises. If Lessee removes any or all Improvements it has constructed on the Leased Premises, Lessee agrees to repair any and all damage resulting to the Leased Premises and the Improvements from such removal.

ARTICLE VII.

CONDITION OF THE PROPERTY

7.1 As Is. The Leased Premises is leased "AS IS, WHERE IS." To the best of Lessor's knowledge, the frontage portion of the Leased Premises which contains fill from the construction of North Fairway Drive is not contaminated with hazardous waste or other harmful substances. Lessee is encouraged to examine the Leased Premises to ascertain the condition of the Leased Premises. Lessor does not make and specifically disclaims any warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose about the Property, including but not limited to any improvements located thereon. No employee or agent of Lessor is authorized to make any warranty or representation to the contrary. The foregoing specifically disclaims warranties with respect to the existence or nonexistence of any pollutants, contaminants, or hazardous waste or claims based thereon arising out of the actual or threatened

discharge, disposal, seepage, migration, or escape of such substances at, from, or into the Property.

7.2 **Inspection**. Lessee acknowledges that Lessee and/or its designated agents have been provided the opportunity to enter upon the Leased Premises at all reasonable times for the purpose of investigating the Leased Premises, and the physical condition thereof, including without limitation, the opportunity to conduct inspections at Lessee's discretion and expense. Lessor agrees to allow Lessee additional inspections of the Leased Premises with 48 hours advance notice.

7.3 **Indemnification and Hold Harmless Regarding Lessee's Inspection**. Lessee agrees to indemnify, defend, and release Lessor, its officers, agents, and employees from any and all claims, liens, costs, damages, fees and expenses (including but not limited to attorney and paralegal fees, costs and expenses, including costs and fees incurred on appeal, as well as consultant fees and costs) caused by or resulting from: (i) The sole negligence of Lessee, its officers, employees, agents, subcontractors or subconsultants; (ii) the concurrent negligence of Lessee, its officers, employees, agents, subcontractors or subconsultants, but only to the extent of the negligence of Lessee, its officers, employees, agents, subcontractors or subconsultants. Within the aforementioned scope, Lessee will be responsible for the payment of any fines or penalties charged against Lessor or Lessee, or for any employees or equipment while under Lessee's control, employment, or direction, related to activities under Sections 7.2 above.

7.4 **Release/Indemnity**. Lessee hereby fully releases Lessor from any and all liability to Lessee arising out of or related to the condition of the Leased Premises from the time Lessee has the right to possess the Leased Premises, including but not limited to the deposit or release of hazardous or toxic wastes, materials or pollutants. It is the intent of the parties that this constitutes a full and final release of any and all claims concerning any substance including, but not limited to, hazardous substances. This release extends to and includes any action for contribution for any environmental remedial action. Lessee agrees to indemnify, defend, and release Lessor with respect to, but not limited to, any claims, damages, liabilities, penalties (civil or criminal), and any other costs, including reasonable attorneys' fees and costs, imposed or related to any hazardous, toxic, dangerous, or harmful substances on the Property deposited or released after Lessee had the right to take possession of the Property.

ARTICLE VIII.
INSURANCE, RESTORATION AND INDEMNIFICATION

8.1 **General Liability Insurance.** At all times during the Term of this Ground Lease, Lessee, at its sole expense, shall maintain in full force and effect commercial general liability insurance in the amount of not less than $1,000,000 per occurrence and $5,000,000 in the aggregate for bodily or personal injury or death to persons and damage to property for acts occurring within or on the Leased Premises, including that for non-owned or hired auto. With respect to claims arising from within or on the Leased Premises and except to the extent that any such claim arises out of Lessor's acts or omissions, the commercial general liability insurance policy or policies shall be primary and noncontributing with any insurance maintained by Lessor. Lessee shall name Lessor, and Lessor's officers, employees and agents, as additional insureds on such policy.

8.2 Property Insurance. At all times during the Term of this Ground Lease, Lessee, at its sole expense, shall maintain in full force and effect special form insurance in the amount of not less than 100% of the full replacement cost of the Improvements except for standard exclusions from coverage, such as for the value of excavations, underground utilities, and exclusive of subtenants' fixtures, furnishings and equipment. The replacement cost shall be revalued annually, and, if required, the special form insurance shall be adjusted so that 100% of the full replacement cost of the Improvements is the base coverage. Lessor shall be a named insured under such insurance.

In case of a nonsubstantial loss or damage from any of the hazards covered by insurance, any and all proceeds of such insurance shall be made payable to Lessee and any leasehold encumbrancer. The Lessee shall disburse the insurance proceeds to the full extent required to repair, restore or rebuild the Improvements to at least as good a condition as existed before such loss or damage. The Lessee shall use the proceeds only in a manner so as to assure no construction lien will be filed against all or any part of the Leased Premises. Any such repairing, restoring or rebuilding shall be done in a good workman like manner. Except as otherwise provided in Section 8.11, if the costs to repair, restore or rebuild the Improvements as required by this Section 8.2 exceed the net amount of the insurance policy proceeds, Lessee shall nevertheless be required to repair, restore or rebuild utilizing its own funds. Lessee shall make the first payments for such repair, restoration or rebuilding, and the insurance proceeds shall be applied toward the last payments due for such repair, restoration or rebuilding. If the net amount of the insurance policy proceeds exceeds the costs to repair, restore or rebuild the Improvements as required by this Section 8.2, the Lessee may retain such excess.

8.3 Rental Insurance and Additional Insurance. Lessee, at its sole discretion and expense, shall maintain Business Income Coverage in an amount sufficient to meet all of its obligations associated with leasing and operating the Leased Premises for a period of eighteen (18) months from the date of any casualty or loss covered by the special form insurance, including, but not limited to, obligations to pay the base rent and the additional rent under this Ground Lease and to pay the principal and interest due on any leasehold mortgage.

8.4 Umbrella/Excess Coverage. In addition to the other insurance required in this Ground Lease, Lessee shall at all times maintain in full force and effect either an excess umbrella policy providing insurance in excess of the limits specified in this Ground Lease for liability risks and name Lessor as a named insured. The limits of the excess or umbrella policy shall be in such amounts as are reasonable from time to time, but in no event less than a combined single limit of $5,000,000.

8.5 Blanket Coverage. The insurance coverages required by this Article VIII may be provided under Lessee's blanket policies, provided all such coverages shall meet the requirements of this Article VIII.

8.6 Insurance Policies - Mortgage Clause. During the existence of any interest by a leasehold encumbrancer, Lessee shall have the right to have any or all of the insurance policies required to be taken out in accordance with this Ground Lease endorsed to include the leasehold encumbrancer under the leasehold mortgage as an additional insured and loss payee, as its interests may appear, subject to the other terms of this Ground Lease.

8.7 Damage to Building Not to Terminate Lease. Except as otherwise provided in Section 8.11, should all or any part of the Leased Premises or Improvements be damaged or destroyed by any cause, such damage or destruction shall neither effect a cancellation of this Ground Lease, nor effect any reduction or abatement of base Rent, or other amounts due to Lessor under this Ground Lease, nor release Lessee from liability for the full performance of all of the covenants of this Ground Lease.

8.8 Rebuilding after Destruction. Except as otherwise provided in Section 8.11 or unless otherwise restricted by any leasehold mortgage, if a part of the Leased Premises or Improvements shall be injured or destroyed by fire or other casualty, whether or not covered by the insurance policies required by this Ground Lease and whether or not the insurance proceeds are sufficient fully to repair, restore and rebuild the Leased Premises, Lessee, as soon as practical after the date of such injury or destruction, shall commence to repair, restore or rebuild the Leased Premises and Improvements to their condition prior to the injury or destruction, and shall complete the repair, restoration and rebuilding as rapidly as possible, but in any event not later than eighteen (18) months after such injury or destruction. All such repair, restoration and rebuilding shall be done in a good workman like manner and at Lessee's sole cost.

8.9 Termination for Failure to Rebuild. Except as otherwise provided in Section 8.11, if Lessee shall not commence to repair, restore or rebuild the Leased Premises injured or destroyed as soon as practical and complete the same as provided in Section 8.8, and subject to additional time provided to the leasehold encumbrancer pursuant to 8.2, if any holder of a leasehold mortgage shall refuse or fail to do so in conformity with this Ground Lease, then Lessor may, but shall not be required to, proceed in the manner provided in Article XII, and any and all proceeds of the insurance policies shall be used as provided in Section 8.2.

8.10 Additional Insurance Requirements. All insurance policies Lessee is required to obtain pursuant to this Article VIII shall be issued only by responsible insurers, properly licensed in the State of Washington, which insurers have sufficient financial reserves to cover the risks for the amounts of insurance required by this Article VIII. An insurance company shall be deemed to be responsible under this Section 8.10 if it has a rating of A- or better, by A.M. Best. Lessee shall cause to be issued to Lessor upon request, and in any event at least annually, appropriate certificates of insurance evidencing Lessee's compliance with the terms of this Article VIII. The limits on Lessee's insurance policies required by this Article shall be reviewed by Lessor not less than once every five (5) years, and may be adjusted upwards by Lessor in Lessor's reasonable discretion. All insurance policies the Lessee obtains as required in this Article VIII shall include the following:

(a) a provision or endorsement that the policy or policies will not be cancelled or reduced in amounts or coverages without at least forty-five (45) days prior written notice by the insurer to Lessor and any leasehold encumbrancer;

(b) the policy or policies shall name the Lessor and any leasehold encumbrancer as an additional insureds and/or loss payees, as appropriate;

(c) the policy or policies shall provide that an act or omission of one of the insureds or additional insureds which would void or otherwise reduce coverage shall not reduce or void the coverage as to the other insureds or additional insureds;

(d) the policy or policies shall contain waivers of subrogation; and

(e) the policy or policies shall contain a "severability of interest" or "separation of insureds" clause.

8.11 Substantial Damage or Destruction.

(a) Notwithstanding the preceding provisions of this Article VIII, if during the Term of this Ground Lease, the Improvements shall be substantially damaged or destroyed by fire or other casualty and if Lessee reasonably determines it is economically unfeasible to repair, restore or rebuild the Improvements, or at the time of the casualty the Improvements are reasonably determined to be economically or functionally obsolete, then Lessee may do either of the following:

(i) Terminate this Ground Lease, after having demolished and removed from the Leased Premises any debris remaining from the Improvements. Should Lessee exercise this option (i), any insurance proceeds shall first be applied towards the cost of demolition and removal, with any remaining proceeds to be first paid to discharge any leasehold mortgagee, with any remainder paid to the Lessor; or

(ii) Replace the Improvements with an improvement other than one that is substantially in the condition of the Improvements at the time of such substantial damage or destruction, so long as such improvement is approved by Lessor and meets the uses for the Leased Premises. Should Lessee exercise this option (ii), any insurance proceeds shall first be applied towards the cost of designing and constructing the improvement, with any remaining proceeds to be paid to Lessor. All design is subject to approval by Lessor and construction shall be done in a good workman like manner. Lessee shall notify Lessor of its election under either (i) or (ii) by written notice to Lessor within ninety (90) days of the substantial damage or destruction. If Lessee fails to give any notice within the ninety (90) day period, then this Section 8.11 shall not apply, and Lessee shall proceed to fulfill its obligations under the other provisions of this Article VIII.

(b) If the Development shall be substantially damaged or destroyed by fire or other casualty within the last five (5) years of the Term of this Ground Lease, notwithstanding the continued economic feasibility of the Improvements, Lessor may terminate this Ground Lease by giving written notice of its election to do so within thirty (30) days of the date of such damage or destruction, in which event, Lessee shall not be required to restore or rebuild the Improvements, but shall, if requested to do so by Lessor, demolish and remove the damaged Improvements and level and clear the Leased Premises, within sixty (60) days of receipt of such request from Lessor. Any insurance proceeds shall first be applied towards Lessee's cost of

demolition and removal, with any remaining proceeds to be first paid to discharge any leasehold mortgagee, and any remainder paid to Lessor.

(c) The terms "substantially damaged or destroyed" or "substantial damage or destruction" as used in this Article VIII, shall mean that the Improvements or a portion thereof has been damaged or destroyed to the extent that the cost of restoration of the Improvements will exceed fifty percent (50%) of the total replacement cost of the Improvements. If Lessor and Lessee disagree as to the extent of the damage or destruction, the issue shall be resolved pursuant to Article XIV.

8.12 Inspection. During the Term of this Ground Lease, upon forty-eight (48) hours prior written notice Lessee shall permit Lessor at all times to enter upon and to inspect the Leased Premises and the Improvements, subject only to the limitations resulting from the rights of Subtenants.

8.13 Indemnification by Lessee. To the extent permitted by law, Lessee agrees to protect, defend, indemnify and save harmless Lessor against and from any and all claims by or on behalf of any person, firm, corporation or governmental authority arising from the occupation, use, possession, conduct or management of or from any work or thing whatsoever done in and on the Leased Premises. Lessee shall further protect, defend, indemnify and save Lessor harmless against and from any and all claims arising from any condition on, within or about the Leased Premises constructed by Lessee, its predecessor, any subtenants or other third persons upon the Leased Premises or adjoining the Leased Premises which are under the control of Lessee after the date of this Ground Lease and until the expiration of the Term of this Ground Lease; or arising from any breach or default on the part of Lessee in the performance of any covenant or agreement on the part of Lessee to be performed pursuant to the terms of this Ground Lease; or arising from any act or negligence of Lessee, or any of its agents, contractors, servants, employees, licensees or subtenants; or arising from any accident, injury or damages whatsoever caused to any person, firm or corporation, including any subtenant or Lessee, in or about the Leased Premises occurring after the date of this Ground Lease and until the expiration of the Term of this Ground Lease; and from and against all costs, expenses and liabilities incurred in connection with any such claim, action or proceeding brought thereon including, without limitation, reasonable attorneys' fees and costs.

8.14 Non-liability of Lessor. Excluding liability arising out of Lessor's negligent acts or omissions, Lessee further covenants and agrees that Lessor shall not be responsible or liable to Lessee, or any person, firm or corporation claiming by, through or under Lessee for or by reason of any defect in or on the Leased Premises or the Improvements.

ARTICLE IX.
LEASEHOLD MORTGAGES

9.1 Mortgage of Leasehold Estate. Without the consent of the Lessor, the Lessee shall have the right at any time and from time to time to convey or encumber by mortgage, deed of trust, or other encumbrance in the nature thereof, as security for any bona fide debt, its leasehold interest in this Ground Lease and its interest in the Improvements created under this

Ground Lease. The holder of any such mortgage, deed of trust, or other encumbrance in the nature thereof, is sometimes referred to in this Ground Lease as the "leasehold mortgagee" or "leasehold encumbrancer." Such mortgage, deed of trust, or other encumbrance shall, however, be a leasehold mortgage only, it being acknowledged and agreed that Lessee has no right to mortgage or encumber the fee title to the Leased Premises.

So long as any encumbrance described in this Paragraph 9.1 shall remain in force, this Ground Lease may not be modified or voluntarily terminated by Lessor and Lessee without the prior written permission of the leasehold encumbrancer.

Without the consent of the Lessor, any such leasehold encumbrancer may assign or transfer its interest in this Ground Lease to any assignee or nominee who may hold and exercise all rights of the leasehold encumbrancer upon any foreclosure of this mortgage, and such assignment shall thereafter relieve the leasehold encumbrancer or similar encumbrancer from liability for further obligations under the provisions of this Ground Lease.

9.2 Notice to and curing of Default by Encumbrance Holder.

(a) Should any leasehold encumbrancer furnish the Lessor with a copy of the instrument encumbrancing Lessee's said interest in this Ground Lease, so long as such encumbrance shall continue in force, Lessor thereafter shall mail, by registered or certified mail, to such leasehold encumbrancer, at the same time as notice is given to Lessee, a duplicate copy of any notice which Lessor may from time to time give to or serve upon Lessee under or pursuant to the terms and provisions of this Ground Lease. Such leasehold encumbrancer shall advise Lessor in writing of its proper mailing address and any change thereof.

(b) So long as any mortgage or deed of trust shall continue in force, the leasehold encumbrancer may at its option, within sixty (60) days after expiration of the time provided in this Ground Lease within which Lessee may cure such default, make any payment or commence and proceed diligently to do any other act or thing required of Lessee by the terms of this Ground Lease or which may be necessary and proper to be done in the observance of the covenants and conditions of this Ground Lease, and all payments so made and all things so done and performed by any such leasehold encumbrancer shall cure any default and prevent a forfeiture of the rights of Lessee under the terms of this Ground Lease. Any such mortgage or deed of trust may be so conditioned as to provide that as between the leasehold encumbrancer and the Lessee, said leasehold encumbrancer, on curing such default or defaults, shall be subrogated to any or all of the rights of the Lessee under the terms and provisions of this Ground Lease. The leasehold encumbrancer, upon acquisition of Lessee's interest in the Ground Lease may request the Lessor to execute a new Ground Lease in substantially the same form and content as the existing Ground Lease as a replacement Ground Lease. The leasehold encumbrancer, upon acquisition of the Lessee's interest in this Ground Lease, shall assume and be obligated to perform all terms and provisions of this Ground Lease and shall continue to be so obligated so long as such leasehold encumbrancer shall remain owner of the leasehold estate; but its liability is limited to

the extent of its interest in the leasehold estate, and, that upon the sale or assignment by the leasehold encumbrancer of the leasehold estate to a bona fide purchaser, and the assumption of the terms of this Ground Lease by said purchaser or assignee in writing, a copy of which shall be furnished to Lessor, the leasehold encumbrancer shall be released of all personal liability accruing hereunder from and after the date of such sale.

9.3 Effect of Lessor's Cure of Lessee's Default; Effect of Mortgage Assignment to Lessor.

(a) In the event that Lessor shall, on behalf of or for the account of Lessee, cure any default which shall exist under a leasehold mortgage, such cure shall not automatically cure the default existing under this Ground Lease which shall exist by virtue of the leasehold mortgage default; and said default existing under this Ground Lease shall only be cured at such time as Lessee shall pay to Lessor all costs and expenses incurred by Lessor to cure the leasehold mortgage default, as set forth in Article IX herein.

(b) Neither the assignment to Lessor of the mortgagee's interest under a leasehold mortgage nor the subrogation of Lessor to the mortgagee's rights (either by statutory procedure or otherwise) shall merge said mortgagee's interest into the fee estate, or otherwise affect the validity of the leasehold mortgage, until the same be satisfied or discharged by Lessor (or other party holding both the mortgagee's and the fee interest); and upon such assignment, Lessor shall be subrogated to all of the mortgagee's rights against Lessee.

ARTICLE X.
LESSOR'S RIGHT TO CURE LESSEE'S DEFAULT

10.1 Lessor May Cure Lessee's Default. In the event Lessee shall fail or neglect at the times and as provided in this Ground Lease to pay any tax, charge or assessment against the Leased Premises or any fine, penalty or interest thereon, or to pay any judgment against the Leased Premises for labor or material furnished to the Leased Premises, or to provide and pay for any insurance, or to pay any amounts due a leasehold encumbrancer, or to make any other payment which it is the obligation of Lessee to pay under the terms of this Ground Lease, when due and payable, and not later than ten (10) days following notice from Lessor to Lessee and to any leasehold encumbrancer that any said payment is due (except that no such notice shall be required with respect to Lessee's failure to pay for any insurance required by this Ground Lease), then in addition to all other remedies provided by this Ground Lease or as now or hereafter provided by law, Lessor may, at its option, and subject to the limitations contained in this Ground Lease with respect to protests and contests of taxes and liens, pay any such judgment, tax, charge or assessment, procure such insurance and pay the premiums therefore, and pay any other amount required by this Ground Lease to be paid by Lessee. The amount or amounts so paid together with interest thereon at the Applicable Rate, as defined in Section 10.2, from the date of Lessor's payment until repaid, shall thereupon be immediately due and payable by Lessee

to Lessor, as additional rent under this Ground Lease. The amounts paid by Lessor to cure any default in a leasehold mortgage, and all costs and expenses incurred by Lessor in connection with said cure, including reasonable attorneys' fees and costs and interest thereon at the Applicable Rate, as defined in Section 10.2, from the date of Lessor's payment until repaid, shall be immediately due and payable by Lessee to Lessor, as additional rent under this Ground Lease.

10.2 Lessor's Advances to Bear Interest. Lessee will pay to Lessor interest at the Applicable Rate on every payment of every kind which Lessee is obligated to pay to Lessor under the terms of this Ground Lease from the date when such payment shall become due and payable until the same is paid. The Applicable Rate shall equal 2% plus the prime rate of interest as published in the "Money Rates" section of The Wall Street Journal or similar publication for the day upon which such payment became due or the next business day if the day upon which such payment becomes due is not a business day, or twelve percent (12%), whichever is greater.

ARTICLE XI.
ASSIGNMENT AND SUBLETTING

11.1 Assignment. Except as otherwise provided in Article IX, which gives the leasehold encumbrancer the right to freely assign its interest in the Ground Lease, Lessee shall not assign this Lease without Lessor's prior written consent, which consent shall not be unreasonably withheld, delayed or conditioned, provided that each of the following conditions are satisfied: (i) Lessee shall not be in default under any of the terms and conditions of this Lease at the time of the proposed assignment; (ii) the assignee shall occupy the Leased Property and conduct its business therein in accordance with the use as set forth in Article V above; (iii) the net worth of the proposed assignee as of the date of such assignment and after giving consideration to the financial effect of the assignment, is reasonably satisfactory to Lessor (provided, however, that if the proposed assignee's net worth is equal to or greater than that of Lessee, then this condition shall be deemed satisfied); (iv) Lessee shall provide to Lessor an executed counterpart of such proposed assignment and any pertinent information requested by Lessor concerning the proposed assignee, (hereinafter referred to as "Transferee"), including a current balance sheet of the Transferee, and that the Transferee has assumed all of Lessee's obligations under this Lease and has agreed to perform and observe all the terms, covenants and conditions in this Lease on Lessee's part to be performed. Lessor shall have thirty (30) days after receipt by Lessor of notice of the forgoing assignment and pertinent information to give Lessor's written consent to such assignment, transfer or conveyance, or to withhold such consent. In the event of written consent, the Transferee shall become the Lessee herein upon such assignment. Upon such assignment, the Lessee herein shall thereafter be released by Lessor from all further claims or obligations arising after the effective date of such assignment. In the event Lessee shall request Lessor's consent to an assignment of this Lease, Lessee shall pay to Lessor an administrative fee of One Thousand Dollars ($1,000.00), which shall be due and payable regardless of whether such proposed assignment is consummated by Lessee.

11.2 No Continuing Consent. Except as to the rights of the leasehold encumbrancer pursuant to Article IX, the consent by Lessor to any one sale, assignment, conveyance or transfer of this Ground Lease or Lessee's interest under this Ground Lease shall apply only to the specific transaction thereby authorized; and the consent shall not be construed as a waiver of the duty of

Lessee, or any immediate or remote purchaser, assignee, grantee or transferee, to obtain Lessor's consent to any other or subsequent sale, assignment, conveyance or transfer.

11.3 Lessor May Assign. Subject to this Section 11.3, Lessor's right to sell, convey, assign or transfer the Leased Premises, subject to this Ground Lease, or its interest in this Ground Lease is and shall remain unqualified. Upon any said sale, conveyance, assignment or transfer, Lessor shall thereupon be entirely relieved of all obligations of the Lessor under this Ground Lease and shall not be subject to any liability resulting from any act or omission or event occurring after the assignment, sale, transfer or conveyance. The preceding two sentences shall apply to a sale, conveyance, assignment or transfer of all of Lessor's interest in the Leased Premises or in this Ground Lease or in both. Lessor may mortgage or otherwise encumber or sell, convey, assign or transfer all or any portion of its interest in this Ground Lease or the Leased Premises provided such mortgage, encumbrance or sale, conveyance, assignment or transfer is expressly made subject to this Ground Lease, and Subtenant Leases, and the rights of any holder of any leasehold encumbrancer.

ARTICLE XII.
CONDEMNATION

12.1 Condemnation. In the event that, during the Term of this Ground Lease, the entire Leased Premises shall be taken by exercise of the power of eminent domain or deed in lieu of condemnation, or in the event that a sufficient portion of the Leased Premises be taken so as to make it economically unfeasible to continue to operate the remaining portion as permitted by this Ground Lease (as reasonably determined by Lessee), this Ground Lease shall terminate on the date that title shall vest in the condemning authority, and all rent and other sums payable under this Ground Lease shall be prorated to that date. Upon the occurrence of either event, the entire condemnation award (or aggregate of separate awards), regardless of division or apportionment by the court, commissioner or other body making or supervising such condemnation, shall be apportioned between the Lessor and Lessee as the Lessor and Lessee may agree. If the Lessor and Lessee are unable to agree upon the apportionment within thirty (30) days after either party has requested a determination of the apportionment, the apportionment of the award between the Lessor and Lessee shall be by arbitration as provided in Article XIV, taking into account all facts and circumstances bearing upon the value of Lessor's and Lessee's interest including, without limitation, the Lessee's ownership of the Improvements during the Term of this Ground Lease and Lessor's ownership of the Improvements at the end of the Term of this Ground Lease. Notwithstanding the foregoing, this Article XII shall not allow for termination of this Ground Lease in the event that Lessor is the condemning authority.

12.2 Partial Condemnation. In the event that, during the Term of this Ground Lease, less than the entire Leased Premises shall be taken by the exercise of the power of eminent domain or deed in lieu of condemnation, and it is economically feasible to continue to operate the remaining portion as permitted by this Ground Lease, this Ground Lease shall not terminate but shall continue in full force and effect for the remainder of the Term, subject to the provisions of this Section 12.2. In that event, Lessee shall be entitled to the entire condemnation award (or aggregate awards), regardless of division or apportionment by the court, commissioner or other body making or supervising such condemnation, as shall be required to repair, restore and replace the Leased Premises, to the fullest extent possible, to its utility and value immediately

prior to the taking; and Lessee shall so repair, restore and replace, using its own funds if the condemnation award (or aggregate awards) is insufficient. All restoration and replacement shall be done in a good workman like manner. In the event that the entire award or aggregate awards is greater than shall be required so to repair, restore and replace, the excess shall be allocated between Lessor and Lessee in the manner provided in Section 12.1.

12.3 Immaterial Taking. Notwithstanding anything contained in Section 12.2 to the contrary, in the event of any immaterial taking by the exercise of the power of eminent domain or deed in lieu of condemnation this Ground Lease shall continue in full force and effect without reduction or abatement of any rents or other amounts payable under this Ground Lease. In the event of an immaterial taking, the entire award or aggregate awards shall be used first to repair, restore or replace the damage; and Lessee shall so restore or replace using its own funds, if the award or awards are insufficient. All restoration and replacement shall be done in a good workman like manner. Any excess funds shall be the allocated between Lessor and Lessee as provided in Section 12.1.

12.4 Temporary Taking. In the event of any government action which does not result in a taking of any portion of the Leased Premises but creates a right to compensation therefore, such as, without limitation, a change of the grade of any street, or in the event of any temporary taking creating a right to such compensation, this Ground Lease shall continue in full force and effect without reduction or abatement of any Rent or other amounts payable under this Ground Lease. In that event, Lessee shall be entitled to receive the entire amount of any compensation made with respect to any such governmental action or temporary taking and, if such governmental action or temporary taking results in physical damage to any of the Leased Premises, Lessee shall repair such physical damage, and if the amount of such compensation is not sufficient, Lessee shall provide the additional funds required. All repairs shall be done in a good workman like manner.

12.5 Negotiations. Both the Lessor and Lessee shall be authorized to negotiate through their representatives regarding any condemnation award, except that only the Lessee shall be entitled to negotiate a condemnation award in the case of a temporary taking under Section 12.4.

ARTICLE XIII.
DEFAULT

13.1 Default. An event of default shall exist under this Ground Lease if Lessee shall violate, fail to perform or if Lessee shall be in breach of: (i) a covenant to pay Rent, or any other amount due under this Ground Lease or (ii) any other term, condition, covenant or provision of this Ground Lease and, in either of the cases described in clause (i) or (ii), Lessee shall fail to pay or cure such violation, nonperformance or breach within thirty (30) days (or fifteen (15) days if the default can be cured by the payment of money) after being given notice by Lessor or the mortgagee, as the case may be, of such violation, nonperformance or breach; provided, however, if payment of money is not the only cure required, and if the cure which is other than the payment of money cannot reasonably be completed in thirty (30) days and Lessee, within the thirty (30) day period, initiates such cure and proceeds continuously and diligently therewith, then no event of default shall exist unless such default is not cured by the end of such reasonable period needed to cure. Upon an event of default for which Lessee has failed to cure, Lessor may,

without further notice to Lessee, either (i) re-enter the Leased Premises and terminate Lessee's right to possession thereof, without terminating this Ground Lease or (ii) re-enter the Leased Premises and terminate both Lessee's right to possession of the Leased Premises and this Ground Lease. Such re-entry may be effected without further notice to Lessee and without the need for a writ, order, judgment or decree of any court or the need for any court or judicial proceeding (any rights to which Lessee hereby expressly waives); and upon such re-entry Lessor shall have the right, subject to then existing non-disturbance agreements with subtenants, to remove all persons and personal property from the Leased Premises. Lessor may, at its sole discretion, store any of Lessee's personal property so removed, at the sole cost and expense of Lessee.

13.2 **Payment by Lessee upon Re-entry.** Upon such re-entry whether or not Lessor shall terminate this Ground Lease, Lessee shall pay to Lessor upon demand (i) all Rent, and any other amount due to Lessor at the time of such re-entry, and (ii) all costs and expenses incurred by Lessor to effect such re-entry, including, without limitation, reasonable attorneys' fees and expenses and the costs to repair the Leased Premises (hereinafter, the amounts described in clauses (i) and (ii) shall be collectively referred to as "Re-entry Costs"). No such re-entry shall be deemed a termination of this Ground Lease unless Lessor notifies Lessee and each leasehold mortgagee that this Ground Lease is terminated; and any such termination shall be effective only as of the date set forth in such notice.

13.3 **Payment of Rent Reserved.** If Lessor, following the re-entry, shall terminate this Ground Lease by notice, or if this Ground Lease shall be terminated by a writ, order, judgment or decree of any court of competent jurisdiction, Lessee shall pay to Lessor upon demand, in addition to the Re-entry Costs, Rent and other amounts owed by Lessee under this Ground Lease for the period between the re-entry and the termination, plus all damages the Lessor has suffered by reason of the Lessee's failure to comply with its obligations under this Ground Lease.

13.4 **Reletting on Lessee's Behalf.** Following any re-entry, Lessor may, if it does not terminate this Ground Lease, relet all or any part of the Leased Premises (which is not subject to the rights of an occupying subtenant entitled to non-disturbance) for the account of Lessee for such term or terms (whether longer or shorter than the unexpired Term of this Ground Lease), at such rent and upon such conditions and covenants as Lessor, in its sole discretion, may deem advisable. Upon each such reletting, all rents received by Lessor, including any rents received by Lessor from any subtenants, shall be applied to the following obligations of Lessee to the extent not then satisfied: first, to Re-entry Costs; second, to any costs and expenses incurred by Lessor in reletting the Leased Premises or part of the Leased Premises, including, without limitation, the costs of reasonable brokers' and attorneys' fees and remodeling costs; third, to the payments of base rent and additional rent unpaid and due to Lessor at the time of such reletting; fourth, to any other unpaid amount then due to Lessor; and the balance, if any, shall be held by Lessor and applied in payment of Rent, and other amounts due to Lessor under this Ground Lease as the same shall become due under this Ground Lease. If the base rent received upon such reletting during any calendar month shall be less than the Rent and other amounts Lessee is to pay to Lessor under this Ground Lease, Lessee shall pay the deficiency to Lessor, such deficiency being calculated and paid monthly.

13.5 No Election of Remedy. No remedy provided to either party under this Ground Lease shall be deemed an exclusive remedy and the election by either party of any such remedy shall not bar it from pursuing any other remedy, for damages or otherwise, whether available to it under this Ground Lease or existing at law or in equity.

13.6 Lessor May Terminate Lease on Lessee's Bankruptcy, etc. In the event any of Lessee's interest under this Ground Lease be assigned by operation of law, or an event of the bankruptcy, receivership, insolvency, voluntary or involuntary liquidation or winding up of the affairs of Lessee, any general assignment or arrangement for the benefit of creditors, or in event of any corporate reorganizations or arrangements under the bankruptcy or insolvency laws of the United States of any State involving the interest of Lessee under this Ground Lease, Lessor may, immediately and without notice of any kind, terminate and cancel this Ground Lease, provided, however, Lessor shall have no right to terminate and cancel this Ground Lease without the consent of any leasehold encumbrancer so long as a leasehold mortgage shall exist and so long as there shall be no default under this Ground Lease in the payment of Rent or any other amounts due under this Ground Lease.

13.7 Additional Lessor Remedies. In addition to all of the other rights and remedies of Lessor set forth in this Ground Lease, upon any event of default by Lessee and subject to the rights of any leasehold encumbrancer to any rents of subtenants (provided there are no defaults under this Ground Lease that can be cured by the payment of money), Lessor shall be entitled to (i) all of the rents, issues, and profits due or to become due from subtenants and others and all other income and payments of any kind due or payable from subtenants and others for use, possession or occupancy of all or any part of the Leased Premises (all of which Lessee hereby presently assigns to Lessor, even though Lessor's right of collection shall not arise until the time specified in this Section 13.7); and (ii) the appointment of a receiver for the Leased Premises and for said rents, issues, profits, income and payments. Lessor shall be entitled to the appointment of a receiver immediately upon an event of default, without further notice to Lessee, regardless of any statute or rule of law, which Lessee hereby waives to the extent it may lawfully do so, and Lessee hereby agrees that such receiver may be appointed by any court of competent jurisdiction prior to or after Lessor's re-entry to or repossession of the Leased Premises by Lessor, upon an application therefore. The receiver shall be required to apply the rent, profits, income and payments first, to the expenses of receivership; second, to all maintenance costs, real estate taxes and special assessments, and insurance premiums not paid by subtenants; third, to Re-entry Costs; and fourth, to the amounts as set forth in Section 13.4. Notwithstanding the foregoing right to the appointment of a receiver, set forth in clause (ii) of the first sentence of this Section 13.7, Lessor may, at its election, enforce its right in clause (i) of the first sentence of this Section 13.7 directly by collection from subtenants or other obligors, with or without any court or judicial action (which action Lessee waives to the extent it may lawfully do so), at the time that Lessor shall commence an action to terminate this Ground Lease and/or to terminate Lessee's right to possession of the Leased Premises. In the event Lessor shall directly enforce its right set forth in clause (i) of the first sentence of this Section 13.7, it shall apply all sums collected in the same order as required to be applied by a receiver. Lessor's right pursuant to clauses (i) and (ii) of the first sentence of this Section 13.7 shall be subject to the rights of any leasehold encumbrancer.

13.8 Lessor's Purchase of Trade Fixtures. Subject to any leasehold encumbrancer's rights as set forth in this Ground Lease, Lessor may, at Lessor's election, purchase any trade fixtures acquired by Lessee with its own funds, and which are used for Lessee's operations on the Leased Premises, at the termination of this Ground Lease, regardless of the reason for the termination of this Ground Lease, including its expiration, or upon Lessor's exercise of its right of entry without termination of this Ground Lease. The purchase price shall be the fair market value of Lessee's trade fixtures as negotiated by the Lessor and Lessee, or in the event the Lessor and Lessee cannot agree upon the fair market value within thirty (30) days after one party has requested a determination of the fair market value, then as determined by arbitration pursuant to Article XIV. The election shall be exercised, if at all, by notice given (i) not more than six (6) months nor less than three (3) months before the termination of this Ground Lease by reason of the expiration of its Term, or (ii) concurrently with or as a part of a notice of termination of this Ground Lease, or (iii) concurrently with Lessor's exercise of its right of re-entry without termination of this Ground Lease. Lessor's purchase of Lessee's trade fixtures shall be consummated at a "Closing." The Closing shall take place concurrently with the termination of the Term of this Ground Lease by reason of the expiration of its Term or, in the event of other termination of this Ground Lease, or re-entry without termination of this Ground Lease, on the tenth (10th) business day after the fair market value has been determined, or such other date as Lessor and Lessee may agree. Lessor may rescind the exercise of its right to purchase the trade fixtures by written notice to Lessee given within five (5) days after the fair market value has been determined. Lessor shall pay the purchase price in cash at the Closing and, at Lessor's election, Lessor may without notice offset against the purchase price any and all sums then due from Lessee to Lessor. Lessor and Lessee shall execute and deliver at the Closing any documents or instruments necessary to complete Lessor's purchase, including the appropriate bill or bills of sale for Lessee's trade fixtures.

ARTICLE XIV.
DISPUTES

14.1 Arbitration Policy. Except for the exercise by Lessor of its statutory remedies for an event of default, if a dispute arises, Lessor and Lessee agree to resolve all disputes by the following alternate dispute resolution process: (a) Lessor and Lessee agree to seek a fair and prompt negotiated resolution, but if this is not successful, (b) the dispute shall be resolved by binding arbitration, provided that during this process and at the request of either Lessor or Lessee made not later than ten (10) days after the initial arbitration demand, Lessor and Lessee agree to attempt to resolve any dispute by nonbinding third-party intervention including mediation or evaluation or both (but without delaying the arbitration hearing date).

14.2 Binding Arbitration. Any claim between Lessor and Lessee, including, but not limited to, those arising out of or relating to this Ground Lease and any claim based on or arising from an alleged tort, shall be determined by binding arbitration, pursuant to the contract arbitration rules, commenced in accordance with arbitration procedures outlined by the American Arbitration Association ("AAA"). There shall be one (1) arbitrator agreed upon by Lessor and Lessee, or if Lessor and Lessee cannot agree on the arbitrator within ten (10) days of the arbitration demand, the arbitrator shall be selected in accordance with the rules of the AAA. The arbitrator shall be an appraiser who is a member of the American Institute of Appraisers if the dispute involves the highest and best use of the Leased Premises or the value of Lessor's or

Lessee's interest in the Leased Premises and, otherwise, the arbitrator shall be a person qualified to determine the dispute. Whether a claim is covered by this Ground Lease shall be determined by the arbitrator. All statutes of limitations which would otherwise be applicable shall apply to any arbitration proceeding under this Ground Lease.

14.3 Arbitration Procedures. There shall be no discovery or dispositive motion practice except that the arbitrator shall authorize such discovery as may be shown to be necessary to ensure a fair hearing, and no such discovery shall extend the time limits contained in this Ground Lease, unless the arbitrator otherwise determines. The arbitrator shall not be bound by the rules of evidence or of civil procedure, but rather may consider such writings and oral presentations as reasonable business people would use in the conduct of their day-to-day affairs, and may require the parties to submit some or all of their case by written declaration or such other manner of presentation as the arbitrator may determine to be appropriate. Lessor and Lessee shall permit live testimony and cross-examination to the extent necessary to ensure a fair hearing on material issues.

14.4 Hearing - Law - Appeal Limited. The arbitrator shall take such steps as may be necessary to hold a private hearing in a neutral location within sixty (60) days of the initial demand for arbitration and to conclude the hearing within three (3) days; and the arbitrator's written decision shall be made not later than fourteen (14) calendar days after the hearing. The parties have included these time limits in order to expedite the proceeding, but they are not jurisdictional, and the arbitrator may for good cause afford or permit reasonable extensions or delays, which shall not affect the validity of the award. The written decision shall contain a brief statement of the claim(s) determined and the award made on each claim. In making the decision and award, the arbitrator shall apply the substantive law of the State of Washington. The arbitrator may not award punitive or exemplary damages. Absent fraud, collusion or willful misconduct by the arbitrator, the award shall be final and binding, and judgment may be entered in any court having jurisdiction thereof.

ARTICLE XV.
ENVIRONMENTAL MATTERS

15.1 Lessee's Obligations. Lessee and Lessee's agents, employees, contractors, licensees, sublessees and invitees shall not manufacture, store, treat, dispose, handle, release or otherwise use any Hazardous Substances, as defined in Section 15.4 below, in, on, under or about the Leased Premises. Notwithstanding the preceding sentence, Lessee, its agents, employees, contractors, licensees, subtenants and invitees may store, handle, or otherwise use any such Hazardous Substances in, on or about the Leased Premises as long as (i) such storage, handling or use is in compliance with all Hazardous Substances Laws, and (ii) such Hazardous Substances are disposed of off the Leased Premises in compliance with such laws, and (iii) the storage, handling or use of such Hazardous Substances by any of the aforementioned parties is considered to be normal and customary for its particular industry or activities associated with its business on the Leased Premises.

15.2 Compliance with Environmental Laws. Lessee shall comply with all local, state, and federal laws, ordinances, regulations, orders and any other requirements (collectively, "Hazardous Substances Laws") relating to industrial hygiene, environmental protection, or the

use, analysis, generation, manufacture, storage, treatment, disposal, handling, release, other usage or transportation of any Hazardous Substances.

15.3 Environmental Notices. If at any time Lessee or Lessor shall become aware, or have reasonable cause to believe, that any Hazardous Substance has come to be located in, on, under or about the Leased Premises, Lessee or Lessor, as the case may be, shall, immediately upon discovering such presence or suspected presence of the Hazardous Substance, give notice of that condition to the other party. In addition, Lessee or Lessor, as the case may be, shall immediately give notice to the other party of (a) any enforcement, cleanup, removal, or other governmental or regulatory action instituted, completed, or threatened pursuant to any Hazardous Substances Laws, (b) any claim made or threatened by any person against the Lessee or Lessor, as the case may be, or the Leased Premises, relating to damage, contribution, cost recovery, compensation, loss, or injury resulting from or claimed to result from any Hazardous Substances, and (c) any reports made by or to any local, state, or federal environmental agency arising out of or in connection with any Hazardous Substances located below, in, on, under or about the Leased Premises or removed from the Leased Premises including any complaints, notices, warnings, or asserted violations in connection therewith. Lessee or Lessor, as the case may be, shall also supply to the other party as promptly as possible, and in any event within twenty (20) business days after the Lessee or Lessor, as the case may be, first receives or sends the same, copies of all action documents, claims, reports, complaints, notices, warnings, or asserted violations relating in any way to the Leased Premises or the use thereof. Lessee shall promptly deliver to Lessor copies of hazardous waste manifests reflecting the legal and proper disposal of all Hazardous Substances removed from the Leased Premises.

15.4 Definition of Hazardous Substances. As used in this Agreement, the term "Hazardous Substance" means any hazardous or toxic substances, chemical materials or wastes, hydrocarbons, petroleum or petroleum containing substances, explosives, fertilizers, insecticides, asbestos, including, but not limited to, those substances, materials and wastes listed in the United States Department of Transportation Hazardous Materials Table (49 CFR 172.10 1) or by the Environmental Protection Agency as hazardous substances (40 CFR Part 302) and amendments thereto, or by the Washington State Department of Ecology under Washington's Model Toxic Control Act (RCW 70.105D) or such substances, materials and wastes which are now or which hereafter become subject to regulation, investigation or remediation under any applicable local, state or federal law, including any statute, regulation, ordinance, order, action, policy, or common law.

15.5 Indemnification of Lessor. Lessee shall indemnify, defend, protect, and hold harmless Lessor, and each of Lessor's partners, employees, agents, attorneys, successors, and assigns, from and against any and all claims, liabilities, penalties, fines, judgments, forfeitures, losses (including, without limitation, diminution in the value of the Leased Premises, damages for the loss or restriction on use of rentable or usable space or of any amenity of the Leased Premises), costs, or expenses (including attorneys' fees, consultant fees, and expert fees) for the death of or injury to any person or damage to any property whatsoever, arising from or caused in whole or in part, directly or indirectly, by (a) any use, analysis, storage, transportation, disposal, release, threatened release, discharge, or generation of Hazardous Substances, in, on, under, about, or from the Leased Premises, or (b) any failure to comply with any Hazardous Substances

Law relating to the Leased Premises. Lessee's obligations under this Section 15.5 shall include, without limitation, and whether foreseeable or unforeseeable, any and all costs incurred in connection with any investigation of site conditions, and any and all costs of any required or necessary repair, cleanup, remediation, detoxification, or decontamination of the Leased Premises (including without limitation, the soil and ground water on or under the Leased Premises, and the preparation and implementation of any closure, remedial action, or other required plans in connection therewith). Lessee's duty to indemnify Lessor under this Section 15.5, includes but is not limited to, proceedings or actions commenced by any person (including any federal, state, or local governmental agency or entity), before any court or administration agency. Lessee shall indemnify Lessor under this Section 15.5 for and against all expenses incurred by Lessor as they become due and not waiting for the ultimate outcome of the litigation or administrative proceeding. Lessee's obligations under this Section 15.5 shall survive the expiration or earlier termination of the Term of the Lease.

15.6 Withholding Consent to Proposed Transferees. Notwithstanding that consent requirement contained in Article XI herein, Lessee acknowledges and agrees that it shall not be unreasonable for Lessor to withhold its consent to any proposed assignment or transfer of Lessee's interest in this Ground Lease and that it will not enter into an Subtenant Lease if (a) the anticipated use of the Leased Premises by the proposed assignee, Subtenant Lessee, or transferee (collectively, a "Transferee") involves the manufacture, storage, treatment, disposal, handling, release or other use of Hazardous Substances other than in the manner permitted by Section 15.1; (b) the proposed Transferee has been required by any prior lessor, lender, or governmental authority to make remedial action in connection with Hazardous Substances contaminating a property; or (c) the proposed Transferee is subject to an enforcement order issued by any governmental authority in connection with the manufacture, storage, treatment, disposal, handling, release or other use of a Hazardous Substance.

15.7 Lessor Access. If Lessee fails or refuses for ten (10) days after notice from Lessor to comply with any Hazardous Substances Law, Lessor shall have the right, in addition to any other rights or remedies it may have pursuant to this Ground Lease or under any law, to comply with said Hazardous Substances Law for and on behalf of Lessee at the cost and expense of Lessee and, for that purpose, to enter onto the Leased Premises for the purpose of making tests, samples and surveys and to perform such other acts as may be required in the discretion of the Lessor. All costs and expenses of the Lessor in connection with Lessor's performance of Lessee's obligations shall be reimbursed by Lessee to Lessor promptly upon receipt of a bill therefore, shall be in addition to any rent due under this Ground Lease and shall bear interest at the Applicable Rate, as defined in Section 10.2, from the date of Lessor's payment until repaid.

15.8 Environmental Reports. Not more than ten (10) business days after Lessee's receipt, each party, hereto shall deliver to the other all environmental reports concerning all or any part of the Leased Premises which it causes to be prepared or which are prepared by others and delivered to any party or its members or those providing financing to the Lessee or Lessor.

ARTICLE XVI.
MISCELLANEOUS

16.1 Estoppel Certificates. Lessor and Lessee each agree at any time and from time

to time, during the Term of this Ground Lease, upon not less than ten (10) days' prior written request by the other party or by any actual or prospective leasehold encumbrancer, to execute and deliver to the requesting party, in recordable form, a certificate, setting forth the following items:

(a) A statement that this Ground Lease is unmodified and in full force and effect (or if there have been modifications, that the Lease is in full force and effect as modified, and stating the modifications);

(b) A statement of the dates to which the rent and any other amounts have been paid in advance, if any;

(c) A statement as to whether any default exists under this Ground Lease to the knowledge of the party making the statement, or whether any notice of default has been served by said party; and

(d) A statement of any other reasonable matters within the knowledge of the certifying party. It is the intention of the parties that any such statement delivered pursuant to this Section 16.1 may be relied upon by any prospective purchaser of Lessor's fee or remainder interest in the Leased Premises, by any prospective or actual leasehold encumbrancer, by any actual or prospective assignee or transferee of Lessee's interest under this Ground Lease, or by any actual or prospective Subtenant of the Leased Premises. The costs of preparation and recording of the certificate shall be borne solely by the requesting party.

16.2 Notices. All notices, requests or demands required or permitted under this Ground Lease, including a Notice of Exercise, shall be in writing and shall be deemed given when personally delivered to the Lessor or to the Lessee, or when mailed first class, postage prepaid, registered or certified mail with return receipt card required or on the day of receipt when given by a reputable overnight courier service such as Federal Express or Airborne Express at the following addresses:

Lessor: Washington State University
Office of Business & Finance
442 French Administration Building
P.O. Box 641045
Pullman, WA 99164-1045

Lessee: Pullman Suites, LLC
c/o Stonebridge Companies
Attn: Navin C. Dimond
9100 E. Panorama Drive, Suite 300
Englewood, CO 80112

Copy to: Howard Pollack, General Counsel
Stonebridge Companies
9100 E. Panorama Drive, Suite 300

Englewood, CO 80112

Either party may, by a written notice given to the other party in the manner set forth in this Section 16.2, change its address under this Ground Lease. In the event Lessor or Lessee cannot be found at its address, or at its then current address under this Ground Lease, notice shall be deemed given as provided in the preceding sentence when mailed or couriered in the aforesaid manner to its last known address.

16.3 Time is of Essence. Whenever any payment is to be made under this Ground Lease by Lessee at or within a specified time, or, subject to Section 16.16, whenever any act not involving the payment of money is to be done under this Ground Lease by either party at or within a stated time, time is of the essence.

16.4 Short Form; Recording. Each party hereto covenants that it shall, upon the written request of the other party, execute and deliver to the other a notice of lease or memorandum of lease in recordable form. Preparation and recording shall be done by the requesting party and the charges therefore shall be paid by the requesting party. Each party agrees that it will not record this Ground Lease.

16.5 Captions. The captions and headings herein are for convenience and reference only and do not limit or construe the provisions of this Ground Lease.

16.6 Severability. If any term, condition, covenant, agreement or provision of this Ground Lease, or the application thereof to any circumstance shall, to any extent, be held by a court of competent jurisdiction or by any authorized governmental authority to be invalid, void or unenforceable, the remainder of this Ground Lease shall not be affected by such holding, and the remaining terms, conditions, covenants, agreements and provisions hereof shall continue in full force and effect.

16.7 Brokers. Each of the parties represents and warrants and covenants to the other that there are no claims for brokerage commissions, finder's fees or like fees or commissions in connection with the execution of this Ground Lease. Each party shall indemnify and hold the other harmless in the event of any said claim, demand or action, cause of action or charge against the other by any broker or other party retained, or alleged to have been retained, by the other and shall hold the other harmless from all other liabilities arising from any said claim, demand, action, cause of action or charge, including, without limitation, reasonable attorneys' fees incurred by the other in connection therewith.

16.8 No Partnership, etc. The parties to this Ground Lease are neither joint venturers, partners, nor principal and agent; and their relationship is solely that of Lessor and Lessee.

16.9 Entire Agreement. This Ground Lease represents the entire agreement between Lessor and Lessee, and there are no agreements, understandings or undertakings except as set forth in this Ground Lease. All prior negotiations and writings between Lessor and Lessee and their representatives, attorneys, brokers and agents are superseded by this Ground Lease. This

Ground Lease may not be amended, modified or supplemented except by a writing executed by both parties.

16.10 No Continuing Waiver. No waiver of any term, condition, covenant, provision or remedy hereunder or delay in the enforcement of any remedy under this Ground Lease in any one instance shall be deemed to be (i) a waiver of any other term, condition, covenant, provision or remedy in such instance or (ii) of such waived or delayed term, condition, covenant, provision or remedy in any other instance.

16.11 Binding. All of the terms, conditions, covenants, agreements and provisions of this Ground Lease shall be construed as covenants running with the land and shall inure to the benefit of and be binding upon Lessor and Lessee and upon their respective personal representatives, heirs, successors and permitted assigns.

16.12 Interpretation. The language in all parts of this Ground Lease shall in all cases be construed as a whole according to its fair meaning and not strictly for nor against either Lessor or Lessee, and the construction of this Ground Lease and any of its various provisions shall be unaffected by any claim, whether or not justified, that it has been prepared, wholly or in substantial part, by or on behalf of Lessor or Lessee.

16.13 Survival. The termination of this Ground Lease whether by expiration of its Term or otherwise shall not terminate Lessee's obligation to pay and perform any obligations it owed to Lessor at the time of such termination.

16.14 Governing Law. This Ground Lease shall be governed by and construed in accordance with the laws of the State of Washington, with venue for any action concerning the Leased Premises or this Ground Lease being Whitman County, Washington.

16.15 Number and Gender. Whenever the singular or masculine or neuter is used in this Ground Lease, the same will be construed to mean the plural or feminine or body corporate, where the context of this Ground Lease so requires.

16.16 Force Majeure. The time within which either Lessor or Lessee shall be required to perform any act under this Ground Lease, other than a payment of money in satisfaction of Lessee's obligations under this Ground Lease, shall be extended by a period of time equal to the number of days during which performance of such act is delayed unavoidably by strikes, walkouts, acts of God, governmental restrictions, failure or inability to secure materials or labor by reason of priority or similar regulations or order of any governmental or regulatory body, war, civil disturbance, fire, unavoidable casualties or any other cause beyond the reasonable control of the Lessee or Lessor, excluding, however, the inability or failure of Lessee to obtain any financing which may be necessary to carry out its obligations under this Ground Lease, provided that each party shall be required to promptly notify' the other of a condition of force majeure on which it relies as soon as reasonably practical after the notifying party learns of the condition of force majeure and provided further the party invoking this Section 16.16 shall exercise reasonable diligence in an effort to remove or overcome or terminate the condition of force majeure as soon as reasonably possible,

16.17 Lessor's Representative. Lessor does hereby appoint its Vice President for Business and Finance, or his/her authorized designee, as Lessor's authorized agent in all matters of and relating to this Ground Lease, including, but not limited to the Lessor's consent for subleases, assignment, easements, nondisturbance, subordination and attornment.

16.18 Counterparts. This Lease may be signed in counterparts and a signature of Lessor by fax is acceptable.

[SIGNATURE PAGE FOLLOWS]

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Eunice L. Coker, Whitman County Auditor

IN WITNESS WHEREOF, the Lessor and Lessee have executed this instrument to be executed as of the date first above written.

WASHINGTON STATE UNIVERSITY

Recommended By:

By: Mark Taylor

Title: Ex. Director, Real Estate

Date: 7-10-12

Approved By:

By: Roger D. Patterson

Title: Vice President for Business & Finance

Date: 7/10/12

Approved as to Form:

Assistant Attorney General — 7/10/12 Date

LESSEE

PULLMAN SUITES, LLC

By: Nasir Ahmad

Title: manager

Date: July 16TH 2012

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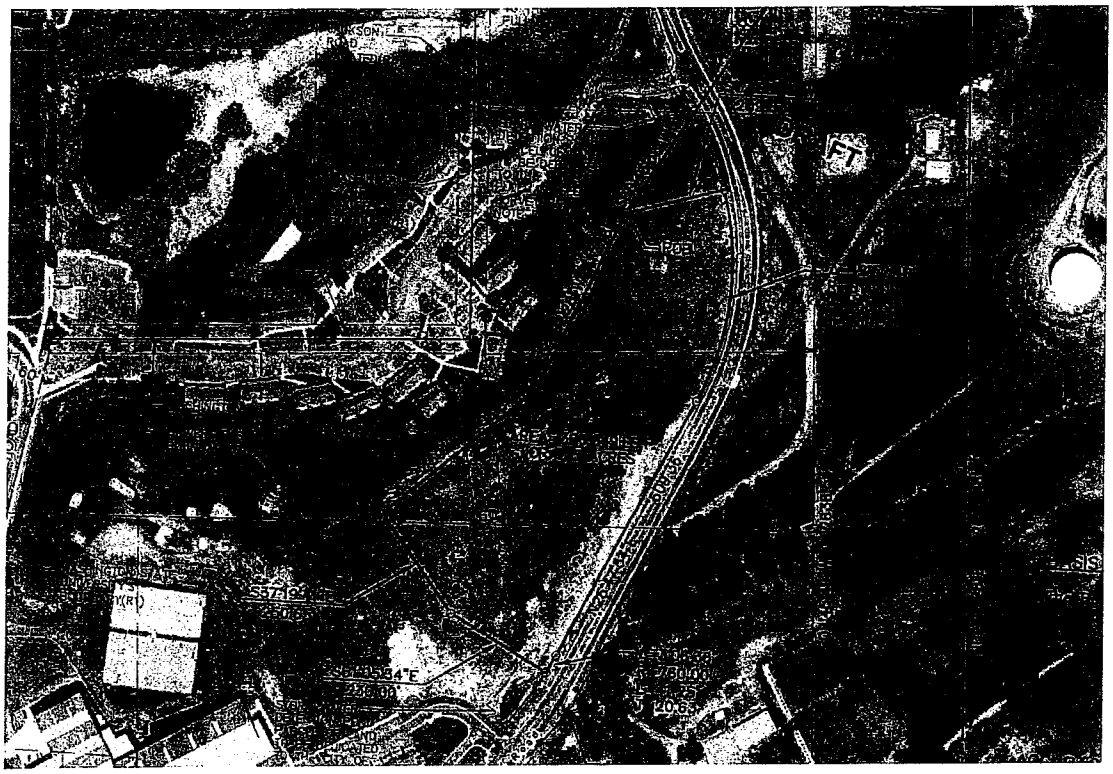
Eunice L. Coker, Whitman County Auditor

EXHIBIT "A"

HOSPITALITY PARCEL

[Rough Depiction and Legal Description]



The Hospitality Parcel is a property located in the City of Pullman, Whitman County, Washington, and further described as 7.5 acres more or less situated in the West ½ of the Southwest ¼ of Section 33, Township 15 North, Range 45 East, W.M., as more particularly described below:

A parcel of land located in the Southwest Quarter of Section 33, Township 15 North, Range 45 East, Willamette Meridian, City of Pullman, County of Whitman, State of Washington, more particularly described as follows:

COMMENCING AT the Center of said Section 33 from which the west Quarter Corner of said Section 33 bears South 87°56'12" West, 2638.27 feet;

Thence South 30°43'53" West, 704.79 feet to the **POINT OF BEGINNING**;

Thence South 24°02'28" West, 417.13 feet;

Thence South 47°22'59" West, 408.84 feet;

Thence South 37°19'41" East, 250.65 feet;

Thence South 61°05'34" East, 230.00 feet to the westerly right-of-way (ROW) line of North Fairway Road, to be dedicated to the City of Pullman in a document given to the City but not yet recorded;

Thence, along said ROW line the following 3 courses;

1) Along a non-tangent curve to the left, the radius of which bears North 61°05'30" West, 760.00 feet, a central angle of 03°06'36", (the long chord of which bears North 27°21'12" East, 41.25 feet) for an arc length of 41.25 feet;

2) North 25°47'54" East, 609.36 feet;

3) Along a tangent curve to the left, the radius of which bears North 64°12'06" West, 610.00 feet, a central angle of 42°52'40", (the chord of which bears North 04°21'33" East, 445.92 feet); for an arc length of 456.50 feet;

Thence South 72°55'13" West, 209.83 feet;

To the **POINT OF BEGINNING.**

CONTAINING: 326, 849 square feet or 7.5 acres of land, more or less.

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Eunice L. Coker, Whitman County Auditor

EXHIBIT "B"

LEASED PREMISES

[Legal Description for Lease A]

[To be Attached]

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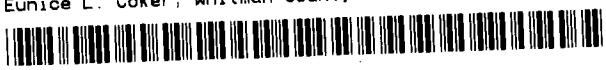

EXHIBIT "C"

[Rent Schedule]

Annual Rent:

Annual Ground Lease Rent Amount Years 1-3 = $12,000

Annual Ground Lease Rent Amount Years 4-5, but not less than 8% of Estimated Land Value = $50,000

Ground Lease Increases:

10% increase every five (5) years; and

Reappraisal every twenty-five (25) years

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Eunice L. Coker, Whitman County Auditor

State of Washington)
) ss.
County of Whitman)

I certify that I know or have satisfactory evidence that **Roger D. Patterson** is the person who appeared before me, and said person acknowledged that he signed this instrument and acknowledged it as the **Vice President for Business and Finance** of **WASHINGTON STATE UNIVERSITY** to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

CYNTHIA L HENDRICKSON
Commission Expires
NOTARY
PUBLIC
04-01-2015
STATE OF WASHINGTON

Dated this 10th day of July, 2012

Printed Name: Cynthia L. Hendrickson
Notary Public in and for the state of Washington
My appointment expires: 04-01-2015

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Eunice L. Coker, Whitman County Auditor

State of Colorado)
) ss.
County of Arapahoe)

I certify that I know or have satisfactory evidence that Marvin C. Dimond is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the manager of Pullman Land, LLC to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated this 16th day of July, 2012

Sheryl A. Hanebrink

Printed Name: Sheryl A. Hanebrink
Notary Public in and for the state of Colorado
My appointment expires: 6/30/2013

SHERYL A. HANEBRINK NOTARY PUBLIC STATE OF COLORADO

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DURYEA & ASSOCIATES, P.S.
Land Surveying & Mapping

June 27, 2012

Job No. 12-1665

LEASE A
PROPOSED RESIDENCE INN HOTEL

A portion of the Southwest Quarter of Section 33, Township 15 North, Range 45 East, Willamette Meridian, situate in the City of Pullman, County of Whitman, State of Washington, and being described as follows:

BEGINNING at the Center one-quarter corner of said Section 33, being hereinabove described; thence from south point of beginning, South 30°43'53" West 704.79 feet; thence South 24°02'28' West 417.13 feet to the **TRUE POINT OF BEGINNING** of this description; thence South 47°22'59" West 408.84 feet; thence South 37°19'41" East 250.65 feet; thence South 61°05'34" East 230.00 feet to the westerly right-of-way of North Fairway Road; thence along said westerly right-of-way the following two courses and distances:

> Northeasterly along a non-tangent curve to the right, from a point with a radial bearing of South 61°05'34" East, having a radius of 760.00 feet, through a central angle of 03°06'36" an arc distance of 41.25 feet, and
> North 25°47'54" East 464.71 feet;

thence leaving said westerly right-of-way, North 64°12'06" West 303.96 feet to the said true point of beginning of this description, containing 4.23 acres of land, more or less.

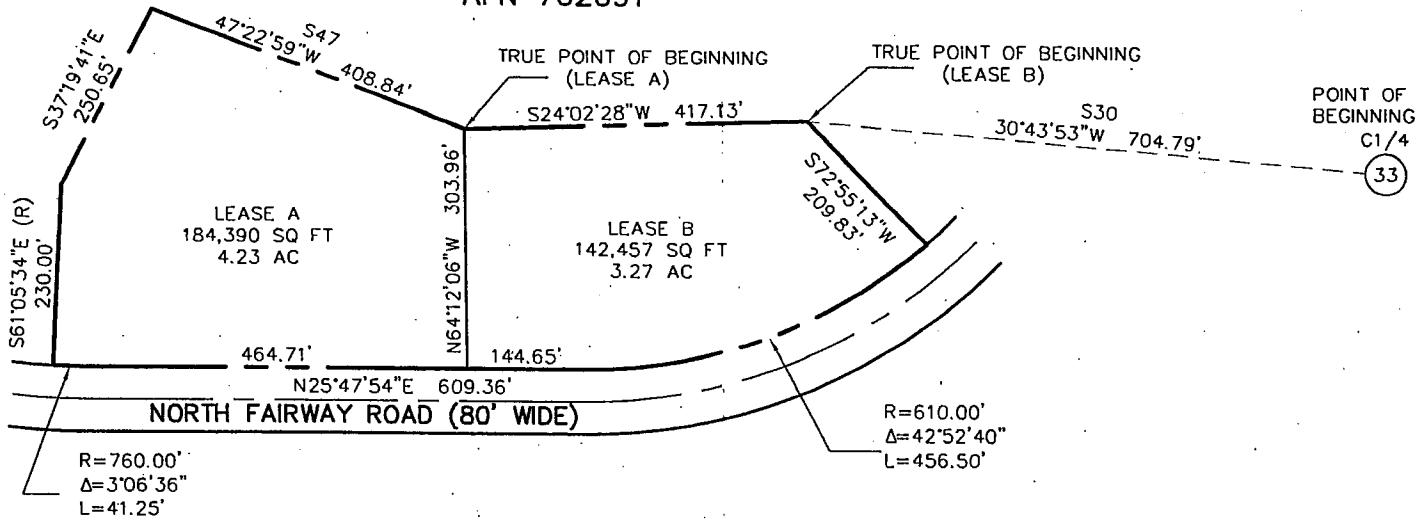
That certain Record of Survey filed on November 29, 2010 in Book 8 of Surveys, Page 122, Whitman County records was taken as the basis of bearings for this description.

PLAT TO ACCOMANY
LEGAL DESCRIPTOINS

SW 1/4 SECTION 33
TOWNSHIP 15 NORTH, RANGE 45 EAST
WILLAMETTE MERIDIAN
CITY OF PULLMAN, WASHINGTON

SCALE: 1"=200'

REOCRD OF SURVEY
(BOOK 8 OF SURVEYS, PAGE 122)
AFN 702091



DURYEA & ASSOCIATES, P.S.
2702 N. Perry Street, Spokane WA 99207
tel: (509) 465-8007
www.duryea-associates.com

JOB NO. 12-1665

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WSU C# 20070

Lease A

AMENDMENT NO. 1 TO

GROUND LEASE

THIS AMENDMENT NO. 1 ("Amendment No. 1") to that certain ground lease agreement which was entered the 16th day of July, 2012, and which is identified by WSU Contract #20070 ("Ground Lease") is made by and between Washington State University, an institution of higher education and agency of the state of Washington (hereinafter referred to as the "Lessor") and Pullman Suites, LLC, a Colorado limited liability company (hereinafter referred to as the "Lessee").

RECITALS:

WHEREAS, Lessor and Lessee previously executed the Ground Lease for the purpose of permitting Lessee to use the premises described therein for the purposes described therein;

WHEREAS, Section 3.5 of the Ground Lease provides that Lessee will remit Leasehold Excise Tax ("LET") payments directly to the Washington State Department of Revenue; and

WHEREAS, the parties wish to amend Section 3.5 of the Ground Lease to provide that Lessee will remit LET payments to Lessor, who will in turn remit the payments to the Washington State Department of Revenue, and to that end, execute this Amendment No. 1.

NOW, THEREFORE, the parties agree to amend the Ground Lease, as follows:

1. **Leasehold Excise Tax Payments.** Section 3.5 of the Ground Lease shall be amended to read as follows (deletions are in ~~strikethrough~~, additions are underlined):

> **3.5. Fair Market Value.** Fair market value rent for the Leased Premises has been determined to currently be $12,000 per year; therefore, LET shall be assessed in the amount of $12,000 per year. Lessee shall remit this LET amount to Lessor and Lessor shall remit said LET payments ~~directly~~ to the Washington State Department of Revenue. Fair market value rent shall be reassessed every five (5) years under this Ground Lease for the purposes of calculation of LET. The assessment shall be performed by an unrelated third party appraiser who will be approved by both parties, the parties' approval not to be unreasonably withheld. The parties agree to be bound by the determination of said appraiser as to fair market value rent for the purposes of calculation of LET.

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Eunice L. Coker, Whitman County Auditor

2. Remainder of Agreement Unchanged. All other terms and conditions of the Ground Lease shall remain unchanged and in full force and effect and the parties shall comply therewith.

IT IS SO AGREED.

WASHINGTON STATE UNIVERSITY

Recommended By:

By: _____

Mel Taylor, Executive Director of
Title: Real Estate and Local Relations

Date: 9/26/12

Approved By:

By: _____

Roger D. Patterson
Title: VP for Business & Finance
Washington State University

Date: 9/26/12

LESSEE

PULLMAN SUITES, LLC

By: _____

Title: Manager

Date: 10/1/12

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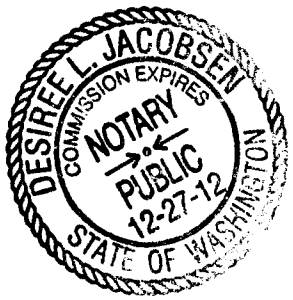
Eunice L. Coker, Whitman County Auditor

State of Washington)
) ss.
County of Whitman)

I certify that I know or have satisfactory evidence that **Roger D. Patterson** is the person who appeared before me, and said person acknowledged that he signed this instrument and acknowledged it as the **Vice President for Business and Finance** of **WASHINGTON STATE UNIVERSITY** to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.



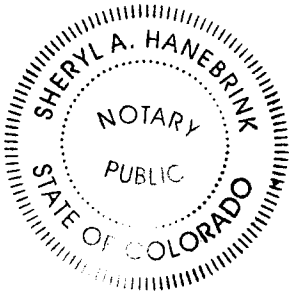
Dated this 26th day of September, 2012

Désirée L Jacobsen

Printed Name: Desiree L. Jacobsen
Notary Public in and for the state of Washington
My appointment expires: 12-27-12

State of COLORADO)
) ss.
County of Arapahoe)

I certify that I know or have satisfactory evidence that Navin C. Dumond is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the manager of Pullman Suites, LLC to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.



Dated this 2nd day of October, 2012

Sheryl A Hanebrink

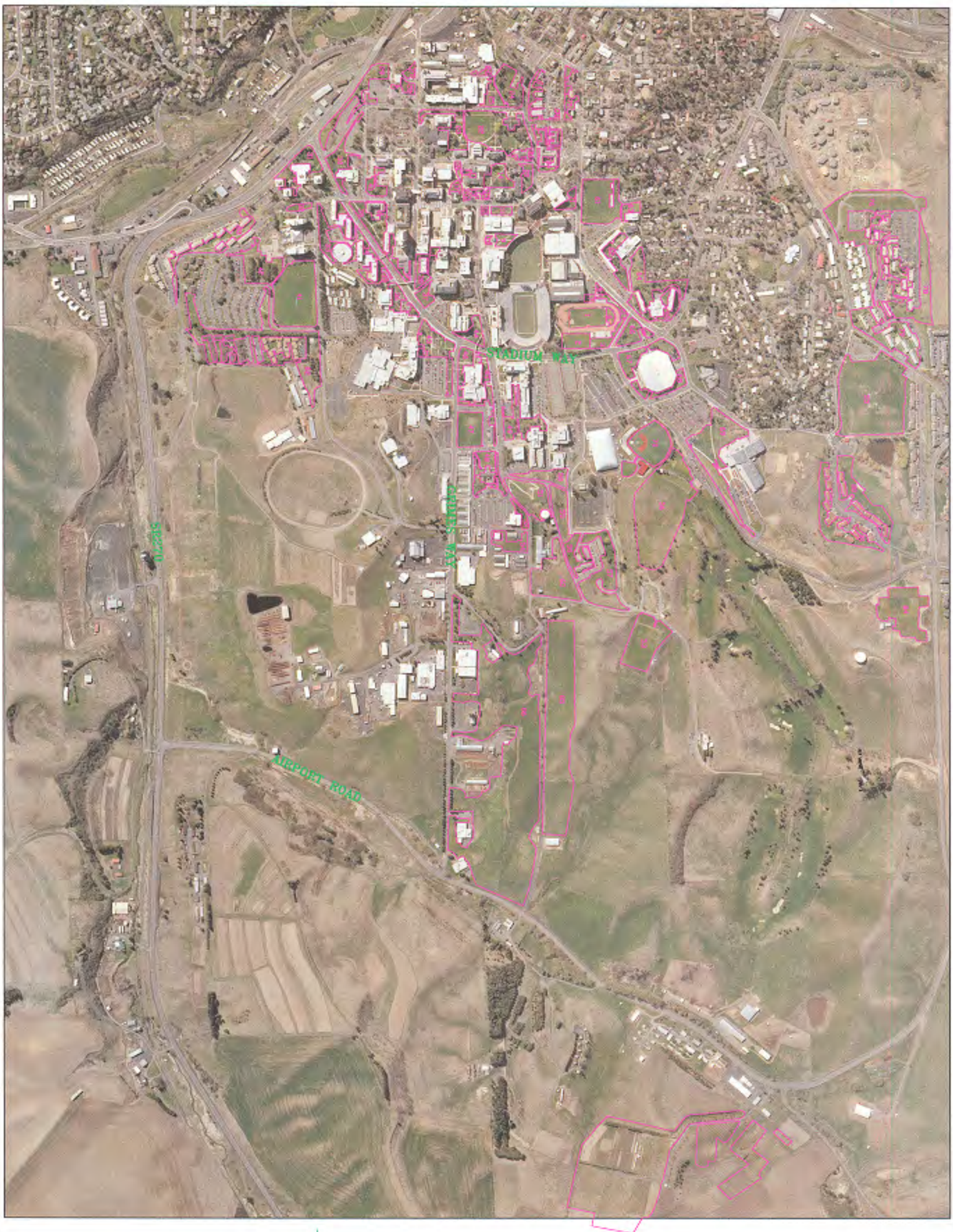
Printed Name: Sheryl A. Hanebrink
Notary Public in and for the state of Colorado
My appointment expires: 6/30/2013

APPENDIX B:

- Item 1 – WSU Aerial Image and Irrigated Acres Calculation
- Item 2 – Water Leak Repair History
- Item 3 - WSU Campus Wells Monthly and Annual Gallons Pumped

APPENDIX B

Item 1 – WSU Aerial Image & Irrigated Acres Calculation



NOTES:
NUMBERS CORRESPOND TO ATTACHED IRRIGATED ACRES CALCULATION SPREADSHEET.

N.T.S.

NORTH

2008 WATER SYSTEM PLAN UPDATE

IRRIGATED ACRES

WASHINGTON STATE UNIVERSITY
Department of Facilities Operations
Main Office
509-335-9003
Pullman, Wa. 99164-1150
FAX 509-335-9070

DRAWN BY: AJT
CHECKED BY: CRG
DATE: 01/18/08
LOG NO. 0

EXHIBIT B-1

WSU
Irrigated Area Calculation
6/30/2015
Appendix B-1
Area # corresponds to area on map.

AREA	SQ. IN.	SQ. FT.	ACRES
1	9,513,165.31	66,063.65	1.5
2	5,674,966.26	39,409.49	0.9
3	2,846,327.32	19,766.16	0.5
4	1,698,193.93	11,793.01	0.3
5	2,127,831.12	14,776.61	0.3
6	1,669,226.73	11,591.85	0.3
7	1,075,452.32	7,468.42	0.2
8	962,699.27	6,685.41	0.2
9	2,749,636.02	19,094.69	0.4
10	677,791.09	4,706.88	0.1
11	2,347,428.96	16,301.59	0.4
12	883,534.49	6,135.66	0.1
13	840,647.27	5,837.83	0.1
14	6,877,170.46	47,758.13	1.1
15	1,044,797.56	7,255.54	0.2
16	754,190.11	5,237.43	0.1
17	1,543,652.96	10,719.81	0.2
18	1,396,494.02	9,697.88	0.2
19	932,864.51	6,478.23	0.1
20	3,551,632.91	24,664.12	0.6
21	910,981.74	6,326.26	0.1
22	28,177,122.92	195,674.46	4.5
23	10,254,339.49	71,210.69	1.6
24	11,077,345.12	76,926.01	1.8
25	5,114,550.13	35,517.71	0.8
26	1,519,790.43	10,554.10	0.2
27	1,605,614.91	11,150.10	0.3
28	2,432,027.27	16,889.08	0.4
29	13,982,162.27	97,098.35	2.2
30	9,036,575.23	62,753.99	1.4
31	10,532,988.17	73,145.75	1.7
32	1,993,788.40	13,845.75	0.3
33	10,696,089.25	74,278.40	1.7
34	4,911,423.83	34,107.11	0.8
35	4,243,428.67	29,468.25	0.7
36	5,653,018.59	39,257.07	0.9
37	3,446,247.11	23,932.27	0.5
38	5,218,043.23	36,236.41	0.8
39	14,627,613.81	101,580.65	2.3
40	4,528,385.67	31,447.12	0.7
41	36,055,158.47	250,383.04	5.7
42	16,223,786.44	112,665.18	2.6
43	14,322,545.79	99,462.12	2.3
44	5,824,750.80	40,449.66	0.9
45	6,878,384.11	47,766.56	1.1

46	6,380,899.16	44,311.80	1.0
48	10,354,235.20	71,904.41	1.7
49	11,846,879.31	82,270.00	1.9
50	7,530,208.95	52,293.12	1.2
51	15,251,214.06	105,911.21	2.4
52	2,497,302.89	17,342.38	0.4
53	22,400,927.28	155,562.00	3.6
54	6,215,014.69	43,159.82	1.0
56	61,715,746.62	428,581.57	9.8
57	23,055,179.73	160,105.41	3.7
58	7,261,444.14	50,426.70	1.2
59	10,017,998.51	69,569.43	1.6
60	23,438,060.65	162,764.31	3.7
61	21,758,596.39	151,101.36	3.5
62	8,184,770.21	56,838.68	1.3
63	2,945,359.84	20,453.89	0.5
64	14,896,301.75	103,446.54	2.4
65	8,058,307.49	55,960.47	1.3
66	6,716,217.24	46,640.40	1.1
67	10,628,846.59	73,811.43	1.7
68	5,624,567.67	39,059.50	0.9
69	31,200,880.02	216,672.78	5.0
70	19,962,390.76	138,627.71	3.2
71	3,087,082.23	21,438.07	0.5
72	3,097,810.85	21,512.58	0.5
73	2,811,675.61	19,525.53	0.4
74	5,039,946.67	34,999.63	0.8
75	4,238,304.51	29,432.67	0.7
76	43,348,229.00	301,029.37	6.9
77	11,202,580.00	77,795.69	1.8
78	21,035,519.00	146,079.99	3.4
79	23,210,584.00	161,184.61	3.7
80	17,435,906.00	121,082.68	2.8
81	17,213,107.00	119,535.47	2.7
82	47,455,657.00	329,553.17	7.6
83	12,917,759.00	89,706.66	2.1
84	24,826,444.00	172,405.86	4.0
85	79,566,827.00	552,547.41	12.7
86	211,047,744.00	1,465,609.33	33.6
TOTAL	**1,143,910,389**	**4,407,292**	**136.0**

not included
not included

Acres recently removed from Irrigation per Kappy Brun of WSU Facility Operations

OFF	20,030,338	139,100	(3.2)

Grand Total **136**

Green Numbers = Crop Areas

105 Used in Exhibit 2-6
per WSU Facilities Operations

ON	109,766,494	762,267	15.8

already in calculation

APPENDIX B

Item 2 – Water Leak Repair History

WATER LEAK REPAIR HISTORY

WSU Main Campus			
Water Leak Repair History			
DATE	LOCATION	DESCRIPTION	COMMENTS
2/19/2006	Gannon Hall	Replace 1 inch service valve	
12/31/2006	Greenhouse 114	2 - Repair bands on 2 inch main line	
12/5/2006	ARU Lama Pens	Repair band 3/4 inch service line	
11/29/2006	Fine Arts Building	Repair band 6 inch main	
11/7/2006	Hitchcock Barn	Replaced 200 ft of 1 inch service line	
11/2/2006	USDA - Albion Road	Repair band 3/4 inch service line	
10/23/2006	Stevens Hall	Replace section of 3/4 inch service line	
10/22/2006	Perham Hall	Repair band on 3 inch service line	
10/17/2006	Quad Services Road	Replaced 1 inch valve	
10/5/2006	Round Top Drive	Repair 3/4 inch valve	
9/5/2006	Bryan Hall	Repair band on 3/4 inch service	
9/1/2006	Cattle Feeding Lab	Replaced 3/4 inch service line	
8/15/2006	Animal Sciences/Wagu Barn	Replaced 150 ft of 3/4 inch service line	
8/14/2006	Stevens Hall	Replace section of 3/4 inch service	
8/12/2006	Veteran's Way	Replaced short section of 6 inch main	
8/10/2006	Stimson Hall	Replaced 3 inch valve	
7/31/2006	Animal sciences Road	Abandoned 1500 ft of 3/4 inch line	
7/25/2006	Greenhouse 114	Repair band 3/4 inch line	
7/25/2006	Whitlow House	Abandoned 3/4 service line to main	
7/10/2006	Old Incinerator	Abandoned and cap 1 inch service line	
7/5/2006	Swine Center	Repair band on 3/4 service	
6/30/2006	Ensminger Beef Center	Replaced section of 1 inch service line	
6/28/2006	Grimes Way lift station	Replaced 40 ft of 1 inch service line	
6/21/2006	Greenhouse 114	replaced 3/4 inch pipe section and valve	
6/21/2006	Tukey Orchard	Replaced 600' of 4" mainline for irrigation	
6/12/2006	Swine Center	Replaced 75 ft of 2" with 4" service line	
5/24/2006	198 animal barn	Replaced 100 ft of 1 inch service line	
5/22/2006	Honors Hall	Replaced section and repair band 8 inch main	
5/19/2006	Daggy Hall	Replaced 2 inch service line	
5/16/2006	Farm Shop	Replaced 100 foot of 1 inch service line and valve	
5/8/2006	Knott Dairy	Replaced 1 inch hydrant and line	
5/3/2006	Beef Center	Repaired 3/4 inch service line	

WATER LEAK REPAIR HISTORY

3/24/2006	Carver Farm	Replaced 2- 1 inch service lines	
3/22/2006	Murrow Hall	Replaced 100 foot of 1 inch service line	
2/28/2006	198 animal barn	Repaired 1 inch service	
2/15/2006	198 animal barn	repair 1 inch service line	
2/6/2006	Johnson Hall	Cap and abandon 1 inch line	
1/26/2006	Archway	repair 2 inch irrigation main	
12/1/2005	141 Animal Barn	Capped 11/2 inch line to abandoned well	Estimated volume 5.5 million gallons/year
11/21/2005	Animal Sciences Road	replace section 1 inch line	
11/18/2005	Valley Road Restrooms	repair 2 inch service.	
11/14/2005	Stephan Center	repair 11/2 inch service.	
11/1/2005	Nuclear Reactor	repair band 1 inch line	
11/1/2005	Animal Sciences Road	shut down valve on 1 inch service.	Estimated volume 3 million gallons/year
10/27/2005	Beef Center	repair 1 inch service line	
10/19/2005	Vet Barns	Replace frost free hydrant	
10/17/2005	Vet Horse Pasture	Cut and cap 1 inch line	Estimated volume 3 million gallons/year
10/14/2005	Ad Annex	Replace water service building to valve	
10/12/2005	Wilson Road	Replace leaking hydrant	
10/3/2005	Carver Farm	replace section 1 inch line	
9/28/2005	Bohler Gym	Repair band 2 inch line	
9/20/2005	Stephenson Hall	Repair section 3/4 inch irrigation	
9/6/2005	Commons Hall	Repair band 1inch service and valve	
8/29/2005	Valley Road Playfield	Replace irrigation main	
8/25/2005	Stephan Center	replace section 1 inch line	
8/24/2005	Old Incinerator	Repair band 1 inch service	
8/22/2005	Martin Stadium	Repair band 1 inch service	
8/17/2005	Horticulture Greenhouse	Replaced 1 inch line main to building	
8/10/2005	Grimes Way	repair section 1 inch service	
8/4/2005	R/O Playfield	Repair 2 inch main to irrigation	
8/1/2005	Rotunda	Repair band 2 inch line	
7/27/2005	Smoot Hill	Replace 400 feet 1 inch and valves	
7/18/2005	Cleveland Hall	Repair irrigation 1 inch main	
7/18/2005	Cooper Publications	Replace 1 inch service line	
6/21/2005	199 Isolation Buildings	Replace entire 2 inch main andi inch services	
5/26/2005	Presidents Residence	Replaced 1 inch service line to house	
5/23/2005	Wilson Road	Repair band split 6 inch main	

WATER LEAK REPAIR HISTORY

5/10/2005	Gannon Hall	Replaced 2 inch valve	
5/4/2005	Grimes Way Greenhouse	Repaired 1 inch service	
4/26/2005	Knott Dairy	replace section 1 inch line	
4/7/2005	Old Hospital	Repair 1 inch irrigation service	
4/7/2005	Murrow Hall	Repair 1 inch stand pipe	
3/31/2005	Observatory	Repair frost free hydrant	
3/29/2005	141 Animal Barn	replace section 1 inch line	
3/21/2005	Nuclear Reactor	Repair band 1 inch line	
3/18/2005	Sheep Barn	Replace frost free hydrant	
3/12/2005	McCluskey	Expose hydrant - not shut off	
3/9/2005	Spokane Street	Repair section 6 inch main	
2/8/2005	Grounds Shop	Replace valve and section 1 inch pipe	
12/17/2004	French Ad	Repair 2 inch water service	
12/7/2004	Spokane Street	Cap and abandon 1 inch line	
11/18/2004	Clark Hall	Repaired pipe	
11/10/2004	LARC	Replace 1 inch service line	
11/9/2004	Knott Dairy	replace section 1 inch line	
10/29/2004	Ag Seed Plant	Replaced 1 inch service from main to building	
10/21/2004	Farm Shop	repair 1 inch service line	
10/14/2004	Olympia Avenue	repair leak	
9/30/2004	Rotunda	Replace section 3 inch service	
9/22/2004	Power Plant	Replace section 3/4 inch service	
8/9/2004	141 Animal Barn	Replaced 1 inch section and valve	
8/3/2004	Spillman Farm	Replaced 400 feet 1 inch service line	
7/12/2004	Beasley Coliseum	Replace section 1 inch irrigation main	
6/14/2004	Stephenson Hall	Repair band 2 inch main	
5/24/2004	Knott Dairy	Replace 2 inch main from pump to building	
5/10/2004	141 Animal Barn	Repair section 1 inch line	
4/21/2004	Ag Seedhouse	Repair section 1 inch line	
4/15/2004	Tukey Orchard	Replace frost free hydrant	
4/8/2004	198 Isolation Pens	Replace 500 feet of 1 inch service	
4/7/2004	Morrill Hall	Repair band 1 inch service	
3/30/2004	Cattle Feeding Lab	Repair band 2 inch service	
3/4/2004	Gannon Hall	Repair 2 inch service and valve	
2/25/2004	198 Isolation Pens	Replace 1 inch service line	

WATER LEAK REPAIR HISTORY

12/18/2003	Knott Dairy	Repair valve and 1 inch section of service	
12/9/2003	Heald Hall	Repair leak	
11/9/2003	Vet Animal Barn	Repair band 1 inch service	
11/13/2003	Cooper Publications	Replace 2 inch section of service	
10/13/2003	Fieldhouse	Replace section 1.5 inch service	
10/6/2003	Carpenter Hall	Replace section of 2inch pipe	
9/19/2003	141 Animal Barn	Repair band 1 inch service	
9/18/2003	Markley Services	Replace section 1 inch service	
9/17/2003	McEachran Hall	Replaced section 2 inch service	
8/13/2003	Vet Large Animal	Repair band 1 inch service	
8/4/2003	199 barns	Repair band 1 inch service	
7/15/2003	Markley Car Wash	Replace section 2" service	
6/17/2003	Food Service Building	Replaced section 2 inch service	
5/29/2003	198 Vet Large Animal Barn	Replaced section 1 inch pipe	
2/28/2003	197 USDA	Repair band 1 inch service	
12/17/2002	199 barns	Repair band 1 inch service	
10/24/2002	Botany	Replace section 1 inch pipe	
10/21/2002	Cattle Feeding Lab	Repair band 1 inch service	
10/16/2002	Campus	Replace leaking hydrant	
10/10/2002	Knott Dairy	Repair band 1 inch service	
10/7/2002	Botany	Repair band 1 inch service	
8/19/2002	Cleveland Hall	Repair 2 inch main	
8/13/2002	Observatory	Repair band 1 inch service	
7/17/2002	Botany	Repair band 1 inch service	
7/11/2002	Thatuna Street	Repair band 6 inch main	
6/25/2002	Golf Course	Replaced 1 inch service from main to building	
5/21/2002	141 Animal Barn	Repair band 2-1 inch service	
5/20/2002	141 Animal Barn	Repair 1 inch service line	
4/30/2002	Ensminger Beef Center	Repair section 1 inch line	
4/1/2002	Cattle Feeding Lab	Replaced 2 inch valve and pipe section	
3/29/2002	Cattle Feeding Lab	Repair band 2 inch service	
3/27/2002	Cattle Feeding Lab	Repair band 1 inch service	
3/22/2002	Cattle Feeding Lab	Repair band 1 inch service	

APPENDIX B

Item 3 – WSU Campus Wells Monthly and Annual Gallons Pumped

Campus Wells Monthly Gallons Pumped (MGP)

1988 Datum

Pum

MO/ YEAR	WELL #1	WELL #2	WELL #3	WELL #4	WELL #5	WELL #6	WELL #7	Well #8	Total Month Use	Cumulative Calendar Year Total
Jan-07	0	0	0	0	0	0	25,510,000	1,925,427	27,435,427	27,435,427
Feb-07	0	0	0	0	0	0	25,214,000	1,886,311	27,100,311	54,535,738
Mar-07	0	0	0	0	0	769,000	25,101,200	612,000	26,482,200	81,017,938
Apr-07	0	0	0	0	0	0	24,162,000	4,962,000	29,124,000	110,141,938
May-07	0	0	0	0	0	0	17,713,000	17,931,000	35,644,000	145,785,938
Jun-07	0	0	0	0	0	0	21,874,666	25,098,333	46,972,999	192,758,937
Jul-07	0	0	0	0	0	0	31,511,400	40,477,667	71,989,067	264,748,004
Aug-07	0	0	0	1,846,000	0	1,001,000	26,008,000	52,650,000	81,505,000	346,253,004
Sep-07	0	0	0	18,673,000	0	186,999	11,041,334	42,258,000	72,159,333	418,412,337
Oct-07	0	0	0	0	0	0	18,706,167	17,149,000	35,855,167	454,267,504
Nov-07	0	0	0	316,000	0	118,000	15,134,001	10,200,000	25,768,001	480,035,505
Dec-07	0	0	0	325,000	0	143,000	13,493,999	8,980,000	22,941,999	502,977,504
Jan-08	0	0	0	9,000	0	198,000	16,203,000	10,000,001	26,410,001	26,410,001
Feb-08	0	0	0	0	0	0	11,190,000	15,956,001	27,146,001	53,556,002
Mar-08	0	0	0	248,000	0	242,000	15,432,000	10,600,000	26,522,000	80,078,002
Apr-08	0	0	0	294,000	0	303,000	18,173,003	11,619,998	30,390,001	110,468,003
May-08	0	0	0	257,998	0	280,000	17,486,497	24,469,999	42,494,494	152,962,497
Jun-08	0	0	0	3,000	0	2,000	19,253,750	25,865,001	45,123,751	198,086,248
Jul-08	0	0	0	332,000	0	13,877,000	38,720,750	28,135,000	81,064,750	279,150,998
Aug-08	0	0	0	0	0	10,201,000	43,104,001	21,730,000	75,035,001	354,185,999
Sep-08	0	0	0	203,000	0	0	26,880,999	34,449,000	61,532,999	415,718,998
Oct-08	0	0	0	308,000		290,100	18,618,001	16,412,500	35,628,601	451,347,599
Nov-08	0	0	0	0		120,000	15,128,998	10,356,000	25,604,998	476,952,597
Dec-08	0	0	0	558,000		176,000	12,502,001	10,824,000	24,060,001	501,012,598
Jan-09	0	0	0	727,000		1,390,000	13,813,000	10,040,000	25,970,000	25,970,000
Feb-09	0	0	0	70,000		8,483,000	14,936,001	0	23,489,001	49,459,001
Mar-09	0	0	0	942,000		9,360,000	15,246,000	0	25,548,000	75,007,001
Apr-09	0	0	0	1,321,000		10,568,000	17,864,000	0	29,753,000	104,760,001
May-09	0	0	0	430,000		12,154,000	13,769,000	0	26,353,000	131,113,001
Jun-09	0	0	0	0		0	15,333,000	31,230,000	46,563,000	177,676,001
Jul-09	0	0	0	214,000		3,276,000	25,887,000	42,509,999	71,886,999	249,563,000
Aug-09	0	0	0	0		0	28,651,998	49,840,000	78,491,998	328,054,998
Sep-09	0	0	0	383,000	0	737,000	28,030,000	36,130,000	65,280,000	393,334,998
Oct-09	0	0	0	3,940,000	0	0	11,412,001	17,680,000	33,032,001	426,366,999
Nov-09	0	0	0	13,556,999	0	210,000	0	11,640,000	25,406,999	451,773,998
Dec-09	0	0	0	13,807,997	0	1,276,000	0	12,110,000	27,193,997	478,967,995
Jan-10	0	0	0	11,093,997	0	329,000	0	11,399,999	22,822,996	22,822,996
Feb-10	0	0	0		0	887,000	3,787,005	14,120,000	18,794,005	41,617,001
Mar-10	0	0	0	459,000	0	333,000	16,554,003	16,410,002	33,756,005	75,373,006
Apr-10	0	0	0	0	0	0	16,862,001	16,459,999	33,322,000	108,695,006
May-10	0	0	0	70,000	0	147,000	11,233,000	14,669,999	26,119,999	134,815,005
Jun-10	0	0	0	458,000	0	511,000	14,502,000	18,900,000	34,371,000	169,186,005
Jul-10	0	0	0	309,000	0	1,016,000	22,856,000	40,450,000	64,631,000	233,817,005
Aug-10	0	0	0	407,000	0	0	31,899,000	50,579,998	82,885,998	316,703,003
Sep-10	0	0	0	740,000	0	1,039,000	22,901,997	23,120,000	47,800,997	364,504,000

Campus Wells Monthly Gallons Pumped (MGP)

1988 Datum

Pum

MO/ YEAR	WELL #1	WELL #2	WELL #3	WELL #4	WELL #5	WELL #6	WELL #7	Well #8	Total Month Use	Cumulative Calendar Year Total
Oct-10	0	0	0	198,000	0	762,000	18,349,001	12,960,000	32,269,001	396,773,001
Nov-10	0	0	0	0	0	0	13,655,004	14,010,002	27,665,006	424,438,007
Dec-10	0	0	0	0	0	0	10,945,998	15,030,002	25,976,000	450,414,007
Jan-11	0	0	0	1,152,000	0	1,036,000	11,360,999	15,859,999	29,408,998	29,408,998
Feb-11	0	0	0	0	0	0	11,419,000	12,970,000	24,389,000	53,797,998
Mar-11	0	0	0	302,000	0	239,000	12,181,002	14,210,001	26,932,003	80,730,001
Apr-11	0	0	0	389,000	0	188,000	11,696,005	16,579,999	28,853,004	109,583,005
May-11	0	0	0	597,000	0	990,000	8,935,001	18,819,999	29,342,000	138,925,005
Jun-11	0	0	0	144,000	0	470,000	10,357,001	25,610,003	36,581,004	175,506,009
Jul-11	0	0	0	119,000	0	280,000	16,880,002	40,400,000	57,679,002	233,185,011
Aug-11	0	0	0	0	0	111,000	29,681,998	56,599,999	86,392,997	319,578,008
Sep-11	0	0	0	198,000	0	612,000	27,270,998	38,600,001	66,680,999	386,259,007
Oct-11	0	0	0	419,000	0	50,000	13,632,003	16,299,998	30,401,001	416,660,008
Nov-11	0	0	0	232,000	0	0	12,102,999	12,900,002	25,235,001	441,895,009
Dec-11	0	0	0	0	0	0	10,907,000	12,999,999	23,906,999	465,802,008
Jan-12	0	0	0	118,000	0	0	12,229,001	13,800,000	26,147,001	26,147,001
Feb-12	0	0	0	0	0	0	11,004,998	16,299,998	27,304,996	53,451,997
Mar-12	0	0	0	176,000	0	0	12,958,000	13,599,999	26,733,999	80,185,996
Apr-12	0	0	0	0	0	0	14,871,000	15,600,000	30,471,000	110,656,996
May-12	0	0	0	165,000	0	167,000	10,180,999	18,900,000	29,412,999	140,069,995
Jun-12	0	0	0	504,000	0	4,741,000	13,370,002	18,600,002	37,215,004	177,284,999
Jul-12	0	0	0	332,000	0	2,399,004	24,004,999	39,200,001	65,936,004	243,221,003
Aug-12	0	0	0	0	0	253,000	28,096,000	54,100,000	82,449,000	325,670,003
Sep-12	0	0	0	2,269,000	0	537,000	21,808,031	36,300,000	60,914,031	386,584,034
Oct-12	0	0	0	129,000	0	739,000	16,248,997	18,700,001	35,816,998	422,401,032
Nov-12	0	0	0	0	0	9,891,001	13,668,999	0	23,560,000	445,961,032
Dec-12	0	0	0	0	0	7,840,940	15,663,999	0	23,504,939	469,465,971
Jan-13	0	0	0	1,308,000	0	176,995	14,901,000	11,400,000	27,785,995	27,785,995
Feb-13	0	0	0	0	0	0	10,691,000	13,700,000	24,391,000	52,176,995
Mar-13	0	0	0	299,000	0	206,000	11,069,999	14,400,000	25,974,999	78,151,994
Apr-13	0	0	0	151,000	0	179,000	12,846,000	14,800,000	27,976,000	106,127,994
May-13	0	0	0	266,000	0	1,488,000	10,149,001	21,100,000	33,003,001	139,130,995
Jun-13	0	0	0	0	0	935,000	14,629,000	27,400,000	42,964,000	182,094,995
Jul-13	0	0	0	0	0	0	24,535,000	52,600,000	77,135,000	259,229,995
Aug-13	0	0	0	430,000	0	5,173,000	29,254,000	41,300,000	76,157,000	335,386,995
Sep-13	0	0	0	0	0	1,057,000	19,534,001	25,300,000	45,891,001	381,277,996
Oct-13	0	0	0	2,570,000	0	39,000	15,299,000	13,900,000	31,808,000	413,085,996
Nov-13	0	0	0	352,000	0	136,000	12,163,999	12,800,000	25,451,999	438,537,995
Dec-13	0	0	0	0	0	0	8,666,001	14,300,000	22,966,001	461,503,996
Jan-14	0	0	0	0	0	0	10,875,000	13,300,000	24,175,000	24,175,000
Feb-14	0	0	0	0	0	6,645,000	11,889,000	5,300,000	23,837,000	48,012,000
Mar-14	0	0	0	0	0	268,000	11,844,000	13,700,000	25,812,000	73,824,000
Apr-14	0	0	0	0	0	0	13,227,000	13,900,000	27,127,000	100,951,000
May-14	0	0	0	0	0	0	12,958,000	22,600,000	35,558,000	136,509,000
Jun-14	0	0	0	0	0	0	16,370,000	30,600,000	46,970,000	183,479,000

			Campus Wells Monthly Gallons Pumped (MGP)							1988 Datum
										Pum
MO/										
YEAR	WELL #1	WELL #2	WELL #3	WELL #4	WELL #5	WELL #6	WELL #7	Well #8	Total Month Use	Cumulative Calendar Year Total
Jul-14	0	0	0	*513,000*	0	*3,116,000*	26,526,000	47,300,000	77,455,000	260,934,000
Aug-14	0	0	0	*100,000*	0	*0*	24,747,000	46,200,000	71,047,000	331,981,000
Sep-14	0	0	0	*82,000*	0	*22,000*	25,655,000	34,400,000	60,159,000	392,140,000
Oct-14	0	0	0	*2,260,000*	0	*222,000*	12,933,000	17,400,000	32,815,000	424,955,000
Nov-14	0	0	0	*325,000*	0	*16,000*	11,976,000	12,300,000	24,617,000	449,572,000
Dec-14	0	0	0	*2,401,000*	0	*125,000*	8,228,000	12,900,000	23,654,000	473,226,000

APPENDIX C:

- Item 1 – Anatek Certification
- Item 2 – WSU Well Logs
- Item 3 – Pump Curves for Transfer Station Pumps and Wells 6, 7 & 8
- Item 4 – Hydrant Test Reports
- Item 5 – Existing High and Low Zone Maps – Year 2015
- Item 6 - Water Modeling Results: Low Zone PHD Year 2015
- Item 7 - Water Modeling Results: Low Zone Fire Flow Year 2015; 2-, 3- & 4-Hour Fire Events
- Item 8 - Water Modeling Results: High Zone PHD Year 2015
- Item 9 - Water Modeling Results: High Zone Fire Flow Year 2015; 2-, 3- & 4-Hour Fire Events

APPENDIX C

Item 1 – Anatek Certification

Anatek Labs, Inc.

Statement of Qualifications

Introduction

Anatek Labs, Inc. is a full service environmental testing laboratory with offices in Moscow, ID and Spokane, WA. Anatek was founded in 1992 and has continued to grow since.

Anatek operates with a staff of 16 technical and administrative personnel. Anatek's facilities occupy 10,000 square feet of laboratory and administrative space, with designated areas for sample receiving, refrigerated sample storage, chemical storage, sample preparation and analysis. There is also designated space for container and bottle preparation and shipping.

All data is collected via a dedicated LIMS and backed up daily. The IT section maintains redundancy of servers to guarantee the safety of all stored data. Backup systems are maintained in the event of emergency.

Anatek's clients have included the US Army Corps of Engineers, Ft. Lewis, WA, Idaho Department of Environmental Quality and City of Spokane among others.

Analytical Laboratory Services

The analytical testing capabilities of Anatek include requirements mandated by federal, state and local regulatory agencies. Anatek uses analytical methods approved by the Federal Environmental Protection Agency (EPA), Idaho Department of Health, Florida Department of Environmental Protection, Washington Department of Environmental Quality, Montana Department of Health, Oregon Department of Environmental Quality, Indiana State Department of Health, Kentucky Department for Environmental Protection, Nevada Bureau of Health Protection, Arizona Department of Health Services, New Mexico Drinking Water Bureau, and EPA Region 8, including Wyoming. Anatek provides analytical testing services for underground storage tanks (UST), private and commercial wells, sludges and compost testing.

Sophisticated equipment is operated by experienced chemists and microbiologists. A carefully developed Quality Assurance (QA) plan has been developed to ensure data reliability. To this end procedures have been developed to ensure the highest quality data. All analytical techniques and data are reviewed on a regular basis to ensure quality. Quality control procedures are built into all analytical programs to further verify data. Computer hardware and software have been integrated with laboratory analytical instrumentation allowing the validation of instrument performance.

Summary of Professional and Support Personnel

Our team of professionals comes from a diverse background and a wide variety of disciplines. Anatek Labs currently employs 26 people across two laboratories.

13 Chemists
4 Lab Technicians
2 Quality Assurance Specialists
1 Systems Administrator
4 Administrative Specialists
2 Shipping and Receiving Specialists

Resumes of Key Personnel

Mike Pearson

Mike Pearson is the owner and Laboratory Director of Anatek Labs. He started the company in 1992. Mr. Pearson has years of experience working in environmental analytical laboratories with duties including laboratory set up, instrument acquisition, analytical method development and instrument maintenance and calibration. Mr. Pearson's background includes analysis of organic, inorganic, and pharmaceutical parameters using methods that comply with State and Federal regulations including CWA, SDWA, GLP, UST, RCRA, and NPDES requirements.

Mr. Pearson holds a B.S. in Engineering from the University of Idaho and has completed course work in chemistry at Washington State University.

John Coddington

John Coddington oversees the Moscow Facility. Mr. Coddington joined Anatek in 1999 as the Laboratory Manager. He holds a B.S. in chemistry from Oregon State University and a Ph. D. in Inorganic Chemistry from Washington State University. Mr. Coddingtons's background includes experience with analyses of drinking water, wastewater, and soils chemistry using EPA methods and Standard methods approved by state and federal agencies.

Todd Taruscio

Todd Taruscio acts as the Technical Director for Anatek Labs. Mr. Taruscio holds a BS in biochemistry from Washington State University in 1989 and a Ph.D. in Zoophysiology from WSU in 1994. Todd joined the Anatek Labs staff in 2006 from the Analytical Sciences Lab at the University of Idaho where he served as Organic Group Leader. He is responsible for technical leadership for both laboratory locations. Todd serves as internal and external technical support as well as researching new technologies for the company.

Kathy Sattler

Kathy Sattler oversees the Spokane Facility. Ms. Sattler joined Anatek in 1996 as the Microbiology Supervisor and is currently the Laboratory Manager. She has a B.S. in Microbiology with a minor in Chemistry from the University of Idaho. Ms. Sattler's background

includes experience with drinking water, wastewater, soils and microbiological analyses in accordance with EPA and Standard methods approved by state and federal agencies.

Erin Linskey

Erin Linskey has been with Anatek since 1998 as a Laboratory Technician. He is currently the Inorganic Supervisor. Mr. Linskey has a B.S. in Biology from the University of Idaho. Mr. Linskey's background includes experience with EPA and Standard methods for wet chemistry, metals and microbiology. He specializes in ICP-OES and ICP-MS analysis for the determination of inorganic compounds in drinking and wastewater, soils and solids.

Gene Solomon

Gene Solomon is Anatek's Quality Assurance Officer and came to Anatek after more than ten years as a software trainer and GMP validation consultant with Blue Mountain Quality Resources. He has also served as Quality Assurance Officer for an FDA GLP-compliant bio-analytical laboratory. In addition to his TNI, EPA, and FDA experience, he also has a background in software validation, calibration, and GLP and GMP compliance. Mr. Solomon maintains all performance testing records and all state certifications.

Professional Licensing and Certifications

Anatek maintains drinking water certification with eleven states and wastewater certification with four. Anatek also maintains certification in Washington, Nevada, and Arizona for soils and chemical materials.

Anatek is certified in the state of Florida and the state of Oregon through The NELAC Institute (TNI, formerly NELAP) for analysis of drinking water and non-potable water.

Drinking water and microbiological testing certification is maintained in Idaho. Drinking and wastewater certifications, as well, as microbiological testing are maintained in Washington.

Drinking water certification is maintained in Montana, Nevada, New Mexico, Arizona, Indiana, Kentucky, and EPA Region 8, including Wyoming. In addition, Anatek Labs is certified by the Environmental Protection Agency for analysis of drinking water under the UCMR2 program (Unregulated Contaminant Monitoring Regulation, Phase 2).

Quality Assurance Program

Anatek Labs, Inc. has integrated many Quality Assurance (QA) practices into its measurement activities. These QA practices are designed to generate high quality data in an efficient and cost effective manner. Anatek has a laboratory-wide Quality Assurance (QA) Program designed to assess and monitor the ongoing quality of the testing performed in its facilities. Its purpose is to identify and correct problems as they occur and, if possible, to determine in advance potential problem areas and institute measures for their resolution.

It is the policy of Anatek Labs that there shall be sufficient Quality Assurance activities conducted to ensure that all data generated and processed will be scientifically valid and of known and documented quality. All data generated, unless acknowledged and authorized by the submitting party, will be of known precision and accuracy and legally defensible. Quality Assurance activities are designed in the most cost-effective fashion possible without compromising data quality objectives. The laboratory staff adheres to the requirements and specifications of the laboratory Quality Assurance Plan. All data reported meets the applicable requirements for NELAC, EPA and/or any State specific methods used.

Anatek Moscow Equipment List

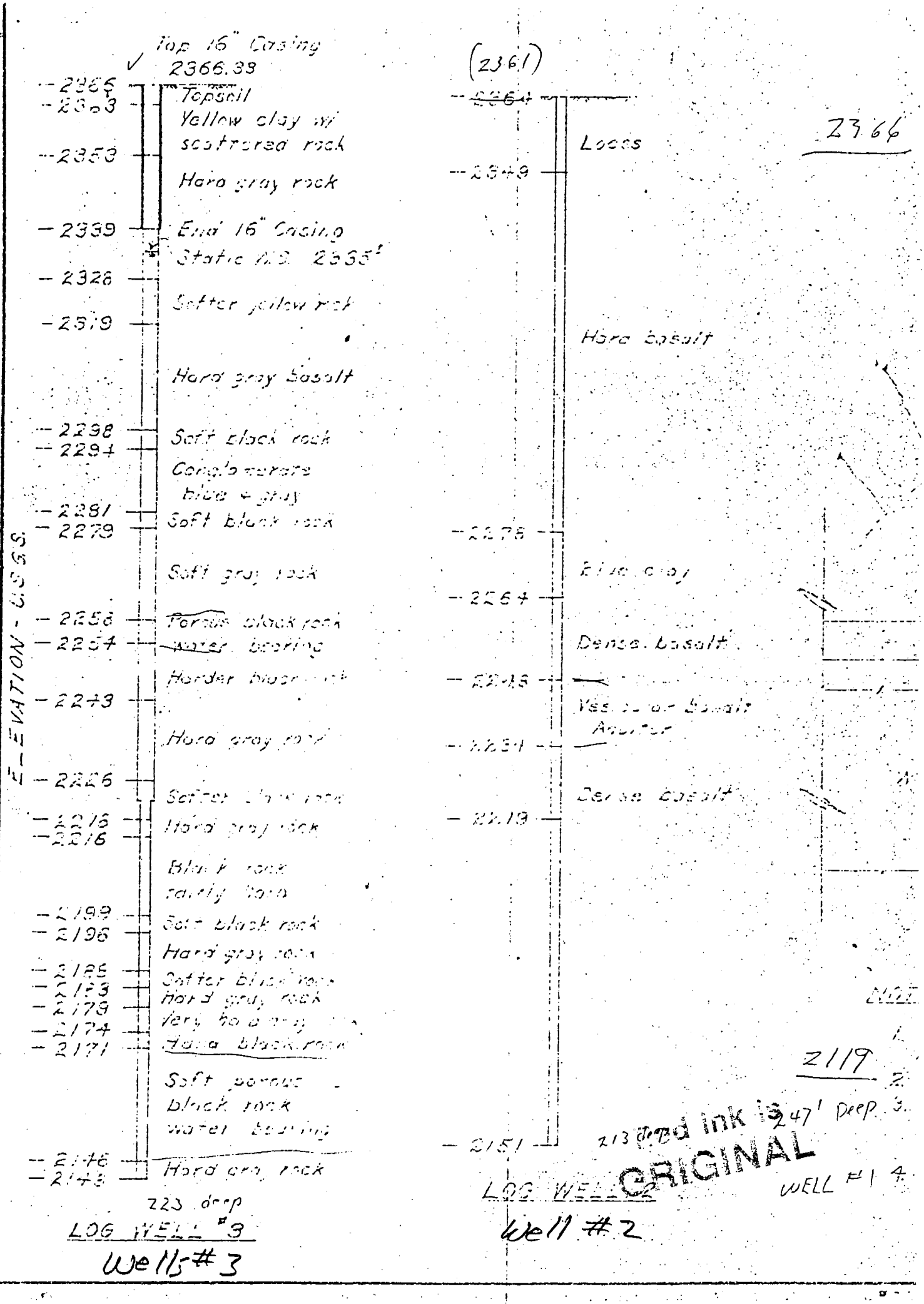
Type	*Description*	*Manufacturer*	*Model*
API-3000	TRIPLE QUAD MS/MS	PE SCIEX	API-3000
DISCRETE ANALYZER	Spectrophotometer	SYSSTEA	EASY CHEM PLUS
ECD1	GC SYSTEM	HP	HP6890
ECD2	GC SYSTEM	HP	HP6890
FIA	ANALYZER	OI ANALYTICAL	FS 3000
FID1	GC SYSTEM	HP	6890
FID2	GC SYSTEM	AGILENT	6890N
HPLC #2	PCX	PICKERING	PINNACLE PCX
	DIODE ARRAY DETECTOR	SHIMADZU	SPD M20A
	FLUORESCENCE DETECTOR	SHIMADZU	RF20A
ICP	ICP-OES	VARIAN	720-ES
ICP-MS	ICP-MS	AGILENT	G3155A
IC	COMPACT IC	METROHM	761
Mercury Analyzer	Hg Analyzer	CETAC	M8000
MSD2	MSD	AGILENT	5973N
	GC SYSTEM	AGILENT	6890N
OIL & GREASE	EXTRACTOR	HORIZON	3000
SATURN 2100	GC/MS	Varian	2100T
SEMIVOC	GC SYSTEM	AGILENT	6890
	MSD	AGILENT	5973N
VARIAN 1200	GC	VARIAN	CP-3800
	QUADRUPOLE MS/MS	VARIAN	1200
VARIAN 4000	MS/MS	VARIAN	4000
	GC SYSTEM	VARIAN	4000
VOC1	GC	Agilent	6890N
	MS	Agilent	5975

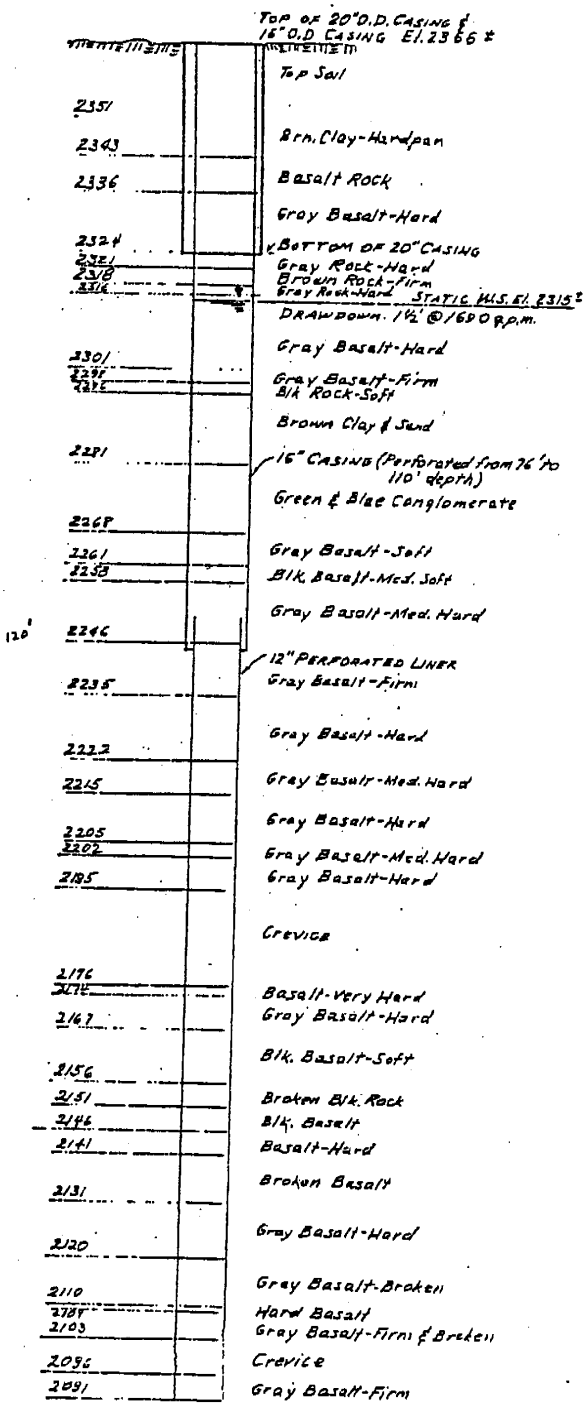
Anatek Labs Equipment List - Spokane

Type	Description	Manufacturer	Model
Autoclave		Market Forge Sterilmatic	STM-E
Balances	410g ± 0.01g	Denver Instruments	XS-410
	160g ± 0.0001g	Denver Instruments	AB-160
	400g ± 0.01g	Denver Instruments	APX-402
	120g ± 0.0001g	Sartorius	SP1245
	120g ± 0.0001g	Mettler Toledo	ML104
FIA	Analyzer	Lachet	QUIKCHEM 8500
	Autosampler	Lachet	ASX-520
	Auto Dilutor	Lachet	PDS-200
	Pump	Lachet	RP-150
	TKN Digestor Block	Lachet	BD-46
	Cyanide Distillation System	Lachet	65454
GC/ECD	GC	Hewlett Packard	5890 SERIES II
	Autosampler	Hewlett Packard	7673
GC/ECD	GC	Hewlett Packard	5890 SERIES II PLUS
	Autosampler	Hewlett Packard	7673
GC/FID	GC	Hewlett Packard	5890 SERIES II
	Autosampler	Hewlett Packard	6890
GC/FID	GC	Hewlett Packard	6890 SERIES II
	Autosampler	Hewlett Packard	6890
GC/MS	Purge and Trap	Encon	ENCON EV
	Autosampler	Centurion	CENT272011509
	GC	Hewlett Packard	5890 SERIES II PLUS
	MS		
GC/MS	Purge and Trap	TEKMAR	3000
	Autosampler	Varian Archon	
	GC	Hewlett Packard	5890 SERIES II PLUS
	MS		
GC/PID/FID	Concentrator Purge and Trap	Hewlett Packard	4430
	Lamp Power Supply	Hewlett Packard	
	Autosampler	TEKMAR	ALS 2016
		TEKMAR	LSC 2000
IC	Compact IC	Metrohm Peak	761
	Autosampler	Metrohm Peak	788
ICPMS	ICPMS	Agilent	7500cx
	Autosampler	Agilent	ASX-500
	Recirculating Pump	Agilent	6106T / G3292A
Spectrophotometer	Analyzer	HACH	DR/3000
TOC		DOHRMANN PHOENIX	8000
TOX	Analyzer	MITSUBISHI MCI MICROCOULOMETER	
	Sample Preparator		TOX-10-A
Turbidimeter		HACH	2100AN
		WTW	TURB355IR

APPENDIX C

Item 2 – WSU Well Logs


Top 16" Casing
2366.38
2365
2363
Topsoil
Yellow clay w/
scattered rock
2353
Hard gray rock
2339
End 16" Casing
Static W.S. 2335'
2328
Softer yellow rock
2319
Hard gray basalt
2298
2294
Soft black rock
Conglomerate
blue & gray
2281
2279
Soft black rock
Soft gray rock
2258
2254
Porous black rock
water bearing
Harder black rock
2243
Hard gray rock
2226
Softer black rock
2216
2216
Hard gray rock
Black rock
rarely hard
2199
2196
Soft black rock
Hard gray rock
2185
2183
2179
2174
2171
Softer black rock
Hard gray rock
very hard gray
Hard black rock
Soft porous
black rock
water bearing
2146
2143
Hard gray rock
ELEVATION - USGS
223 deep
LOG WELL #3
Well #3
(2361)
2364
Loess
2349
Hard basalt
2278
Fine clay
2264
Dense basalt
2245
Vesicular basalt
Aquifer
2234
Dense basalt
2213
2151
213 deep
LOG WELL #2
Well #2
2366
2119
Red ink is 247' Deep
ORIGINAL
WELL #1 4



LOG OF WELL No. 4

Completed 4-3-63 by
HOLMAN DRILLING CORP.

NOTE: Depths & classifications given by Driller.

Log Well # 4

DWN:	WASHINGTON STATE UNIVERSITY	SHEET OF
TR'D:	PULLMAN, WASHINGTON	DWG. NO. 3284
APP'D:	DEPT. OF BUILDINGS & GROUNDS	FILE NO. UC 128
DATE: 5-15-67		
SCALE:		

STATE OF WASHINGTO
DEPARTMENT OF CONSERVATION AND DEVELOPMENT Appli. #6064

Well #4

WELL LOG No. ...../.....

Date April 9, 1963

Record by Driller

Source Driller's Record

Location: State of WASHINGTON

County Whitman

Area

Map

¼ ¼ sec. 5 T. 14 N., R. 45 E. W.

Diagram of Section

Drilling Co. Holman Drilling Corporation

Address 3410 E. 9th, Spokane 31, Washington

Method of Drilling Date Nov. 29, 1962

Owner Washington State University

Address Pullman, Washington

Land surface, datum ft above / below

Correlation	Material	Thickness (feet)	Depth (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Top soil	15	15
	Brown clay	8	23
	Basalt, hard	45	68
	Brown sandy clay	17	85
	Green & blue, conglomerate	13	98
	Basalt, soft water bearing	10	108
	Basalt, medium hard	28	136
	Basalt, hard	63	199
	Basalt, soft	11	210
	Basalt, soft & fractured water bearing	10	220
	Basalt, medium hard fractured	15	235
	Basalt, hard very broken, water bearing	28	263
	Basalt, crevice, hard water bearing	7	270

Turn up

Sheet ..... of ..... sheets

APR 2 3 19[illegible]

PHYSICAL PLANT			
CC	RT	TO	INIT
		DIR	
		A DIR	
		ENGR	
		WMC	
		PWR PLT	
		M/C	
		ADM	
Comments			
Respond			
Your Info/File			
Note & Dist. File			
Control File			
Pers. File			

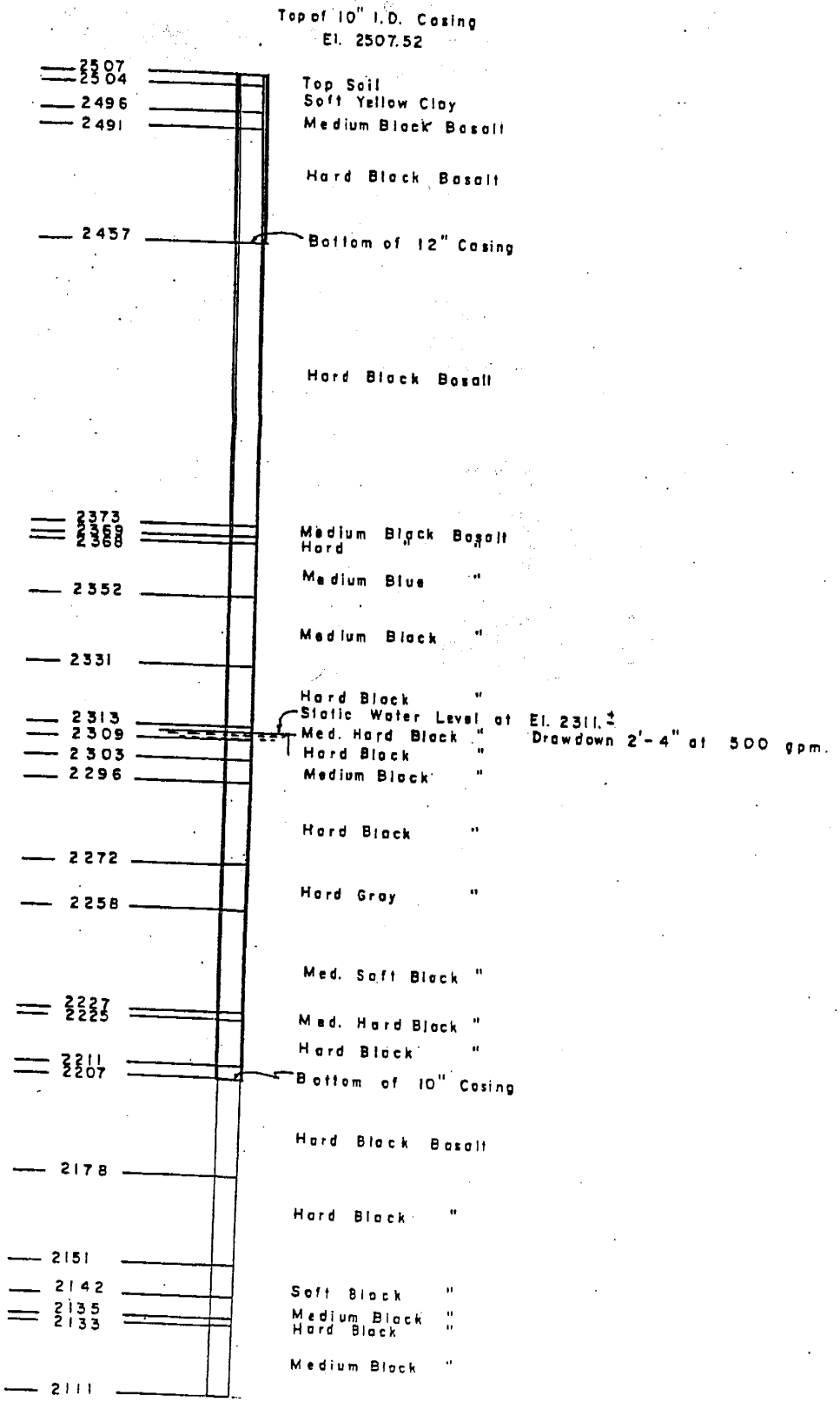
App 6405

WELL LOG.—Continued No. 1

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Depth forward	———	
	Basalt, hard	5	275
	Casing: 20 O.D. from 0 to 40'		
	16 O.D. from +2 to 121.5'		
	12 I.D. from 116 to 263'		
	Perforated from 65 to 102'		
	206 to 261'		
	SWL: 50.88' on 4-8-63		
	Yields 1750 gpm with 1.22' DD after 6 hours		
	Instantanous recovery		
	(April 8, 1963)		
	Pump: 175 hp, turbine		
	Pumped 1976 — ~~212 716 000~~ 279 725 000		

S. F. No. 7449—OS—6-61—2M.

LOG OF WELL NO. 5



(1) OWNER:
Name Washington State University
Address Pullman, Washington

(2) LOCATION OF WELL:
County Whitman Owner's Well No.
NE ¼ SW ¼ Section 36 T. 15 N. R. 45 E. W.M.
Bearing and distance from section or subdivision corner
500 feet north 50° west from southeast corner of NE1/4 SW 1/4 Sec. 36

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:
Threaded ☐ Welded ☐
12 " Diam. from +2 ft. to 50 ft. Gage Standard
10 " Diam. from +2 ft. to 300 ft. Gage Standard
" Diam. from ft. to ft. Gage

(7) PERFORATIONS:
Perforated? Yes ☒ No
Type of perforator used
Size of perforations in by in
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS:
Yes ☒ No
Manufacturer's Name
Type Model No.
Diam. Slot size From ft. To ft.
Diam. Slot size From ft. To ft.

(9) CONSTRUCTION:
Was well gravel packed? Yes ☒ No
Gravel placed from ft. to ft.
Was a surface seal provided? ☒ Yes ☐ No To what depth? 50 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 196 ft. 7 in. Above land surface Date 1-27-64
Artesian pressure lbs. per square inch Date
Water is controlled by (Cap, valve, etc.)

(11) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? Contractor
gal/min with 21 ft. drawdown after 2 hrs.
gal/min with ft. drawdown after hrs.
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Time Water Level Time Water Level
0 196' 7" 196' 11"
Date of test January 27, 1964
Bailer test gal/min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 55 Was a chemical analysis made? Yes ☐ No ☐

(12) WELL LOG:
Diameter of well 12 " x 10 in.
Depth drilled 396 ft. Depth of completed well 396 ft.
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Top Soil	0	3
Clay	3	11
Basalt Dark	11	139
Blue Clay	139	155
Basalt Dark	155	225
Lost Water at 180 ' hole sucking air		
Basalt Grey	225	249
Broken Basalt Dark	249	280
Basalt Dark	280	296
Dark Broken Basalt	296	360
Basalt Dark	360	365
Broken Basalt	365	372
Lost Cuttings 365 ' - 372 '		
Basalt Dark	372	396

Work started Sept. 16, 1963 Completed Jan. 4, 1964

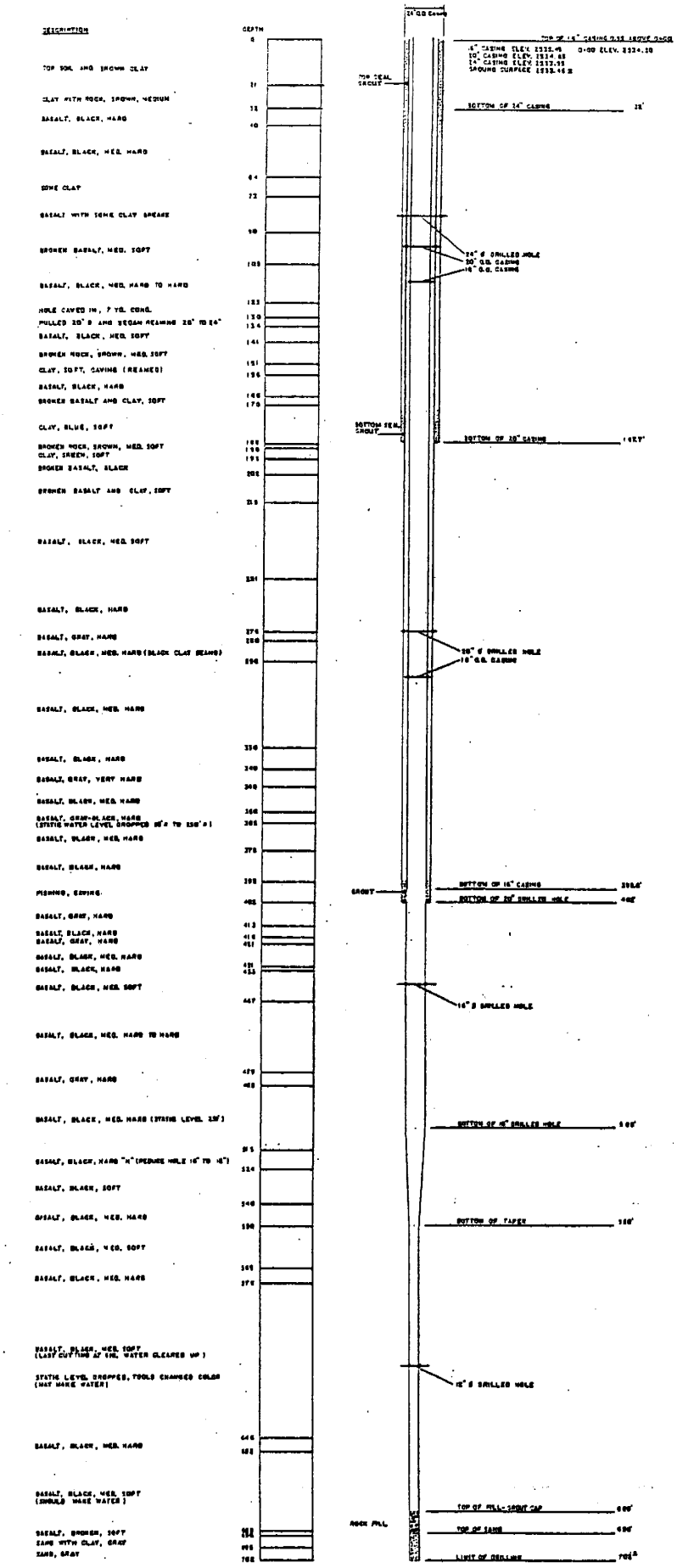
(13) PUMP:
Manufacturer's Name
Type HP

Well Driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Chas. Jungmann Drilling Co.
NAME By Chas. Jungmann Owner
(Person, firm, or corporation) (Type or print)
Address 115 East Ave. P. O. Box 423
Walla Walla, Washington
[Signed] Redink
223 dz 119160
License No. Contractor Date February 20, 1964

ORIGINAL

(USE ADDITIONAL SHEETS IF NECESSARY)

U. S. Reg. 1259—Rev. 1-62—4-62—5M 75168



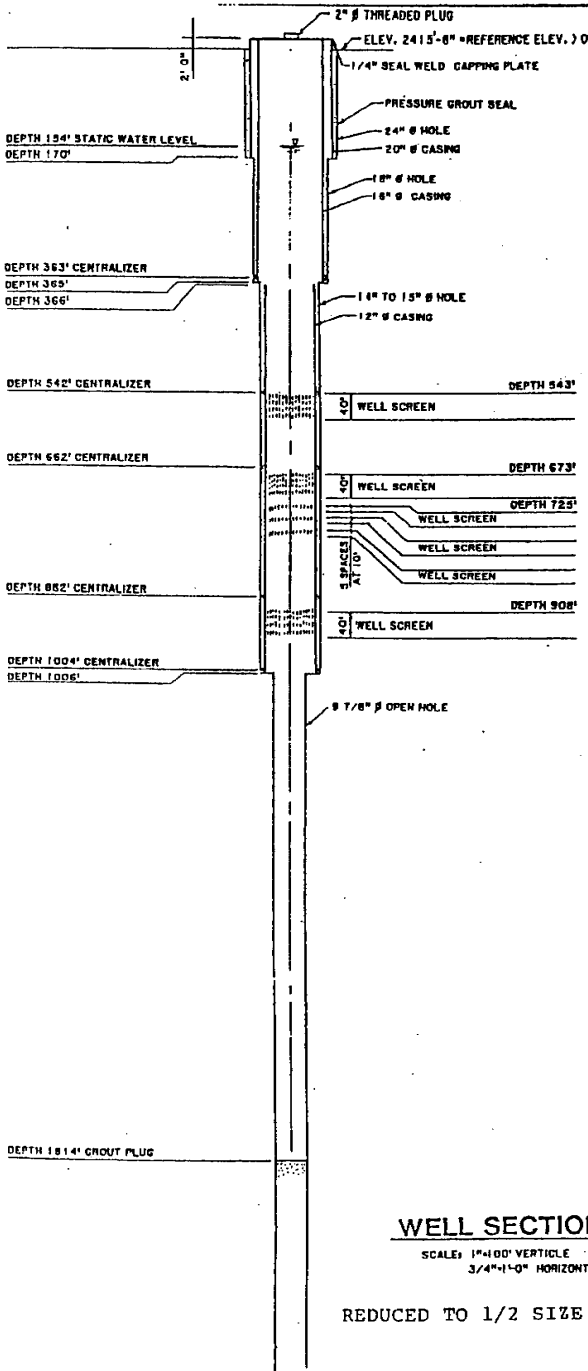
REDUCED TO 1/2 SIZE

W.S.U. PHYSICAL PLANT

VERTICAL SECTION WELL NO. 6

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON
DEPT. OF PHYSICAL PLANT

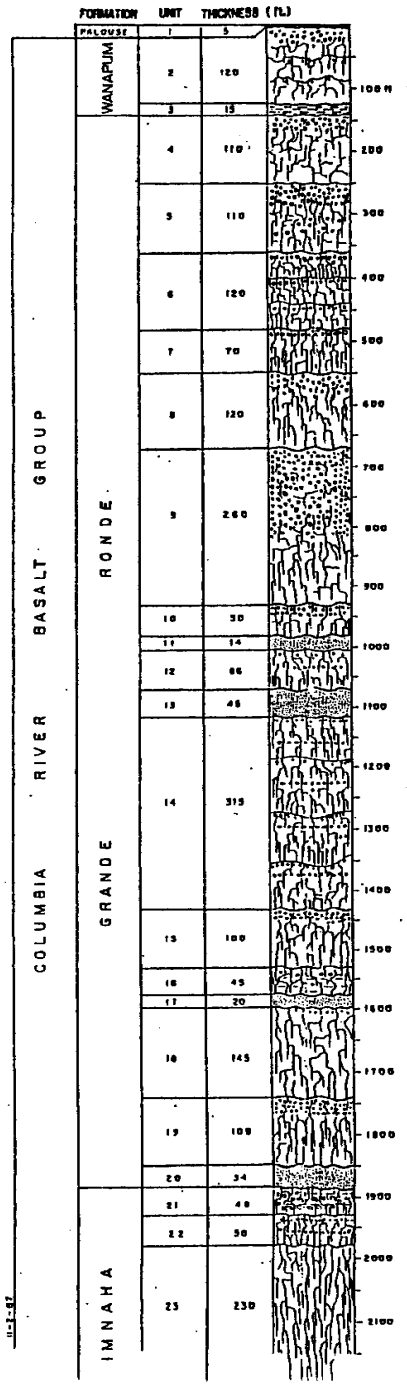
DRAWN
TRACED
CHECKED
APPROVED
DATE
SCALE
JOB NO.
DWG. NO.



WELL SECTION

SCALE: 1"=100' VERTICLE
3/4"=1'-0" HORIZONTAL

REDUCED TO 1/2 SIZE



LITHOGRAPHIC LOG W.S.U. WELL NO. 7

Unit No.	Description	Thickness (Ft)	Interval (Ft)
1	Palouse Formation Loess	5	0-5
	Columbia River Basalt Group Wanapum Formation Priest Rapids Member		
2	Basalt, medium light gray, coarse-grained, plagioclase and olivine micro phenocrysts, finely vesicular at top.	120	5-125
3	Claystone and siltstone, greyish yellow, arenaceous with angular quartz and feldspar, poor sample.	15	125-140
	Grande Ronde Formation		
4	Basalt, dark grey, fine-grained, aphyric, interpreted as one flow, sample recovery poor.	110	140-250
5	Basalt, medium gray, fine-grained, aphyric, highly iron stained, interpreted as one flow with 40 ft scoriaceous top, basal 70 ft vesicular in places.	110	250-360
6	Basalt, medium gray to brownish gray, fine-grained, one flow or one flow with three-flow units, interpreted from alternating three dense and non-dense zones visible on the geophysics logs.	120	360-480
7	Basalt, medium dark gray, fine-grained, aphyric, one flow.	70	480-550
8	Basalt, medium dark gray, fine-grained, aphyric, upper 30 ft scoriaceous, represents one distinct flow.	120	550-670
9	Basalt, dark gray, fine-grained, aphyric, upper 100 ft vesicular, with dark gray green clay, vesicle fillings, approximat 30 ft soft and glassy and may represent Topkes, sand/or near root material. Interpreted as thick flow with thick scoriaceous top containing near root fragments.	260	670-930
10	Basalt, sample not collected, neutron-neutron logs indicate this flow unit similar to overlying flow.	50	930-980
11	Sandstone, salt and pepper, medium-grained, angular quartz and basalt grains, minor metarcevite, considerable sample loss, thickness interpreted from natural gamma logs.	24	980-1004
12	Basalt, black, fine-grained, aphyric, vesicular in places.	66	1004-1070
13	Sand, yellowish-gray, coarse-grained, angular, weakly cemented, quartz and basalt grains.	45	1070-1115
14	Basalt, black, very-fine-grained, aphyric, pyrite in places, alternating dense and less dense zones, scoria zones in places, interpreted as several similar flows or flow units.	315	1115-1430
15	Basalt, dark-gray, fine-grained, aphyric, scoriaceous upper 20 ft.	100	1430-1530
16	Basalt, medium-gray, aphyric, vesicular with yellow-gray clay, vesicular in places, interpreted as weathered scoria.	45	1530-1575
17	Sand, light gray, coarse-grained, with metarcevite and basalt grains, poor sample.	20	1595-1595
18	Basalt, dark-gray, fine-grained, aphyric.	145	1595-1740
19	Basalt, greyish black, fine-grained, aphyric, interpreted as one flow from neutron-neutron log, with 25 ft scoriaceous top.	100	1740-1048
20	Sand, light gray, very coarse-grained, angular with minor amounts of feldspar, metarcevite and basalt grains.	24	1048-1082
21	Imnaha Formation Basalt, dark gray, minor plagioclase phenocrysts with clay, light gray, soft drilling, in places clay contains small vesicles, unit interpreted as weathered flow top, sample contain material from overlying interbed.	40	1082-1930
22	Basalt, dark gray, medium-grained, abundant plagioclase phenocrysts, alternating dense and less dense units, interpreted to be similar to underlying unit.	50	1930-1980
23	Basalt, dark gray, medium-grained, abundant plagioclase phenocrysts, neutron-neutron log indicates consistent density from 2005 to 2210 ft with less dense possible flow top from 1980 to 2210 ft.	230	1980-2210
24	Claystone, light greenish gray to yellowish gray, wood fragments.	15	2210-2225

* Lithology interpreted from a combination of geophysics logs, chip samples and drillers log by John Orth & Linda Hayden.

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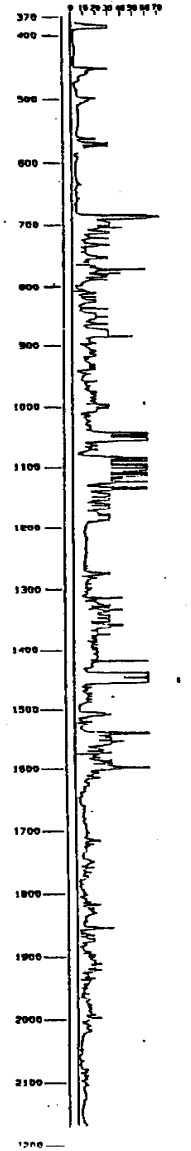
GEOLOGRAPH RECORD



DESIGNED BY: D.R.H. M.W.
DRAWN BY: M.W.
SCALE: AS NOTED
DATE: 11/11/87
FILE NO. 0939
SHEET PLATE 1 OF

WASHINGTON STATE UNIVERSITY
WATER WELL NO. 7
PLATE 1
WELL CONSTRUCTION, GEOLOGY
AND GEOLOGRAPH INFORMATION

Hart-Crowser CONSULTING ENGINEERS
SEATTLE, WASH. SPOKANE, WASH. LEWISTON, IDAHO

Well #8

Please print, sign and return to the Department of Ecology

138651

RECEIVED
SEP 22 2003
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

RECEIVED
SEP 17 2003
DRILLERS

Construction/Decommission

☑ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* WE00919

Current Notice of Intent No. WE00919

Unique Ecology Well ID Tag No. AHG660

Water Right Permit No. G3-22065C

Property Owner Name Washington State University

Well Street Address Wilson Road and Hog Lane

City Pullman County Whitman

Location NW 1/4-1/4 NW 1/4 Sec 4 Twn 14 R 45 EWM or WWM ☑ circle one

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____

Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

PROPOSED USE: ☐ Domestic ☐ Industrial ☑ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) campus well #8

☑ New well ☐ Reconditioned ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 16 inches, drilled 812 ft.
Depth of completed well 812 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 20" Diam. from 0 ft. to 66 ft.
☐ Liner installed 16" Diam. from 0 ft. to 812 ft.
☐ Threaded _____" Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☑ No
Type of perforator used _____
SIZE of perfs _____ in. by ___ in. and no. of perfs _____ from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No ☐ K-Pac Location _____
Manufacturer's Name See attached sheet for screen information
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☑ Yes ☐ No ☐ Size of gravel/sand pea gravel
Materials placed from 285 ft. to 750 ft.

Surface Seal: ☑ Yes ☐ No To what depth? 280 ft.
Material used in seal neat cement
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 333 ft. below top of well Date 3-31-03
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Layne of WA
Yield: 2500 gal./min. with 100 ft. drawdown after 12 hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
2000	436	2005	337	2010	337
2015	337	2020	337	2025	337

Date of test 9/15/03
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water 53° Was a chemical analysis made? ☑ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Tan clay	0	38
Clay with gravel	38	42
Brown clay	42	66
Black basalt	66	115
Grey basalt	115	223
Black basalt w/ green claystone	223	235
Green clay w/ green claystone	235	246
Broken black w/ green claystone	246	280
Black w/ grey basalt	280	345
Black w/ brown scoria	345	373
Black Basalt	373	455
Black w/ black scoria	455	465
Black Basalt	465	500
Black w/ brown scoria	500	514
Black basalt	514	528
Grey basalt	528	543
Black w/ brown scoria & green claystone	543	557
Grey basalt (hard)	557	578
Black w/ black scoria	578	595
Black basalt	595	642
Black basalt w/ green claystone minerals	642	686
Broken black basalt	686	691
Black basalt	691	719
Black w/ green claystone	719	754
Gravels and cobbles	754	758
Black basalt - fractured	758	759
Sand & gravels	759	762
Cemented gravels	762	801
Cemented gravels - tight	801	810
Cemented gravels	810	812

Start Date 2-26-03 Completed Date 7-03-03

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller/Engineer/Trainee Name (Print) Robert Stalker
Driller/Engineer/Trainee Signature _____
Driller or trainee License No. 1789

Drilling Company Geo-Tech Explorations, Inc.
Address 19700 S.W. Teton Ave.
City, State, Zip Tualatin, OR 97062
Contractor's Registration No. 100CZ Date 9/15/03

If TRAINEE,
Driller's Licensed No. _____
Driller's Signature _____

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Dep The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

138651

As Build for WSU # 8

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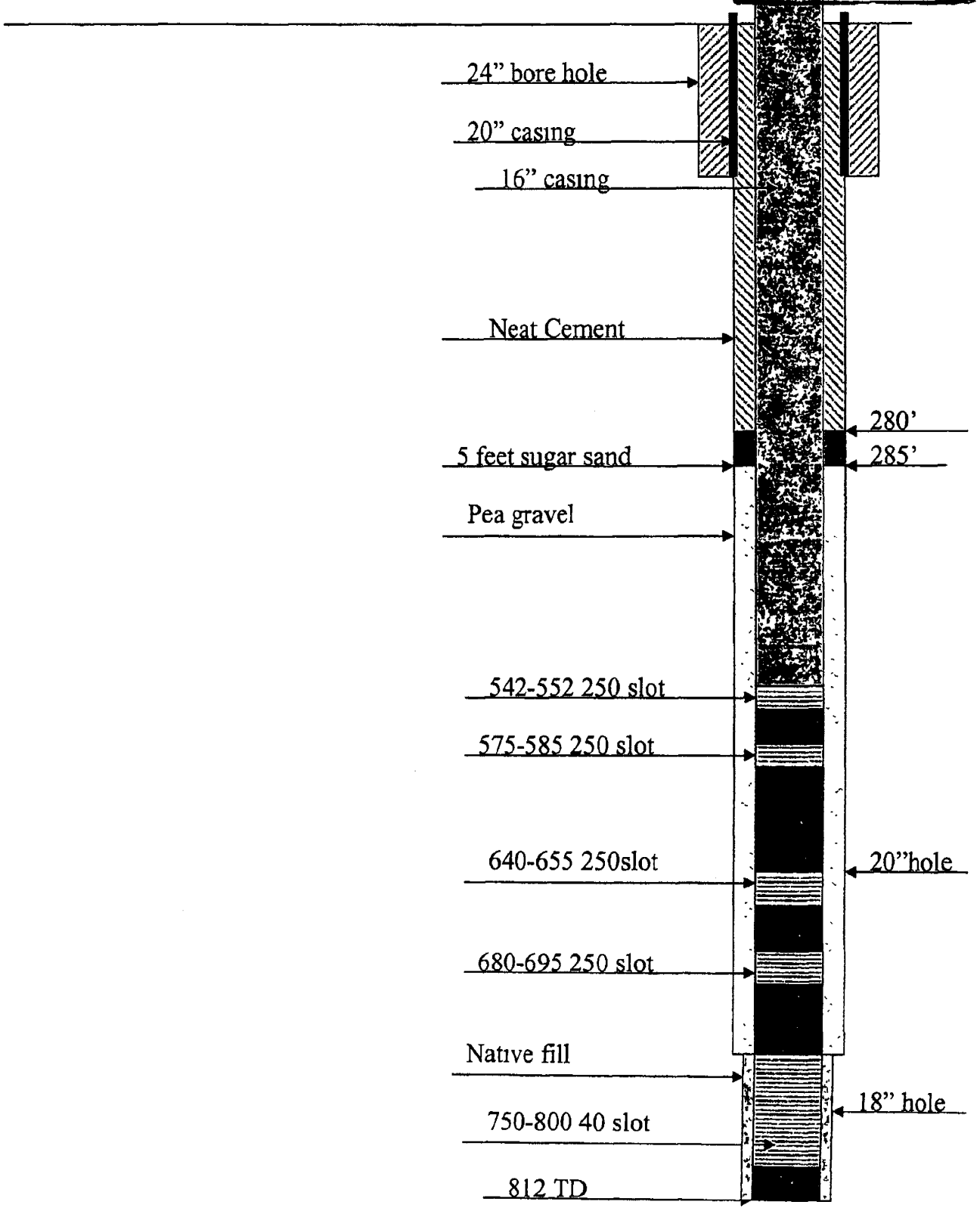
SEP 2 2 2003
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE



The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

138651

Screen Information for WSU Well #8

Screens X Yes __ No __ K-Pac Location _____
Manufacturer s Name __Johnson Screens
Type 304 Stainless Model No 304

Diam 16 Slot size 250 from 542 ft to 552 ft

Diam 16 Slot size 250 from 575 ft to 585 ft

Diam 16 Slot size 250 from 640 ft to 655 ft

Diam 16 Slot size 250 from 680 ft to 695 ft

Diam 16 Slot size 40 from 750 ft to 800 ft

Diam _____ Slot size ____ from ___ ft to ___ ft

RECEIVED
SEP 2 2 2003
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

APPENDIX C

Item 3 – Pump Curves for Transfer Station Pumps and Wells 6, 7 & 8

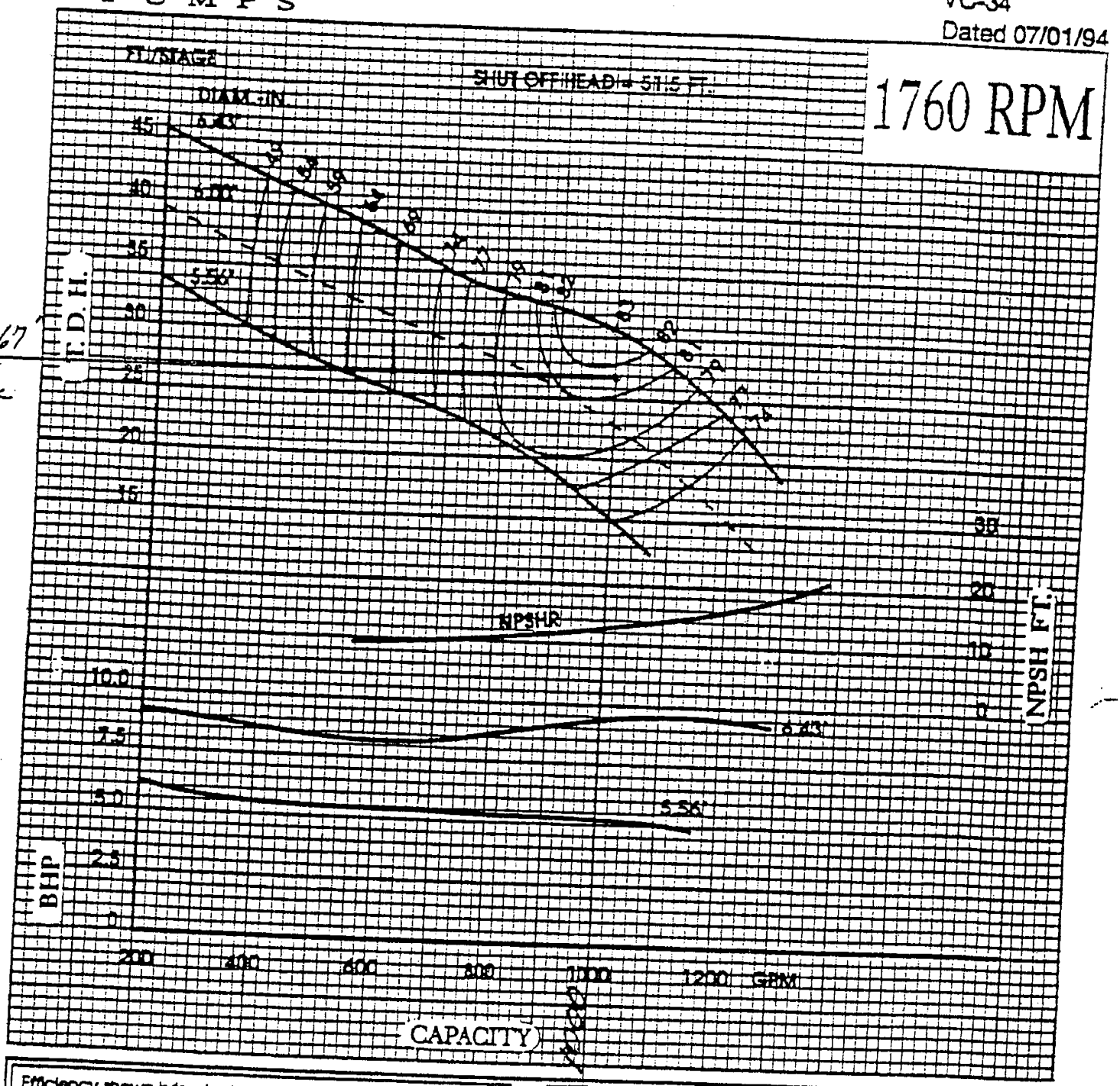
WSU Transfer Pumps Station

VERTICAL TURBINE PUMP

MODEL 10 D-110

WDM PUMPS

VC-34
Dated 07/01/94



Efficiency shown is for 4 stages or more, with standard materials. For fewer stages change efficiency as shown.

No. of stages.	Eff. change	No. of. stages.	Eff. change
1	- 6.0	4	———
2	- 1.5	5	———
3	- 0.5	6	———

TECHNICAL DATA	LBS.
Bowl wt. add'l stage (lbs.)	62
Rotor wt. per stage (lbs.)	17
Bowl wt. first stage (lbs.)	177
Thrust factor	9.9
Max bowl horsepower	140
Impeller eye area (sq. inch.)	22.5

CUSTOMER: WSU
SERVICE:
DATE:

FLUID: H2O
CAPACITY: 1000
T. D. H.: 80

SP. GR.: 1.0
VISC.:
NPSHA:

EFF.: 81
BHP: 24.94
NPSHR: 13

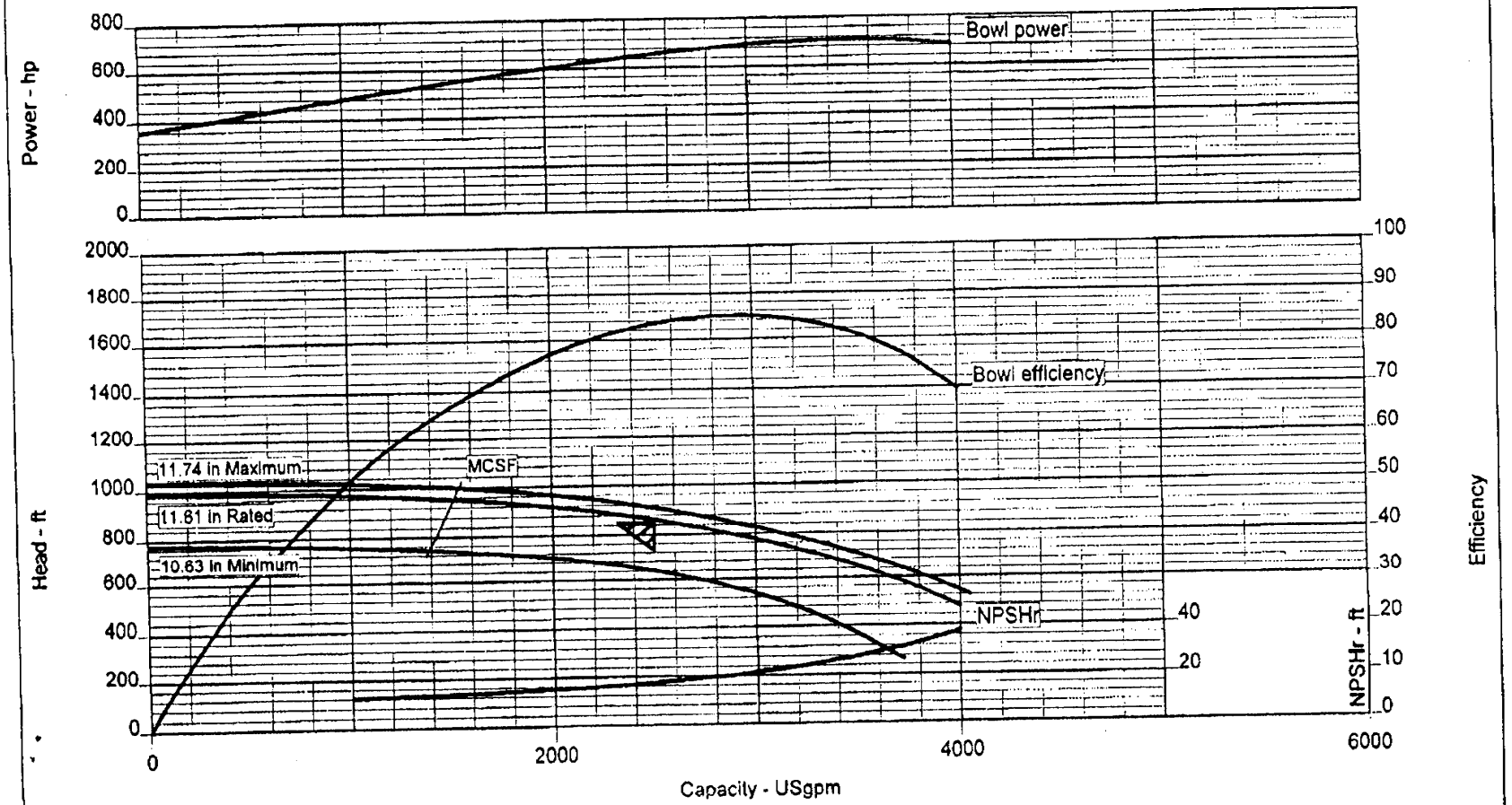
3 Stage 10 D 110 Product Lube

Well #8

Customer	:	FLOWSERVE Pump Division		Pump size & type	: 18EHM
Item number	: 00006			Based on curve no.	: EC-2392
Service	:			Number of stages	: 8
Vendor reference	: 9999-W0000	Capacity	: 2500.0 USgpm	Specific gravity	: 1.000
Date	: May 6, 2004	Head	: 850.00 ft	Pump speed	: 1775 rpm

CURVES ARE APPROXIMATE. PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS: CAPACITY, HEAD, AND EFFICIENCY.

Bowl performance shown below is corrected for materials, viscosity and construction.



Bowl head of 661.5 ft corresponds with 850.0 ft head at discharge flange adjusted for elevation and friction losses.

Windows Hydraulic Selection V3.00, Output Module V2.36

Customer :

DICKERSON PUMP IRRIGATION CO., INC.
3627 E. Broadway, Spokane WA 99220-2823
Bert Kalbeck
Phone : (509) 534.2671
Fax : (509) 534.2616

WSU Well #6

Contact :
Project :
Phone : Fax :
Quote No. : US-2223-2 Page No : 1 Date : Tuesday, November 21, 2000

Pump Model: Peerless Vertical - 14LD 6 Stages
Nom. Speed: 1770 RPM, 60 Hz Electric
Market : Vertical Turbine Pump
Impeller No.: 2634706 / HC
Material Spec. Group: A - B: CIE; I: Brz = Standard

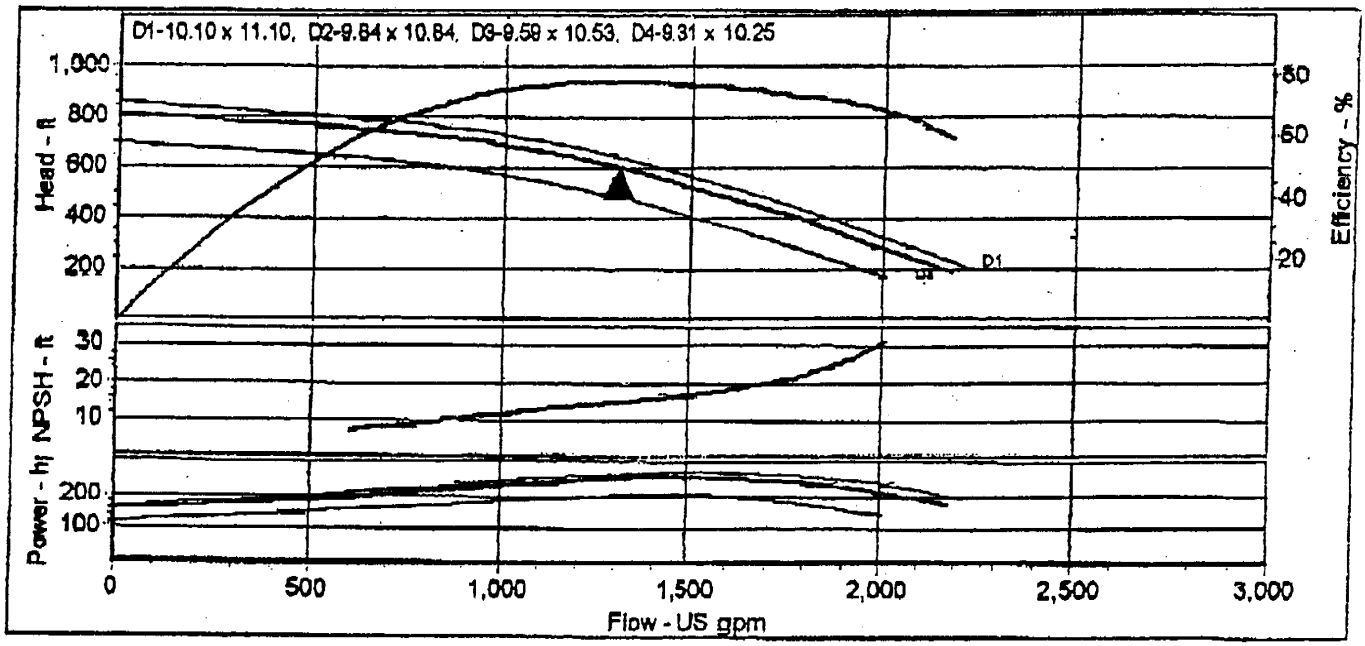
Item : 1
Your Ref. :

Fluid: Water
Viscosity: 0.988 cSt
Sp. Gravity: 0.998

Stage No.	Trim Status	Imp. Dia (inch) D2-in x D2-out
---	Full	---
---	Full	10.10 x 11.10
1 - 6	Trimmed P	9.95 x 10.96

Flow rate Q:	1300 US gpm
Discharge Head H:	900 ft
Efficiency	78.5 %
Power Required	250.86 hp
NPSH Required	16.032 ft

Performance curve according to BS5316 Class B No neg



Comments

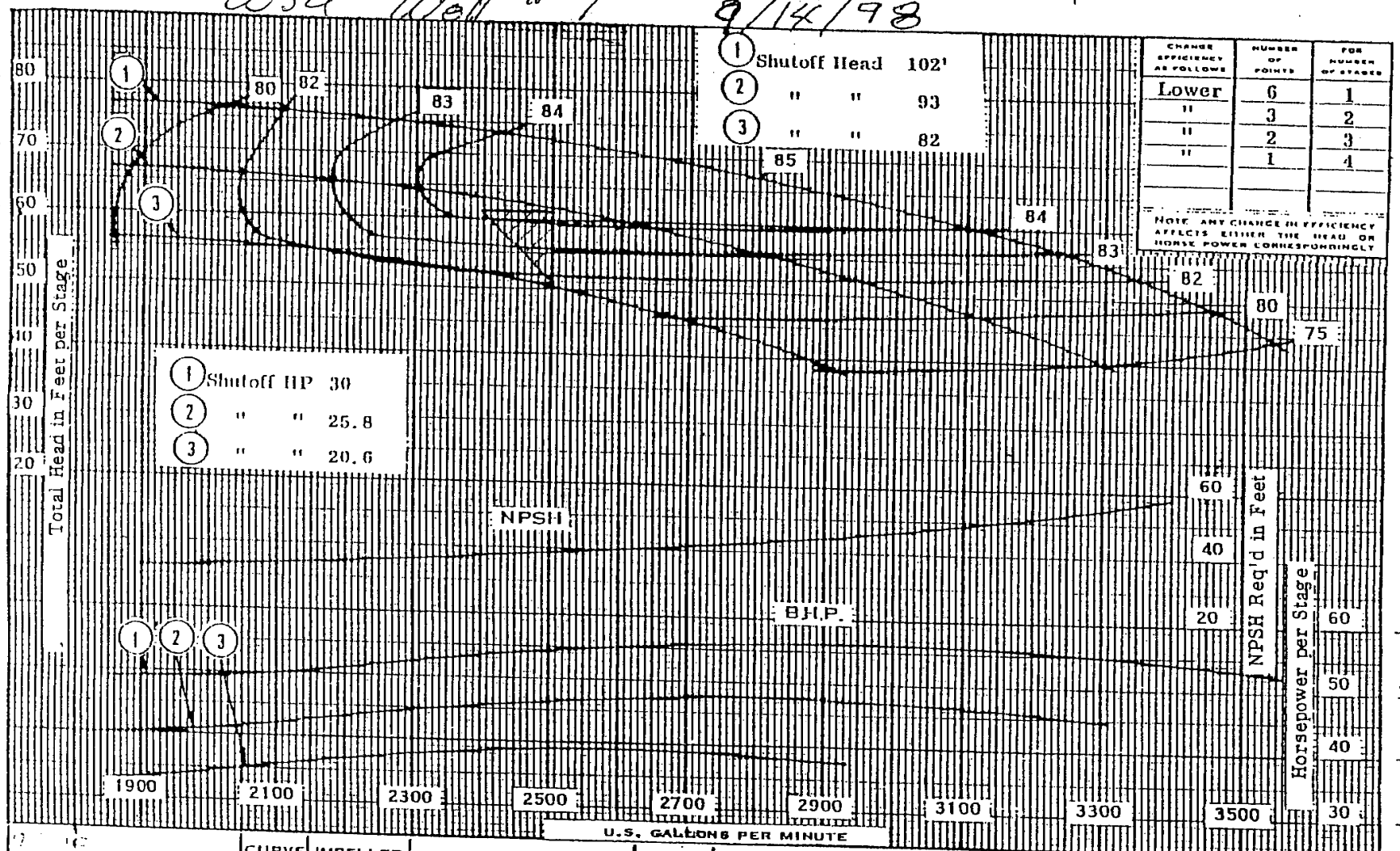
For a guaranteed condition point, pump must be selected with Hydraulic Institute-Peerless Std. See Standard Hydraulic Performance document in RAPID for testing tolerances & contractual guarantees. Applies to 8-20 inch models.

Flow (US gpm)	Head (ft)	Pump Efficiency (%)	Power Required (hp)	NPSH Required (ft)	Thrust (lb)
0.0	817.69	0.0	158.64		10629.14
272.7	789.40	31.7	171.55		9968.55
545.4	762.81	55.4	189.77		8439.72
818.1	725.10	70.4	212.70	9.80	7590.50
1090.7	665.10	77.4	236.80	12.89	6628.91
1363.4	577.01	78.4	253.53	15.63	6482.99
1636.1	463.78	75.9	252.44	18.79	4179.54
1908.8	334.37	71.3	226.17	26.22	2780.20
2181.5	189.08	59.9	173.99		1328.40

1005.1007.1008.

WSU Well #7 9/14/98

MAX OPER. DESIGN ?



HYDRAULIC PERFORMANCE WARRANTY	CURVE NO.	IMPELLER NO.	IMPELLER DIA.	TAKEN FROM
Guaranteed at designated point only, and contingent on:	1	V4400C-E	9 7/16" x 10 13/16"	27522
Proper flow to pump suction Proper submergence Fluid free of gas, air & abrasives Proper lateral setting of impeller	2	V4400C-E	9 7/16" x 10 7/16"	
	3	V4400C-E	8 11/16" x 10 7/16"	
	4			

Customer Dickerson Pump & Irrigation Co

Item W.S.U.

Peerless Ref. No:

Laboratory Performance BOWL V4404D-E

SIZE 14 HXB RPM 1760 CURVE 2840509

PUMP DESCRIPTION: Driver U.S. 450HP ; Head 12x12x20 ; Column 12 x 2 3/16"

GUARANTEED PERFORMANCE: BOWL ☑ FIELD ☐ Capacity 2500 gpm: Head 550 ft. Eff 84 %; BHP 413

APPENDIX C

Item 4 – Hydrant Test Reports

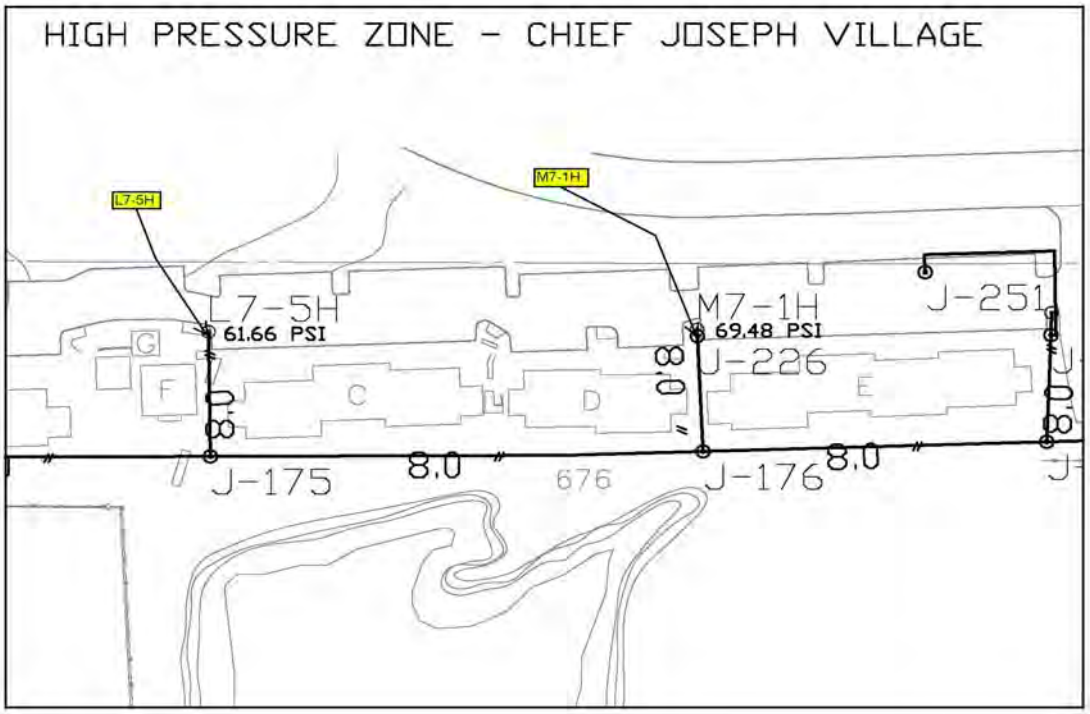
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: JANUARY 6, 2011

NOTE: WELL #7 WAS PUMPING DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	PRESSURE (PSI) FLOWING*	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
M7-1H	LOW	70	34	985	2959
L7-5H	LOW	66	25	845	1385

*-pitot pressure on flow measurement device (Hosemonstor)



Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 1/6/2011 Time: 11:45 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 18.12

Calculated Water Level: 2695.7

	Pressure Hydrant	Flow Hydrant
	L7-5H	M7-1H
Measured Static :* (psi)	66	70
Hydrant Elevation	2570	2553
Calculated Static (psi):	54	62
% Diff. from Measured:	-17.6%	-11.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	60	XXX
Pitot pressure (psig)	XXX	34
Flow (gpm) **	XXX	984.9
Flow @ 20 psi (gpm) ***	XXX	2959
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 1/6/2011 Time: 12:10 PM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 18.12

Calculated Water Level: 2695.7

	Pressure Hydrant	Flow Hydrant
	M7-1H	L7-5H
Measured Static :* (psi)	70	66
Hydrant Elevation	2553	2570
Calculated Static (psi):	62	54
% Diff. from Measured:	-11.8%	-17.6%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	50	XXX
Pitot pressure (psig)	XXX	25
Flow (gpm) **	XXX	844.6
Flow @ 20 psi (gpm) ***	XXX	1385
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

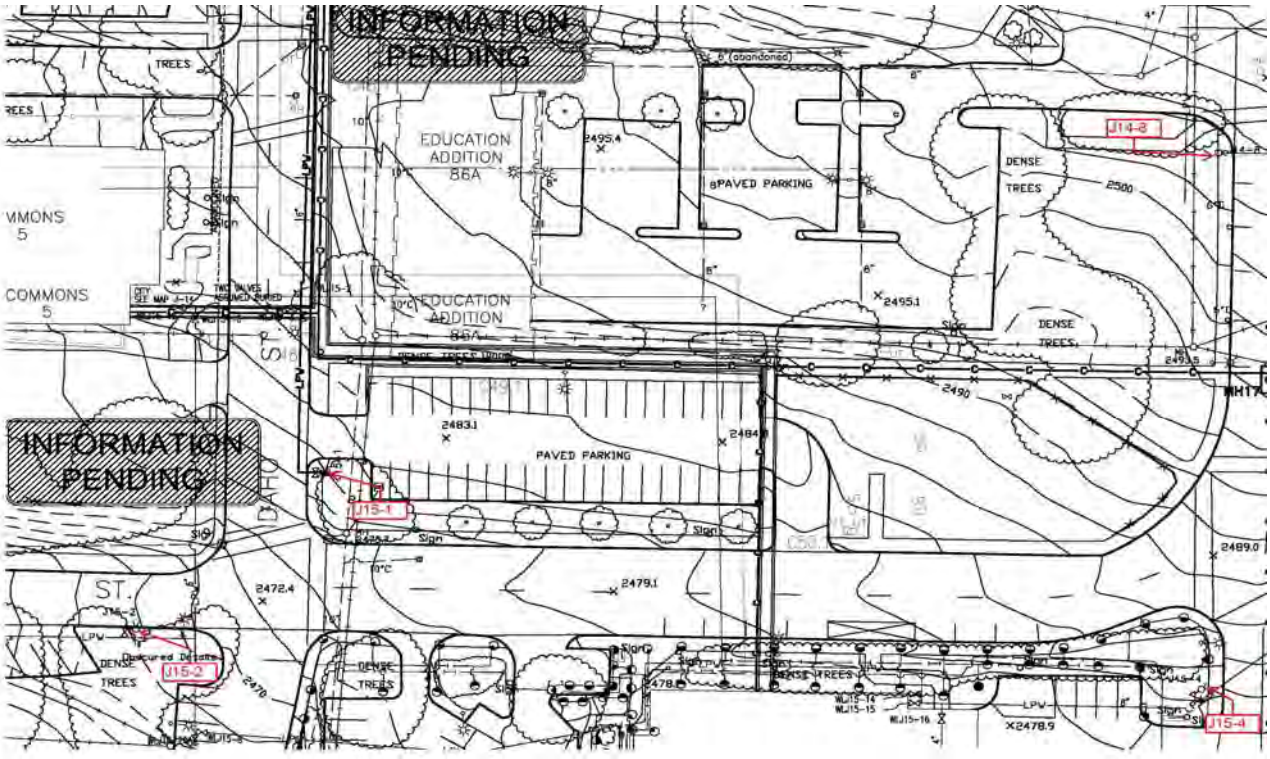
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: February 5, 2015

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
J14-8	LOW	64	894	2621
J15-4	LOW	74	925	2594
J15-1	LOW	74	792	1201
J15-2	LOW	80	1027	1601

HYDRANT TESTING LOCATIONS
5-Feb-15



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 2/5/2015 Time: 9:30 a.m.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17

Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	J14-8	J14-8
Measured Static :* (psi)	64	64
Hydrant Elevation	2504	2504
Calculated Static (psi):	63	63
% Diff. from Measured:	-2.2%	-2.2%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	28
Flow (gpm) **	XXX	893.8
Flow @ 20 psi (gpm) ***	XXX	2621
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 2/5/2015 Time: 9:45 a.m.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17

Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	J15-4	J15-4
Measured Static :* (psi)	74	74
Hydrant Elevation	2482	2482
Calculated Static (psi):	72	72
% Diff. from Measured:	-2.6%	-2.6%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	66	XXX
Pitot pressure (psig)	XXX	30
Flow (gpm) **	XXX	925.2
Flow @ 20 psi (gpm) ***	XXX	2594
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 2/5/2015 Time: 10.00 a.m.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17

Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	J15-1	J15-1
Measured Static :* (psi)	74	74
Hydrant Elevation	2480	2480
Calculated Static (psi):	73	73
% Diff. from Measured:	-1.4%	-1.4%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	49	XXX
Pitot pressure (psig)	XXX	22
Flow (gpm) **	XXX	792.3
Flow @ 20 psi (gpm) ***	XXX	1201
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 2/5/2015 Time: 10:15 a.m.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17

Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	J15-2	J15-2
Measured Static :* (psi)	70	80
Hydrant Elevation	2468	2468
Calculated Static (psi):	78	78
% Diff. from Measured:	11.7%	-2.3%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	48	XXX
Pitot pressure (psig)	XXX	37
Flow (gpm) **	XXX	1027
Flow @ 20 psi (gpm) ***	XXX	1601
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

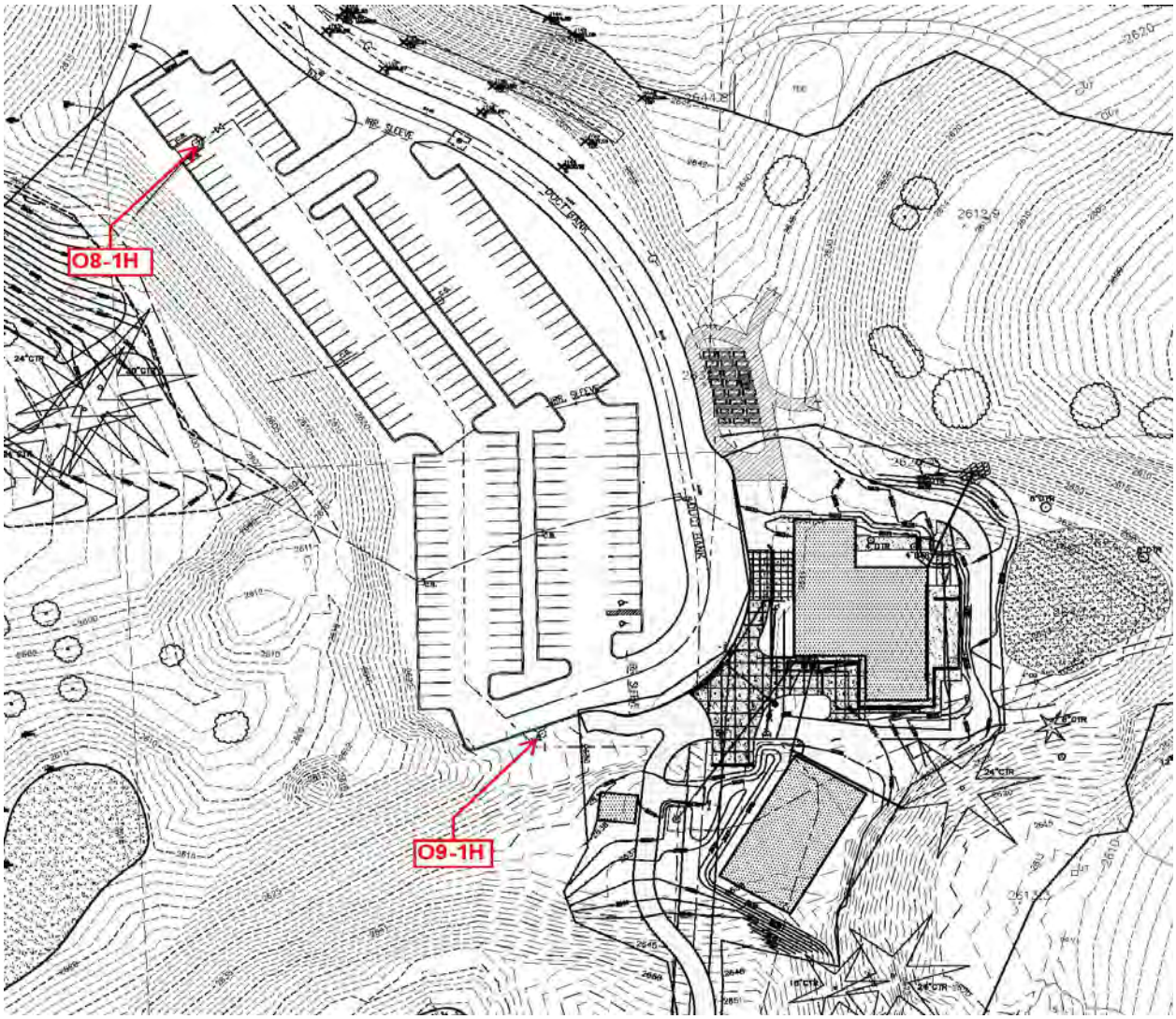
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: October 29, 2012

NOTE: WELL #8 (HIGH ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
O9-1H	HIGH	37	585	939
O8-1H	HIGH	44	478	771

HYDRANT TESTING LOCATIONS
29-Oct-12



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 10/29/2012 Time: 9:10 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.4

Calculated Water Level: 2707.9

	Pressure Hydrant	Flow Hydrant
	O8-1H	O9-1H
Measured Static :* (psi)	44	37
Hydrant Elevation	2621	2627
Calculated Static (psi):	38	35
% Diff. from Measured:	-14.5%	-5.3%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	34	XXX
Pitot pressure (psig)	XXX	12
Flow (gpm) **	XXX	585.1
Flow @ 20 psi (gpm) ***	XXX	938.8
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 10/29/2012 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.4

Calculated Water Level: 2707.9

	Pressure Hydrant	Flow Hydrant
	09-1H	O8-1H
Measured Static :* (psi)	37	44
Hydrant Elevation	2627	2621
Calculated Static (psi):	35	38
% Diff. from Measured:	-5.3%	-14.5%

Test Data:

Hydrant / Data		Flow Hydrant
		Port 1
Resid. pressure (psig)	30	XXX
Pitot pressure (psig)	XXX	8
Flow (gpm) **	XXX	477.8
Flow @ 20 psi (gpm) ***	XXX	771.4
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Friction loss for additional fire hose FL=C(Q^2)L
C=0.2 (4" hose)
L=length of hose in hundreds of feet
Q=flow of hydrant in hundreds of gallons

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING - NORTHSIDE RESIDENCE HALLS
SUMMARY SHEET
TEST DATE: MARCH 22, 2012

NOTE: WELL #7 WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	PRESSURE (PSI) FLOWING*	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
K11-2L	LOW	52	48	654	2824
K11-2H	HIGH	80	70	985	2871

*- at nearby pressure hydrant (see individual test sheets for locations)

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 3/22/2012 Time: 9:15 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.5 ESTAIMTED

Calculated Water Level: 2648.0

	Pressure Hydrant	Flow Hydrant
	K11-1L	K11-2L
Measured Static: (psi)	50	52
Hydrant Elevation	2535	2526
Calculated Static (psi):	49	53
% Diff. from Measured:	-2.1%	1.6%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	48	XXX
Pitot pressure (psig)	XXX	15
Flow (gpm) **	XXX	654.2
Flow @ 20 psi (gpm) ***	XXX	2824
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 3/22/2012 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): NA

Calculated Water Level: #VALUE!

	Pressure Hydrant*	Flow Hydrant*
	K11-1H	K11-2H
Measured Static: (psi)	78	80
Hydrant Elevation	2535	2526
Calculated Static (psi):	######	#####
% Diff. from Measured:	#VALUE!	######

* **NOTE: VALVING SWITCHED ON HYDRANTS SO THEY ARE TEMP. IN THE HIGH ZONE**

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	70	XXX
Pitot pressure (psig)	XXX	34
Flow (gpm) **	XXX	984.9
Flow @ 20 psi (gpm) ***	XXX	2871
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

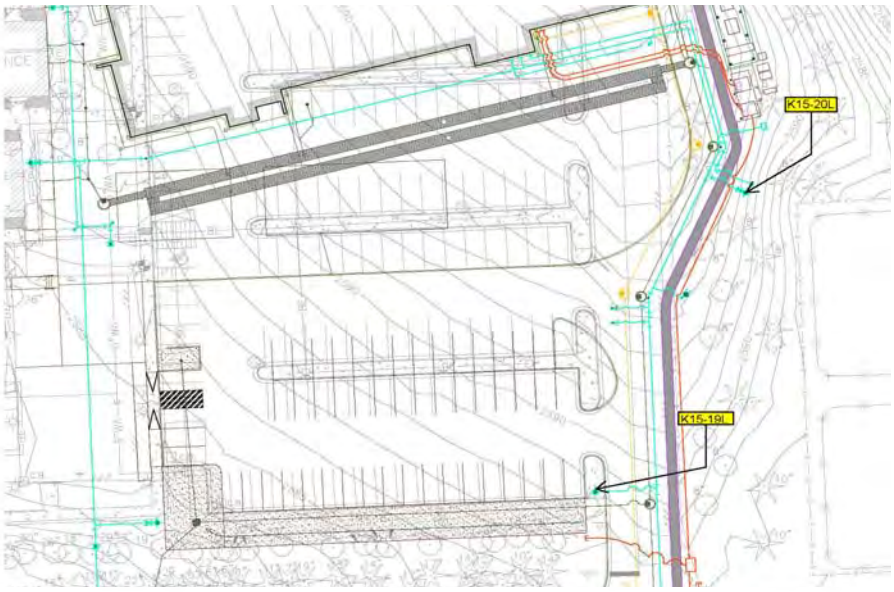
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

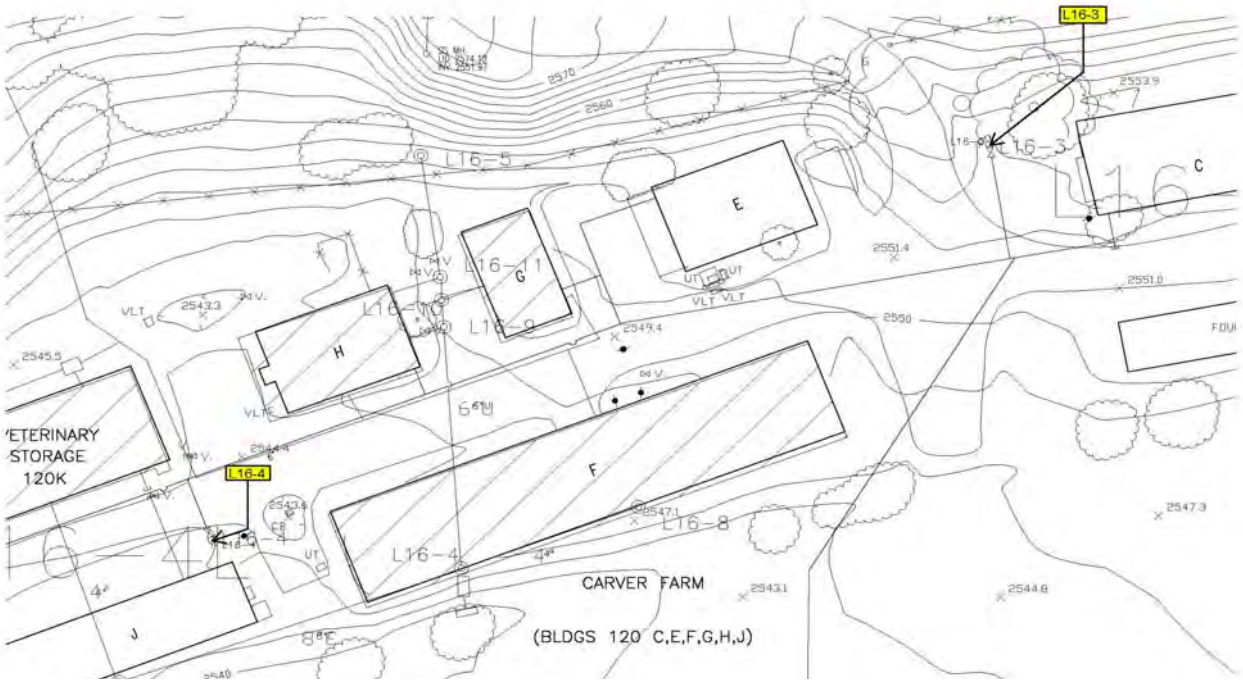
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: APRIL 8, 2010

HYDRANT #	ZONE	FLOW	FLOW (GPM)
K15-19L	LOW	10	534
K15-20L	LOW	7	447
L16-3L	LOW	14	632

See picture below for hydrant locations





Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 8-Apr-10 Time: 1:25 PM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17.87

Calculated Water Level: 2649.4

	Pressure Hydrant	Flow Hydrant
	K15-20L	K15-19L
Measured Static :* (psi)	26	
Hydrant Elevation	2592.5	2588
Calculated Static (psi):	25	27
% Diff. from Measured:	-5.2%	

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	24	XXX
Pitot pressure (psig)	XXX	10
Flow (gpm) **	XXX	534.1
Flow @ 20 psi (gpm) ***	XXX	966.7
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 8-Apr-10 Time: 1:30 PM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17.66
Calculated Water Level: 2649.2

	Pressure Hydrant	Flow Hydrant
	K15-19L	K15-20L
Measured Static :* (psi)	28	
Hydrant Elevation	2588	2592.5
Calculated Static (psi):	26	25
% Diff. from Measured:	-5.4%	

Test Data:

Hydrant Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	26	XXX
Pitot pressure (psig)	XXX	7
Flow (gpm) **	XXX	446.9
Flow @ 20 psi (gpm) ***	XXX	944.763
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 8-Apr-10 Time: 1:43 PM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17.66

Calculated Water Level: 2649.2

	Pressure Hydrant	Flow Hydrant
	L16-4L	L16-3L
Measured Static :* (psi)	46	
Hydrant Elevation	2544	2553
Calculated Static (psi):	46	42
% Diff. from Measured:	-1.0%	

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	40	XXX
Pitot pressure (psig)	XXX	14
Flow (gpm) **	XXX	632
Flow @ 20 psi (gpm) ***	XXX	1395
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 3/9/05
By G. Wells

TEST # _____

Reservoir Levels - WSU Pullman Campus
High Zone
OB=Observation (low zone)
NF=North Fairway (high zone)
Date: 4/08/10

Time	OB	NF
13:00:00	17.79	31
13:15:00	17.87	30.9
13:30:00	17.66	30.7
13:45:00	17.66	30.7
14:00:00	17.71	30.5
14:15:00	17.75	30.4
14:30:00	17.71	30.3
14:45:00	17.62	30.3

Revised 11/4/08
By M. Morse

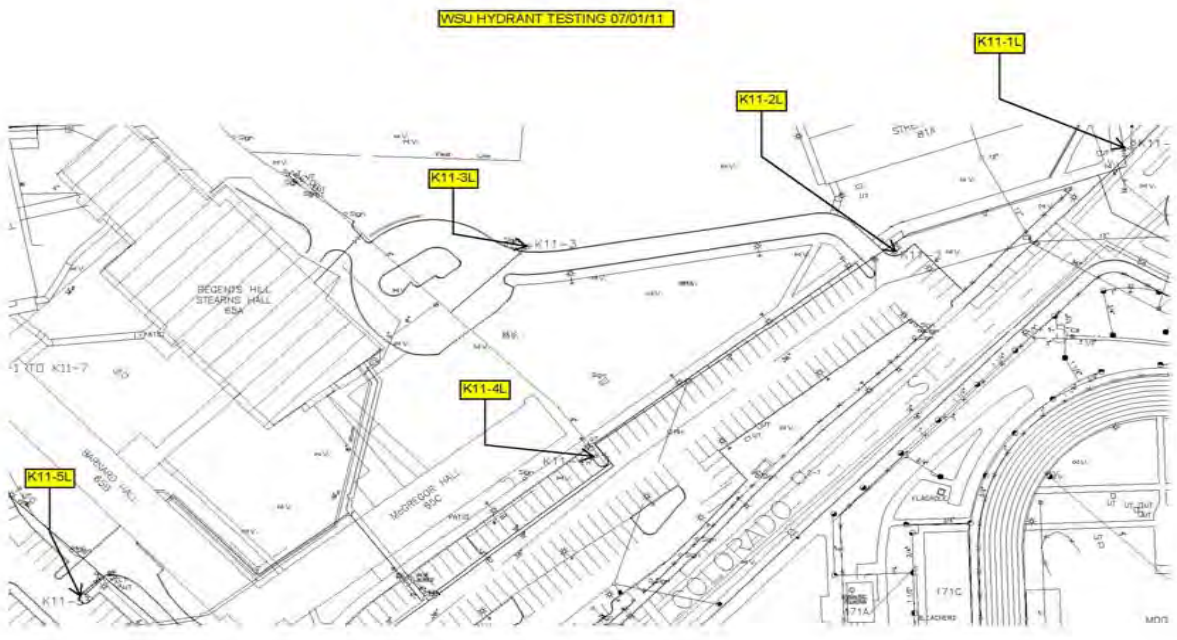
WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING - NORTHSIDE RESIDENCE HALLS
SUMMARY SHEET
TEST DATE: JULY 1, 2011

NOTE: WELL #7 WAS OFF DURING TESTING (per Blaine McMahan e-mail dated 6/30/11)

		PRESSURE (PSI)		TESTED	CALCULATED FLOW
HYDRANT #	ZONE	STATIC	FLOWING*	FLOW (GPM)	@ 20 PSI (GPM)
K11-1L	LOW	50	52	736	3400
K11-2L	LOW	54	46	696	2067
K11-4L	LOW	52	48	845	2155
K11-3L	LOW	49	47	696	2415
K11-5L	LOW	61	43	845	1853

*- at nearby pressure hydrant (see individual test sheets for locations)

MAP OF HYDRANT TESTING LOCATIONS



Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 7/1/2011 Time: 9:07 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.51 9:00 AM reading

Calculated Water Level: 2648.1

	Pressure Hydrant	Flow Hydrant
	K11-2L	K11-1L
Measured Static: (psi)	54	50
Hydrant Elevation	2526	2535
Calculated Static (psi):	53	49
% Diff. from Measured:	-2.2%	-2.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	52	XXX
Pitot pressure (psig)	XXX	19
Flow (gpm) **	XXX	736.3
Flow @ 20 psi (gpm) ***	XXX	3400
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 7/1/2011 Time: 9:15 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.51 9:00 AM reading

Calculated Water Level: 2648.1

	Pressure Hydrant	Flow Hydrant
	K11-1L	K11-2L
Measured Static: (psi)	50	54
Hydrant Elevation	2535	2526
Calculated Static (psi):	49	53
% Diff. from Measured:	-2.1%	-2.2%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	46	XXX
Pitot pressure (psig)	XXX	17
Flow (gpm) **	XXX	696.4
Flow @ 20 psi (gpm) ***	XXX	2067
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 7/1/2011 Time: 9:28 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.51 9:00 AM reading

Calculated Water Level: 2648.1

	Pressure Hydrant	Flow Hydrant
	K11-2L	K11-4L
Measured Static: (psi)	54	52
Hydrant Elevation	2526	2518
Calculated Static (psi):	53	56
% Diff. from Measured:	-2.2%	8.3%

large difference likely due to system demand

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	48	XXX
Pitot pressure (psig)	XXX	25
Flow (gpm) **	XXX	844.6
Flow @ 20 psi (gpm) ***	XXX	2155
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 7/1/2011 Time: 9:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.55 10:00 AM reading

Calculated Water Level: 2648.1

	Pressure Hydrant	Flow Hydrant
	K11-4L	K11-3L
Measured Static: (psi)	50	49
Hydrant Elevation	2518	2538
Calculated Static (psi):	56	48
% Diff. from Measured:	12.6%	-2.7%

large difference likely due to system demand

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	47	XXX
Pitot pressure (psig)	XXX	17
Flow (gpm) **	XXX	696.4
Flow @ 20 psi (gpm) ***	XXX	2415
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 5

Date: 7/1/2011 Time: 9:55 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.55 10:00 AM reading

Calculated Water Level: 2648.1

	Pressure Hydrant	Flow Hydrant
	K11-4L	K11-5L
Measured Static: (psi)	50	61
Hydrant Elevation	2518	2512
Calculated Static (psi):	56	59
% Diff. from Measured:	12.6%	-3.4%

large difference likely due to system demand

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	43	XXX
Pitot pressure (psig)	XXX	25
Flow (gpm) **	XXX	844.6
Flow @ 20 psi (gpm) ***	XXX	1853
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

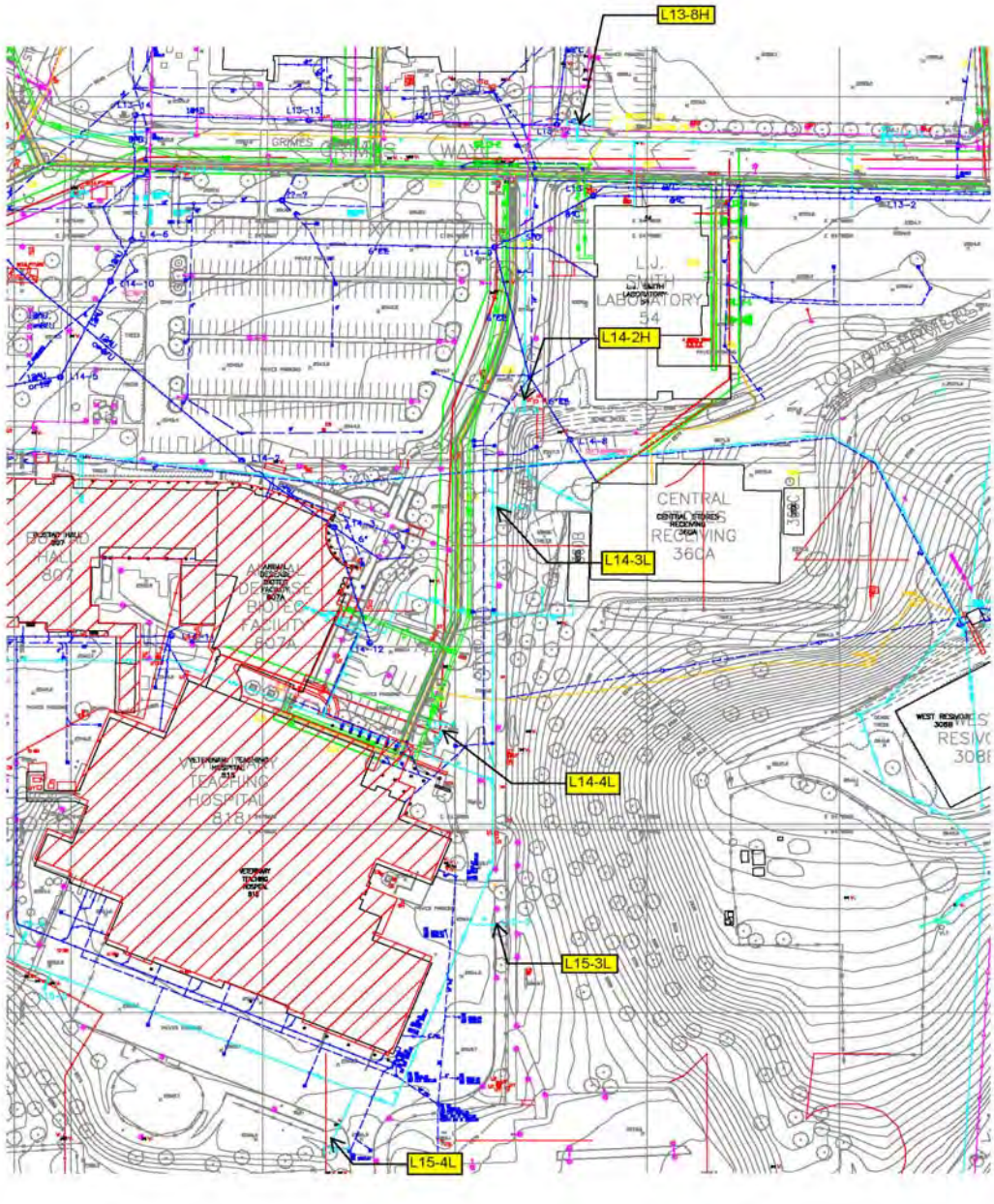
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: AUGUST 28, 2009

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	FLOW	FLOW (GPM)
L14-2H	HIGH	62	24	827
L15-3L	LOW	37	15	654
L15-4L	LOW	36	14	632
L14-4L	LOW	37	13	609
L14-3L	LOW	40	15	654

See picture below for hydrant locations



Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 28-Aug-09 Time: 9:20 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 29.8
Calculated Water Level: 2707.3

	Pressure Hydrant	Flow Hydrant
	L13-8H	L14-2H
Measured Static :* (psi)	66	62
Hydrant Elevation	2548	2550
Calculated Static (psi):	69	68
% Diff. from Measured:	4.5%	9.9%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	60	XXX
Pitot pressure (psig)	XXX	24
Flow (gpm) **	XXX	827.5
Flow @ 20 psi (gpm) ***	XXX	2486
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 28-Aug-09 Time: 10:15 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17.5
Calculated Water Level: 2649.0

	Pressure Hydrant	Flow Hydrant
	L14-3L	L15-3L
Measured Static :* (psi)	40	37
Hydrant Elevation	2555	2564
Calculated Static (psi):	41	37
% Diff. from Measured:	1.8%	-0.5%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	40	XXX
Pitot pressure (psig)	XXX	15
Flow (gpm) **	XXX	654.195
Flow @ 20 psi (gpm) ***	XXX	#DIV/0!
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 28-Aug-09 Time: 10:45 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17.37

Calculated Water Level: 2648.9

	Pressure Hydrant	Flow Hydrant
	L15-3L	L15-4L
Measured Static :* (psi)	37	36
Hydrant Elevation	2564	2566
Calculated Static (psi):	37	36
% Diff. from Measured:	-0.7%	-0.3%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	35	XXX
Pitot pressure (psig)	XXX	14
Flow (gpm) **	XXX	632
Flow @ 20 psi (gpm) ***	XXX	2007
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 28-Aug-09 Time: 11:07 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 17

Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	L15-3L	L14-4L
Measured Static :* (psi)	37	37
Hydrant Elevation	2564	2563
Calculated Static (psi):	37	37
% Diff. from Measured:	-1.1%	0.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	35	XXX
Pitot pressure (psig)	XXX	13
Flow (gpm) **	XXX	609
Flow @ 20 psi (gpm) ***	XXX	1934
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 5

Date: 28-Aug-09 Time: 11:25 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report: 16.96
Calculated Water Level: 2648.5

	Pressure Hydrant	Flow Hydrant
	L14-4L	L14-3L
Measured Static :* (psi)	37	40
Hydrant Elevation	2563	2555
Calculated Static (psi):	37	40
% Diff. from Measured:	0.0%	1.2%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	37	XXX
Pitot pressure (psig)	XXX	15
Flow (gpm) **	XXX	654.19
Flow @ 20 psi (gpm) ***	XXX	#DIV/0!
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 3/9/05
By G. Wells

TEST # _____

Reservoir Levels - WSU Pullman Campus

High Zone

OB=Observation (low zone)

NF=North Fairway (high zone)

Date: 8/28/09

Time	OB	NF
6:45 AM	17.62	30.1
7:00 AM	17.75	29.7
7:15 AM	17.79	29.5
7:30 AM	17.83	29.2
7:45 AM	17.95	29
8:00 AM	18.04	29.4
8:15 AM	17.79	29.7
8:30 AM	17.79	30.1
8:45 AM	17.71	30.1
9:00 AM	17.62	29.9
9:15 AM	17.58	29.8
9:30 AM	17.21	29.8
9:45 AM	17.54	29.7
10:00 AM	17.46	29.5

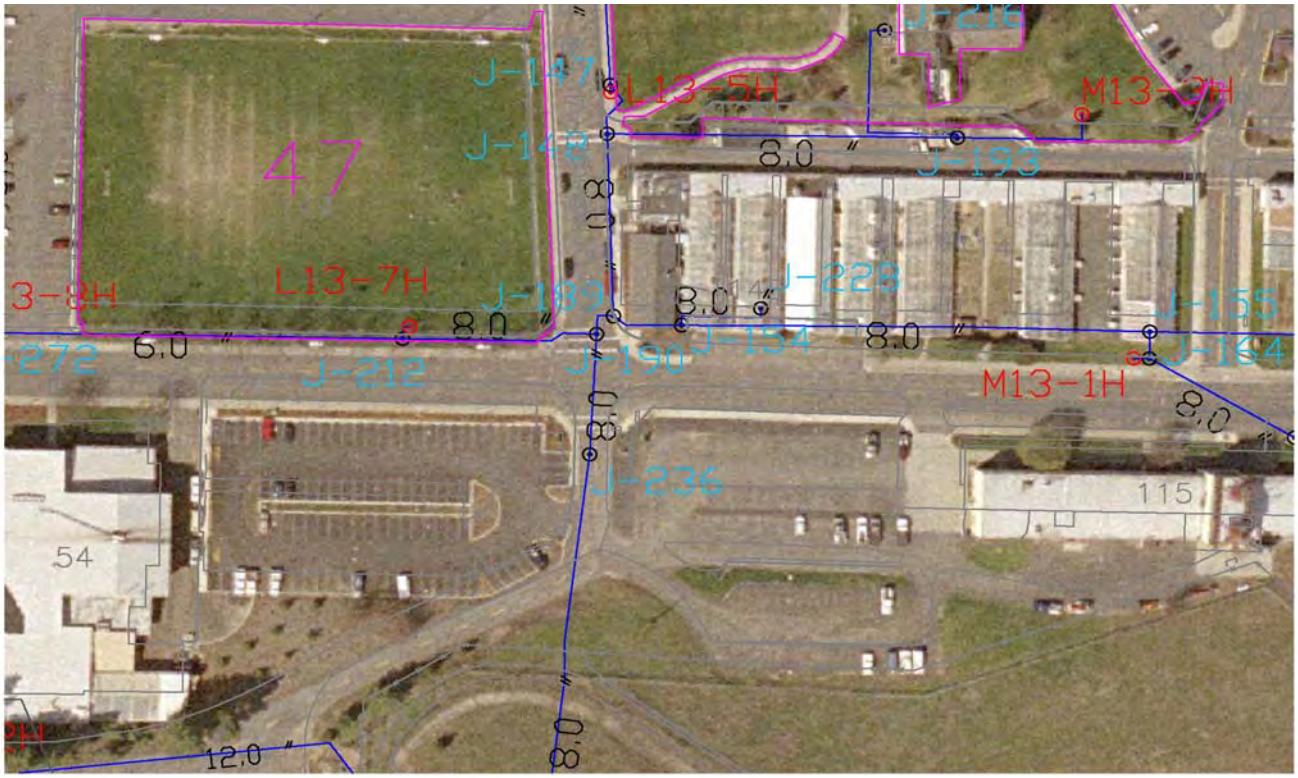
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: March 1, 2013

NOTE: WELL #8 (HIGH ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
M13-1H	HIGH	64	378	2915
L13-7H	HIGH	64	925	4911

HYDRANT TESTING LOCATIONS
1-Mar-13



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 3/1/2013 Time: 10:05 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.8

Calculated Water Level: 2708.3

	Pressure Hydrant	Flow Hydrant
	M13-1H	L13-7H
Measured Static :* (psi)	64	64
Hydrant Elevation	2560	2553
Calculated Static (psi):	64	67
% Diff. from Measured:	0.3%	5.4%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	62	XXX
Pitot pressure (psig)	XXX	30
Flow (gpm) **	XXX	925.2
Flow @ 20 psi (gpm) ***	XXX	4911
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 3/1/2013 Time: 10:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.8

Calculated Water Level: 2708.3

	Pressure Hydrant	Flow Hydrant
	L13-7H	M13-1H
Measured Static :* (psi)	64	64
Hydrant Elevation	2552.5	2560
Calculated Static (psi):	67	64
% Diff. from Measured:	5.4%	0.3%

Test Data:

Hydrant / Data		Flow Hydrant
		Port 1
Resid. pressure (psig)	63	XXX
Pitot pressure (psig)	XXX	5
Flow (gpm) **	XXX	378
Flow @ 20 psi (gpm) ***	XXX	2915
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Friction loss for additional fire hose FL=C(Q^2)L
C=0.2 (4" hose)
L=length of hose in hundreds of feet
Q=flow of hydrant in hundreds of gallons

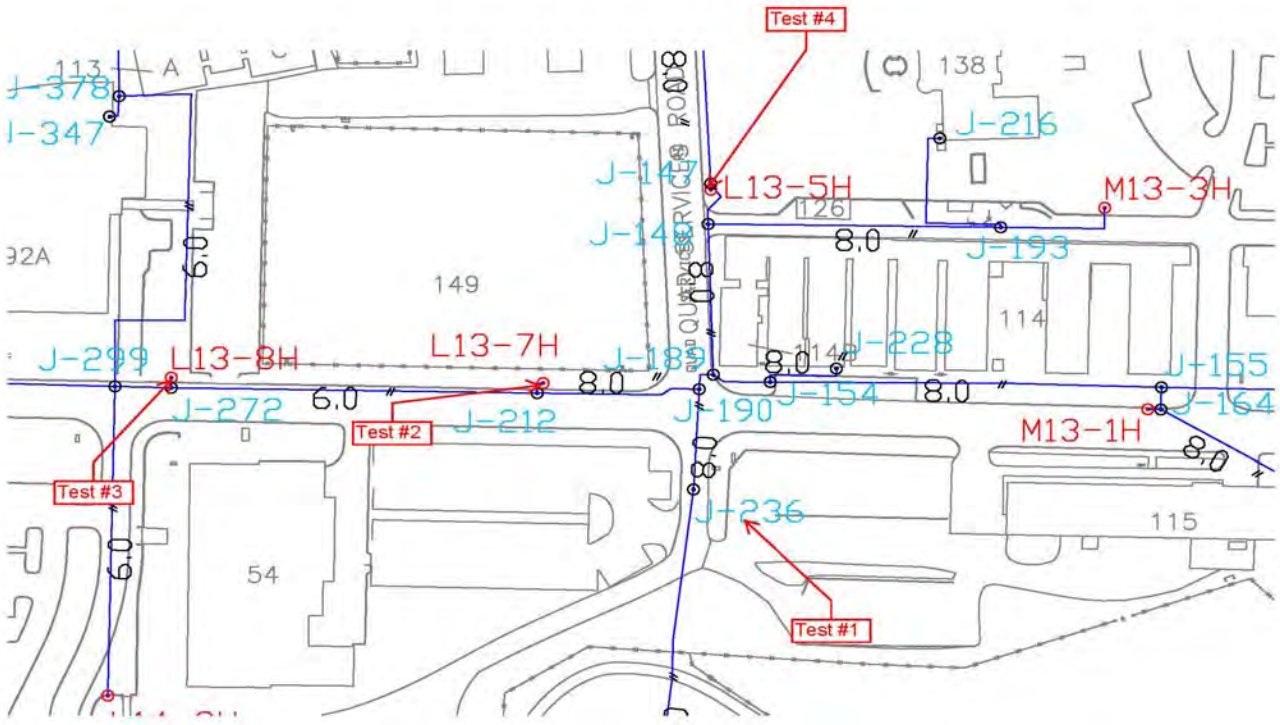
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: May 29, 2014

NOTE: WELL #8 (HIGH ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
at Clean Tech	HIGH	67	755	1400
L13-7H	HIGH	69	792	1403
L13-8H	HIGH	68	755	1367
L13-5H	HIGH	68	755	1308

HYDRANT TESTING LOCATIONS
29-May-14



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 5/29/2014 Time: 10:05 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 29.3

Calculated Water Level: 2706.8

	Pressure Hydrant at Clean Tech	Flow Hydrant at Clean Tech
Measured Static :* (psi)	67	67
Hydrant Elevation	2558	2558
Calculated Static (psi):	64	64
% Diff. from Measured:	-3.8%	-3.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	52	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	1400
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 5/29/2014 Time: 10:15 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 29.3

Calculated Water Level: 2706.8

	Pressure Hydrant	Flow Hydrant
	L13-7H	L13-7H
Measured Static :* (psi)	69	69
Hydrant Elevation	2552	2552
Calculated Static (psi):	67	67
% Diff. from Measured:	-2.9%	-2.9%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	52	XXX
Pitot pressure (psig)	XXX	22
Flow (gpm) **	XXX	792.3
Flow @ 20 psi (gpm) ***	XXX	1403
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 5/29/2014 Time: 10:25 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 29.3
Calculated Water Level: 2706.8

	Pressure Hydrant	Flow Hydrant
	L13-8H	L13-8H
Measured Static :* (psi)	68	68
Hydrant Elevation	2547	2547
Calculated Static (psi):	69	69
% Diff. from Measured:	1.8%	1.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	52	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	1367
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 5/29/2014 Time: 10:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 29.3

Calculated Water Level: 2706.8

	Pressure Hydrant	Flow Hydrant
	L13-5H	L13-5H
Measured Static :* (psi)	67	67
Hydrant Elevation	2554	2554
Calculated Static (psi):	66	66
% Diff. from Measured:	-1.2%	-1.2%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	50	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	1308
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

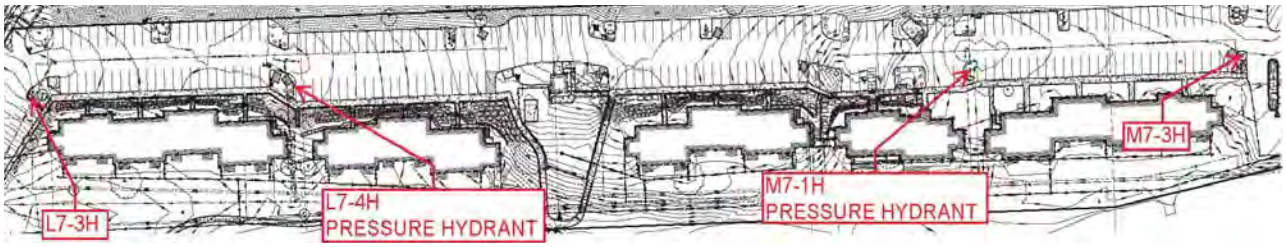
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: July 12, 2013

NOTE: WELL #8 (HIGH ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
L7-3H	HIGH	64	534	2044
M7-3H	HIGH	68	609	2330
L7-4H	HIGH	68	N/A	N/A
M7-1H	HIGH	68	N/A	N/A

HYDRANT TESTING LOCATIONS
12-Jul-13



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 7/12/2013 Time: 9:10 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2
Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	L7-4H	L7-3H
Measured Static :* (psi)	68	68
Hydrant Elevation	2555.5	2551
Calculated Static (psi):	66	68
% Diff. from Measured:	-3.1%	0.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	64	XXX
Pitot pressure (psig)	XXX	10
Flow (gpm) **	XXX	534.1
Flow @ 20 psi (gpm) ***	XXX	2044
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 7/12/2013 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2

Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	M7-1H	M7-3H
Measured Static :* (psi)	68	64
Hydrant Elevation	2553.5	2556
Calculated Static (psi):	67	66
% Diff. from Measured:	-1.8%	2.6%

Test Data:

Hydrant / Data		Flow Hydrant
		Port 1
Resid. pressure (psig)	64	XXX
Pitot pressure (psig)	XXX	13
Flow (gpm) **	XXX	609
Flow @ 20 psi (gpm) ***	XXX	2330
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

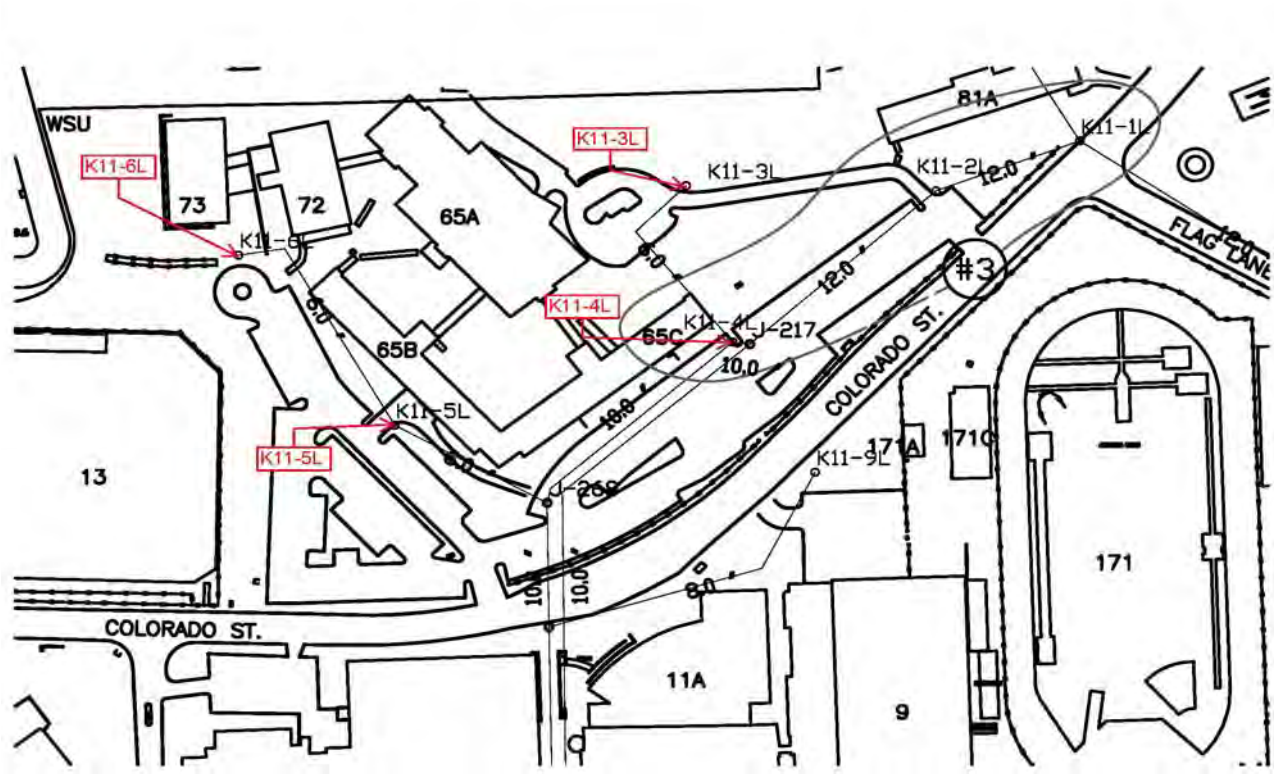
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: September 10, 2013

NOTE: WELL #7 (LOW ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
K11-5L	LOW	60	755	2258
K11-6L	LOW	58	717	2203
K11-3L	LOW	50	632	2132
K11-4L	LOW	58	755	1988

HYDRANT TESTING LOCATIONS
10-Sep-13



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 9/10/2013 Time: 9:15 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.38

Calculated Water Level: 2647.9

	Pressure Hydrant	Flow Hydrant
	K11-5L	K11-6L
Measured Static :* (psi)	60	58
Hydrant Elevation	2512.16	2512
Calculated Static (psi):	59	59
% Diff. from Measured:	-2.0%	1.4%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	55	XXX
Pitot pressure (psig)	XXX	18
Flow (gpm) **	XXX	716.6
Flow @ 20 psi (gpm) ***	XXX	2203
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 9/10/2013 Time: 9:25 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.38

Calculated Water Level: 2647.9

	Pressure Hydrant	Flow Hydrant
	K11-6L	K11-5L
Measured Static :* (psi)	58	60
Hydrant Elevation	2512	2512
Calculated Static (psi):	59	59
% Diff. from Measured:	1.4%	-2.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	53	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	2258
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 9/10/2013 Time: 9:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.38

Calculated Water Level: 2647.9

	Pressure Hydrant	Flow Hydrant
	K11-3L	K11-4L
Measured Static :* (psi)	50	58
Hydrant Elevation	2518	2538
Calculated Static (psi):	56	48
% Diff. from Measured:	12.5%	-18.0%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	45	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	1988
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 9/10/2013 Time: 9:50 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 16.38

Calculated Water Level: 2647.9

	Pressure Hydrant	Flow Hydrant
	K11-4L	K11-3L
Measured Static :* (psi)	58	50
Hydrant Elevation	2538	2518
Calculated Static (psi):	48	56
% Diff. from Measured:	-18.0%	12.5%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	54	XXX
Pitot pressure (psig)	XXX	14
Flow (gpm) **	XXX	632
Flow @ 20 psi (gpm) ***	XXX	2132
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

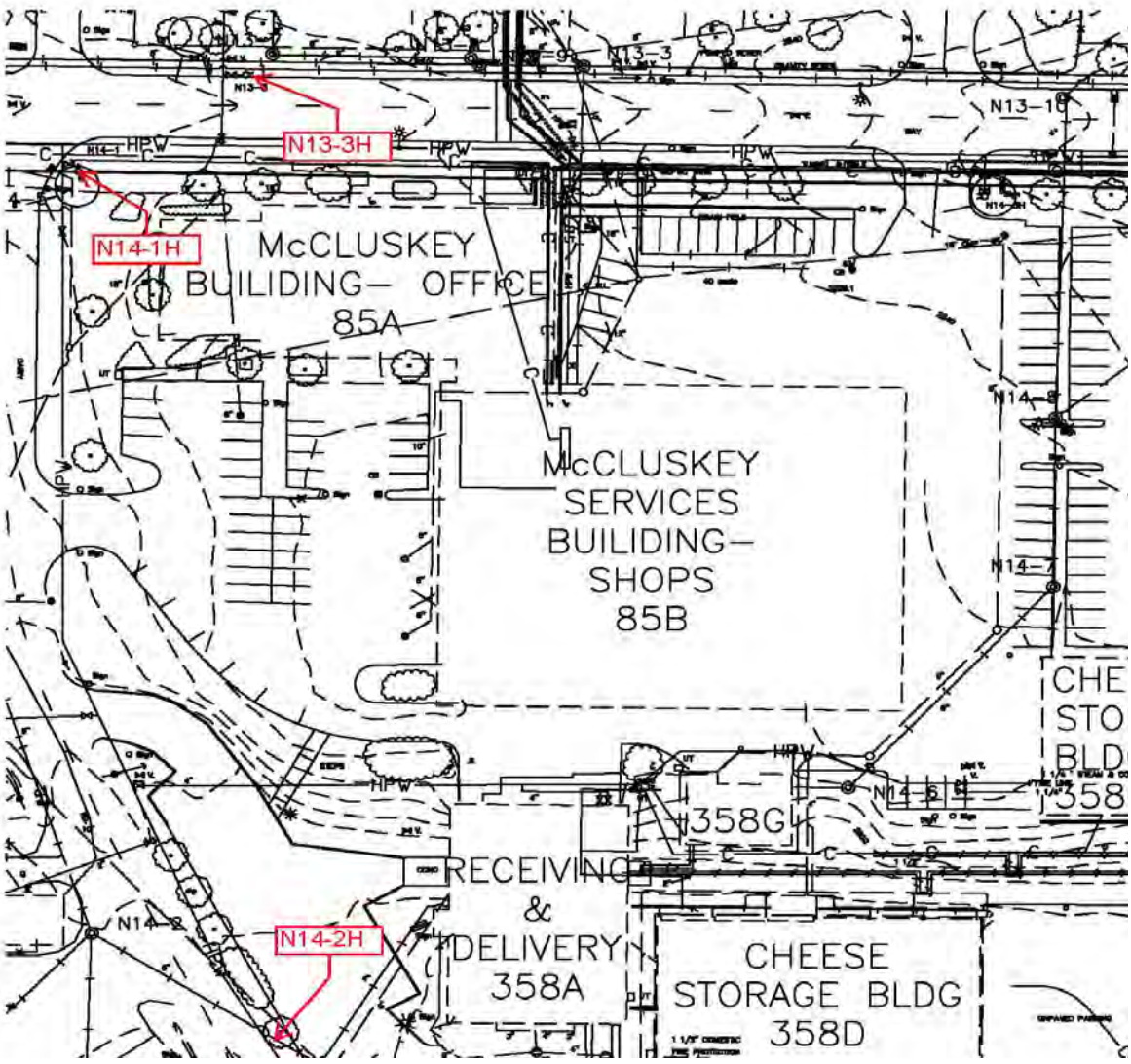
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: September 23, 2014

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
N14-1H	HIGH	70	736	1756
N13-3H	HIGH	70	810	1751
N14-2H	HIGH	68	925	2907

HYDRANT TESTING LOCATIONS
23-Sep-14



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole fact designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 9/23/2014 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.4

Calculated Water Level: 2708.9

	Pressure Hydrant	Flow Hydrant
	N13-3H	N14-1H
Measured Static :* (psi)	70	70
Hydrant Elevation	2546	2547
Calculated Static (psi):	71	70
% Diff. from Measured:	0.8%	0.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	60	XXX
Pitot pressure (psig)	XXX	19
Flow (gpm) **	XXX	736.3
Flow @ 20 psi (gpm) ***	XXX	1756
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 9/23/2014 Time: 9:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.4

Calculated Water Level: 2708.9

	Pressure Hydrant	Flow Hydrant
	N14-1H	N13-3H
Measured Static :* (psi)	70	70
Hydrant Elevation	2547	2546
Calculated Static (psi):	70	71
% Diff. from Measured:	0.1%	0.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	23
Flow (gpm) **	XXX	810.1
Flow @ 20 psi (gpm) ***	XXX	1751
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 9/23/2014 Time: 9:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.4

Calculated Water Level: 2708.9

	Pressure Hydrant	Flow Hydrant
	N14-1H	N14-2H
Measured Static :* (psi)	70	66
Hydrant Elevation	2547	2557
Calculated Static (psi):	70	66
% Diff. from Measured:	0.1%	-0.3%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	64	XXX
Pitot pressure (psig)	XXX	30
Flow (gpm) **	XXX	925.2
Flow @ 20 psi (gpm) ***	XXX	2907
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

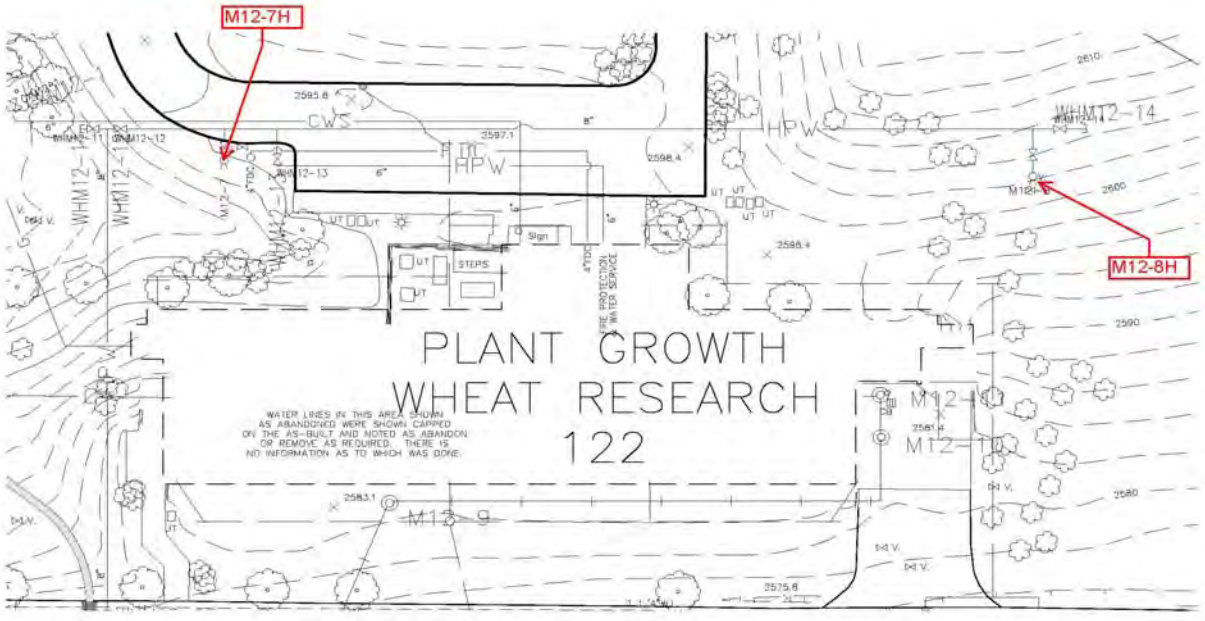
Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: November 22, 2013

NOTE: WELL #8 (HIGH ZONE) WAS OFF DURING TESTING

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
M12-7H	HIGH	50	654	1444
M12-8H	HIGH	46	534	1091

HYDRANT TESTING LOCATIONS
22-Nov-13



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 11/22/2013 Time: 11:10 A.M.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.8

Calculated Water Level: 2708.3

	Pressure Hydrant	Flow Hydrant
	M12-8	M12-7
Measured Static :* (psi)	46	50
Hydrant Elevation	2602	2598
Calculated Static (psi):	46	48
% Diff. from Measured:	0.1%	-4.5%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	40	XXX
Pitot pressure (psig)	XXX	15
Flow (gpm) **	XXX	654.2
Flow @ 20 psi (gpm) ***	XXX	1444
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 11/22/2013 Time: 11:30 A.M.

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.8

Calculated Water Level: 2708.3

	Pressure Hydrant	Flow Hydrant
	M12-7	M12-8
Measured Static :* (psi)	50	46
Hydrant Elevation	2598	2602
Calculated Static (psi):	48	46
% Diff. from Measured:	-4.5%	0.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	42	XXX
Pitot pressure (psig)	XXX	10
Flow (gpm) **	XXX	534.1
Flow @ 20 psi (gpm) ***	XXX	1091
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

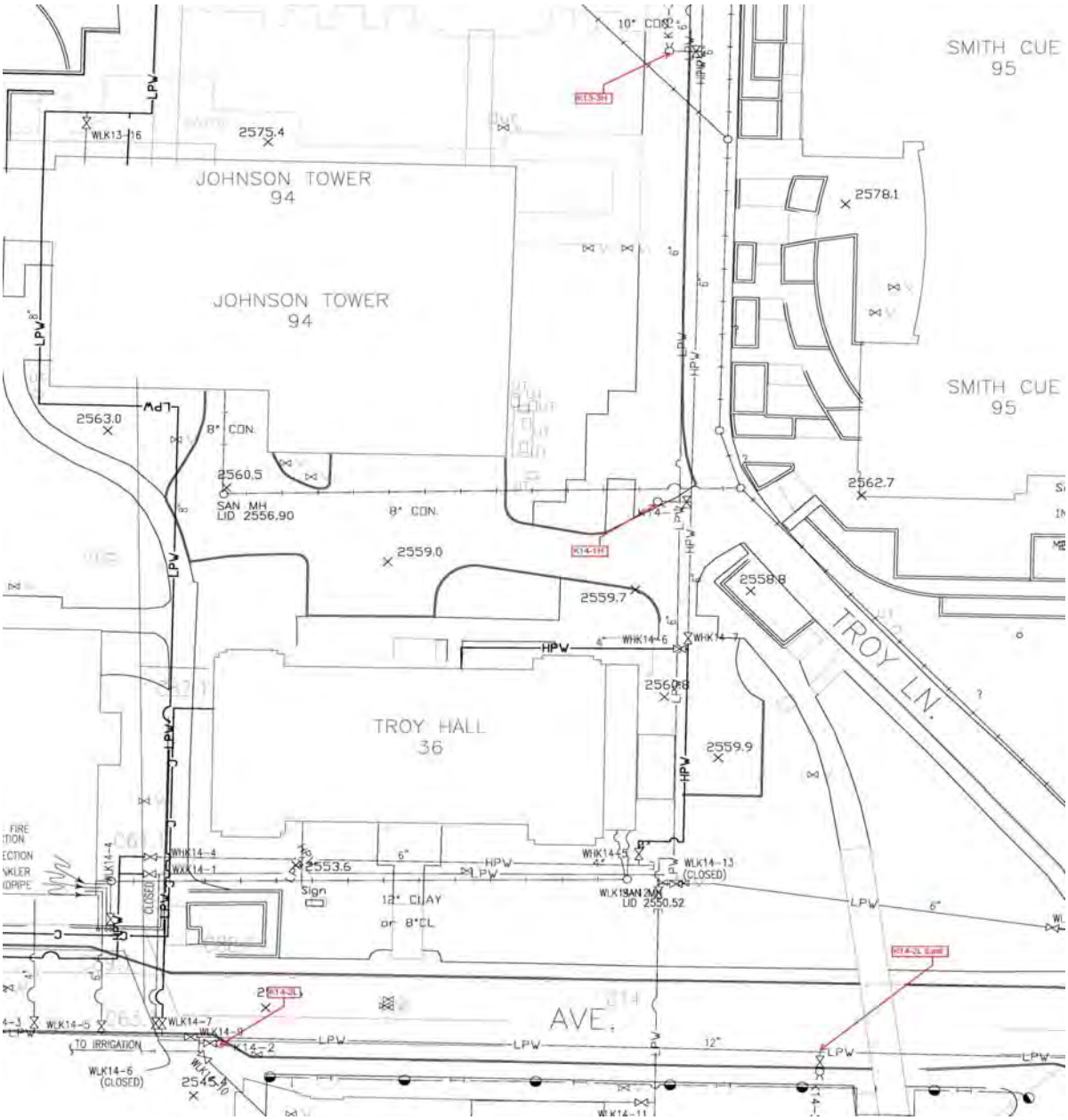
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
TROY HALL FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: March 13, 2015

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
K14-2L East	LOW	54	792	2516
K14-2L	LOW	47	774	2535
K13-3H	HIGH	80	755	1187
K14-1H	HIGH	92	910	1409

HYDRANT TESTING LOCATIONS
13-Mar-15



Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 3/13/2015 Time: 9:10 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17.4

Calculated Water Level: 2648.9

	Pressure Hydrant	Flow Hydrant
		K14-2L East
Measured Static :* (psi)	54	54
Hydrant Elevation	2531	2531
Calculated Static (psi):	51	51
% Diff. from Measured:	-5.5%	-5.5%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	50	XXX
Pitot pressure (psig)	XXX	22
Flow (gpm) **	XXX	792.3
Flow @ 20 psi (gpm) ***	XXX	2516
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 3/13/2015 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): L North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 17.4

Calculated Water Level: 2648.9

	Pressure Hydrant		Flow Hydrant
		K14-2L	
Measured Static :* (psi)	47		47
Hydrant Elevation	2544.5		2545
Calculated Static (psi):	45		45
% Diff. from Measured:	-3.8%		-3.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	44	XXX
Pitot pressure (psig)	XXX	21
Flow (gpm) **	XXX	774.1
Flow @ 20 psi (gpm) ***	XXX	2535
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 3/13/2015 Time: 9:50 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant	Flow Hydrant
		K13-3H
Measured Static :* (psi)	80	80
Hydrant Elevation	2585	2585
Calculated Static (psi):	54	54
% Diff. from Measured:	-32.8%	-32.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	54	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	1187
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 3/13/2015 Time: 10:10 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant		Flow Hydrant
		K14-1H	
Measured Static :* (psi)	92		92
Hydrant Elevation	2562		2562
Calculated Static (psi):	64		64
% Diff. from Measured:	-30.7%		-30.7%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	60	XXX
Pitot pressure (psig)	XXX	29
Flow (gpm) **	XXX	909.6
Flow @ 20 psi (gpm) ***	XXX	1409
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

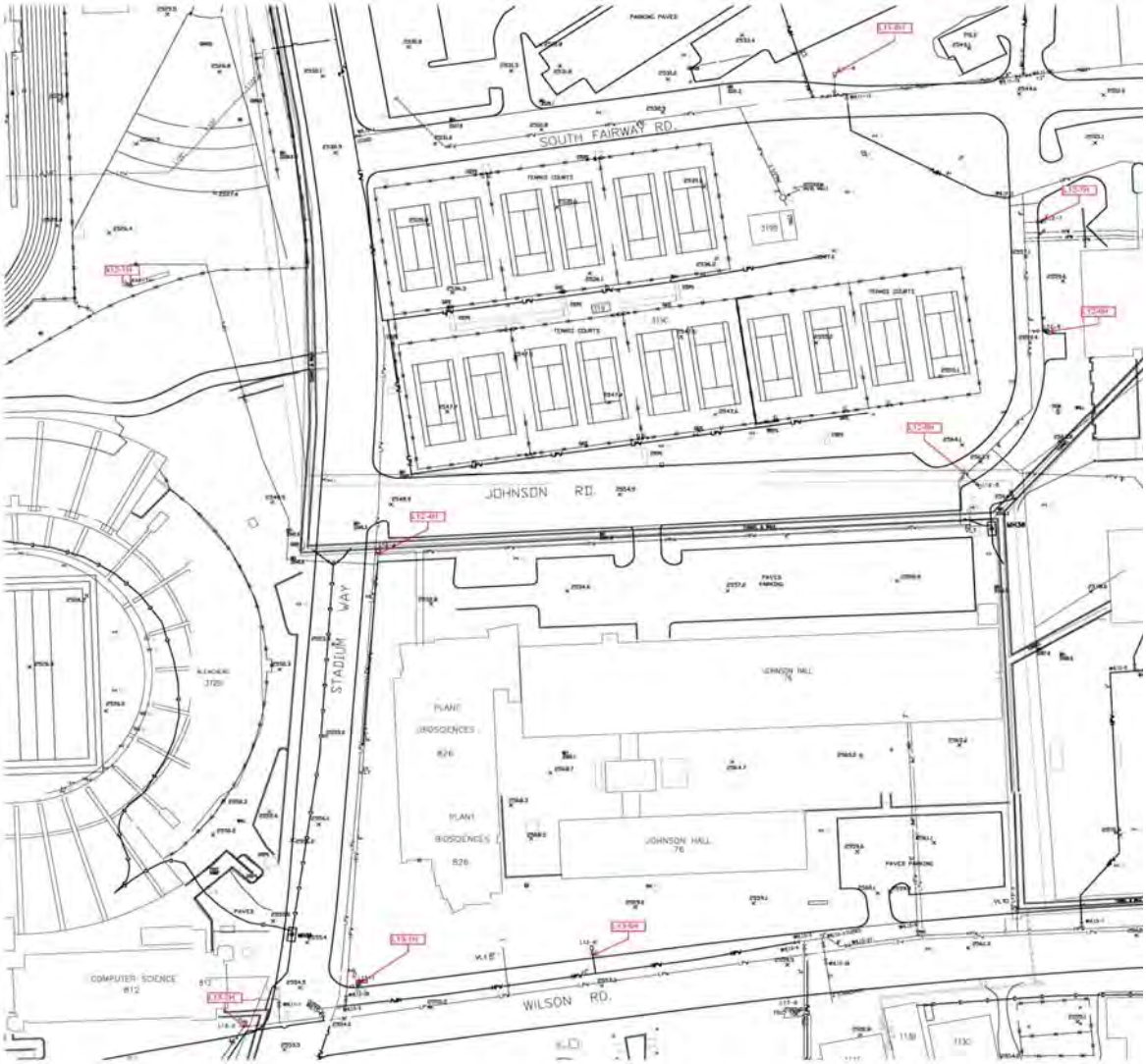
** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM
VET MED REC5 FIRE HYDRANT FLOW TESTING
SUMMARY SHEET
TEST DATE: March 13, 2015 and July 1, 2015

HYDRANT #	ZONE	PRESSURE (PSI) STATIC	TESTED FLOW (GPM)	CALCULATED FLOW @ 20 PSI (GPM)
L13-2H	HIGH	94	1041	1832
L13-1H	HIGH	70	828	1788
L13-6H	HIGH	66	925	2233
L12-4H	HIGH	70	894	1932
L12-1H	HIGH	70	894	1537
L11-6H	HIGH	70	894	4626
L12-6H	HIGH	64	861	2109
L12-7H	HIGH	62	878	4992
L12-8H	HIGH	62	755	2215

HYDRANT TESTING LOCATIONS



NOTE: This fire flow test represents the hydraulic conditions at a specific point in time. Other factors may impact the actual fire flow capacity at any given time. These numbers are only an estimate of available pressure and flows and should not be the sole factor is designing the fire suppression needs for the facility.

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 1

Date: 3/13/2015 Time: 10:20 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant	Flow Hydrant
		L13-2H
Measured Static :* (psi)	94	94
Hydrant Elevation	2554.5	2554.5
Calculated Static (psi):	67	67
% Diff. from Measured:	-28.7%	-28.7%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	68	XXX
Pitot pressure (psig)	XXX	38
Flow (gpm) **	XXX	1041.2
Flow @ 20 psi (gpm) ***	XXX	1831.7
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 2

Date: 3/13/2015 Time: 10:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant		Flow Hydrant
		L13-1H	
Measured Static :* (psi)	70		70
Hydrant Elevation	2555		2555
Calculated Static (psi):	67		67
% Diff. from Measured:	-4.6%		-4.6%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	24
Flow (gpm) **	XXX	827.5
Flow @ 20 psi (gpm) ***	XXX	1788
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 3

Date: 3/13/2015 Time: 10:50 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant	Flow Hydrant
		L13-6H
Measured Static :* (psi)	66	66
Hydrant Elevation	2558	2558
Calculated Static (psi):	65	65
% Diff. from Measured:	-0.8%	-0.8%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	57	XXX
Pitot pressure (psig)	XXX	30
Flow (gpm) **	XXX	925.2
Flow @ 20 psi (gpm) ***	XXX	2232.6
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 4

Date: 3/13/2015 Time: 11:05 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant	Flow Hydrant
		L12-4H
Measured Static :* (psi)	70	70
Hydrant Elevation	2550	2550
Calculated Static (psi):	69	69
% Diff. from Measured:	-1.5%	-1.5%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	28
Flow (gpm) **	XXX	893.8
Flow @ 20 psi (gpm) ***	XXX	1931.6
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 5

Date: 3/13/2015 Time: 11:20 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 31.7

Calculated Water Level: 2709.2

	Pressure Hydrant	Flow Hydrant
		K12-1H
Measured Static :* (psi)	80	80
Hydrant Elevation	2528	2528
Calculated Static (psi):	78	78
% Diff. from Measured:	-1.9%	-1.9%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	28
Flow (gpm) **	XXX	893.8
Flow @ 20 psi (gpm) ***	XXX	1536.5
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 6

Date: 7/1/2015 Time: 9:20 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2

Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	L11-6H	L12-7H
Measured Static :* (psi)	70	62
Hydrant Elevation	2559	2557
Calculated Static (psi):	64	65
% Diff. from Measured:	-8.0%	5.3%

Test Data:

Hydrant	Pressure Hydrant	Flow Hydrant
Data		Port 1
Resid. pressure (psig)	68	XXX
Pitot pressure (psig)	XXX	27
Flow (gpm) **	XXX	877.7
Flow @ 20 psi (gpm) ***	XXX	4991.5
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 7

Date: 7/1/2015 Time: 9:30 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2

Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	L12-7H	L11-6H
Measured Static :* (psi)	62	70
Hydrant Elevation	2557	2539
Calculated Static (psi):	65	73
% Diff. from Measured:	5.3%	4.4%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	60	XXX
Pitot pressure (psig)	XXX	28
Flow (gpm) **	XXX	893.8
Flow @ 20 psi (gpm) ***	XXX	4626.4
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 8

Date: 7/1/2015 Time: 9:40 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2

Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	L12-6H	L12-8H
Measured Static :* (psi)	64	62
Hydrant Elevation	2559	2569
Calculated Static (psi):	64	60
% Diff. from Measured:	0.6%	-3.1%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	58	XXX
Pitot pressure (psig)	XXX	20
Flow (gpm) **	XXX	755.4
Flow @ 20 psi (gpm) ***	XXX	2215.3
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

Revised 11/4/08
By M. Morse

WSU WATER SYSTEM

FIELD WORK SHEET
FIRE HYDRANT FLOW TEST

Test # 9

Date: 7/1/2015 Time: 10:00 AM

Sketch / Remarks:

= cells to be manually inputted

Zone (H or L): H North Fairway (high zone) or Observatory (low zone)

Tank Water Level Elevation:

From Panel Point Log Report (pnt #5): 30.2

Calculated Water Level: 2707.7

	Pressure Hydrant	Flow Hydrant
	L12-8H	L12-6H
Measured Static :* (psi)	62	64
Hydrant Elevation	2569	2559
Calculated Static (psi):	60	64
% Diff. from Measured:	-3.1%	0.6%

Test Data:

Hydrant / Data	Pressure Hydrant	Flow Hydrant
		Port 1
Resid. pressure (psig)	54	XXX
Pitot pressure (psig)	XXX	26
Flow (gpm) **	XXX	861.3
Flow @ 20 psi (gpm) ***	XXX	2108.8
Throat Dia. (in)		2.5
"C"	0.906	

"C" value for Hosemonster with 2.5-inch port is 0.906 or with 1.75-inch port is 0.975.

** Q = 29.83 x C x d^2 x (p)^0.5 (equation from Hose Monstor by Hydro Flow Products)
*** Q' = Q x (Delta P'/Delta P)^0.54 (theoretical available capacity when pumped)
**** One flow port reduced to 1.75

APPENDIX C

Item 5 – Existing High and Low Zone Maps Year 2015

NORTH

SCALE: 1" = 250'

DRAWN BY: AJT DESIGN BY: AJT

DATE: 12/2014

LOG NO. 00

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
Pullman, Wa. 99164-1150
FAX 509-335-9070
509-335-9003

2015 WATER SYSTEM PLAN UPDATE

EXISTING LOW ZONE MAP
YEAR 2015

LEGEND

- EXISTING LOW PRESSURE
- XX–XXH HYDRANT
- J–XXX NODE
- FIRE HYDRANT NODE WITH DEFICIENT FIRE FLOW
- JUNCTION WITH DEFICIENT PEAK HOUR DEMAND PREESURE (LESS THAN 30 PSI)
- PIPELINES 6" AND LARGER ARE SHOWN AND WERE MODELED
- (#XX) HYDRANT FLOW TEST GROUP

EXHIBIT 3-2

NORTH

SCALE: 1" = approx. 400'

CHIEF JOSEPH VILLAGE

SEPTIC MAINTANCE

TERRACE APARTMENTS

KAMIAH APARTMENTS

NEZ PERCE VILLAGE

FAIRWAY RESERVOIR

LEGEND

- EXISTING HIGH PRESSURE
- XX–XXH HYDRANT
- J–XXX NODE
- FIRE HYDRANT NODE WITH DEFICIENT FIRE FLOW
- JUNCTION WITH DEFICIENT PEAK HOUR DEMAND PREESURE (LESS THAN 30 PSI)
- PIPELINES 6" AND LARGER ARE SHOWN AND WERE MODELED
- #XX HYDRANT FLOW TEST GROUP

DRAWN BY: AJT DESIGN BY: AJT

DATE: 12/2014 LOG NO. 00

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

2015 WATER SYSTEM PLAN UPDATE

EXISTING HIGH ZONE MAP
YEAR 2015

EXHIBIT 3-3

APPENDIX C

Item 6 – Water Modeling Results: Low Zone PHD Year 2015

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	124.29	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.68	262.30	2,933.06	606.94	Open	1.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	413.34	2,629.54	2,648.54	86.36	19.00
2		RES-OBS-2	398.70	2,629.54	2,648.54	86.36	19.00

Low Pressure PHD 2015 Pump 7 - Junction Report

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1		I13-1L	0.00	2,453.54	2,652.23	86.09
2		I13-2L	0.00	2,433.54	2,652.86	95.03
3		I14-1L	0.00	2,423.00	2,653.52	99.88
4		I14-2L	0.00	2,358.54	2,654.93	128.42
5		I14-3L	0.00	2,437.00	2,652.72	93.47
6		J-123	21.00	2,451.54	2,653.81	87.65
7		J-124	21.00	2,464.54	2,653.81	82.01
8		J-127	21.00	2,443.54	2,647.14	88.22
9		J-128	21.00	2,443.54	2,646.80	88.07
10		J-131	21.00	2,443.54	2,646.82	88.08
11		J-132	21.00	2,443.54	2,646.98	88.15
12		J-143	21.00	2,521.54	2,646.47	54.13
13		J-168	21.00	2,548.54	2,648.60	43.36
14		J-169	21.00	2,563.54	2,648.61	36.86
15		J-179	21.00	2,553.54	2,648.69	41.23
16		J-187	21.00	2,522.00	2,646.32	53.87
17		J-188	21.00	2,523.00	2,646.32	53.43
18		J-190	21.00	2,502.00	2,647.77	63.16
19		J-191	21.00	2,463.54	2,647.96	79.91
20		J-200	21.00	2,403.54	2,653.30	108.22
21		J-201	21.00	2,398.54	2,653.52	110.48
22		J-202	21.00	2,383.54	2,653.78	117.09
23		J-203	21.00	2,373.54	2,654.27	121.64
24		J-204	21.00	2,373.54	2,654.39	121.69
25		J-205	21.00	2,363.54	2,654.48	126.06
26		J-206	21.00	2,423.54	2,655.29	100.42
27		J-207	21.00	2,498.54	2,650.94	66.03
28		J-208	21.00	2,508.54	2,650.75	61.62
29		J-209	21.00	2,533.54	2,649.28	50.15
30		J-210	21.00	2,528.54	2,648.71	52.07
31		J-211	21.00	2,548.54	2,648.68	43.39
32		J-212	21.00	2,513.54	2,650.71	59.44
33		J-213	21.00	2,523.54	2,650.58	55.05
34		J-214	21.00	2,543.54	2,650.31	46.26
35		J-215	21.00	2,584.50	2,649.25	28.05
36		J-216	21.00	2,538.54	2,648.92	47.83
37		J-217	21.00	2,518.54	2,648.68	56.39
38		J-218	21.00	2,533.54	2,648.68	49.89
39		J-219	21.00	2,528.54	2,648.68	52.06
40		J-220	21.00	2,578.54	2,649.29	30.65
41		J-221	21.00	2,593.54	2,649.08	24.07
42		J-222	21.00	2,598.54	2,648.99	21.86
43		J-223	21.00	2,588.00	2,648.84	26.36
44		J-224	21.00	2,553.54	2,648.82	41.29
45		J-225	21.00	2,553.54	2,648.79	41.27
46		J-226	21.00	2,573.54	2,648.75	32.59
47		J-227	21.00	2,582.50	2,648.73	28.70
48		J-228	0.00	2,520.00	2,651.96	57.18
49		J-229	21.00	2,513.54	2,650.91	59.52
50		J-230	21.00	2,528.54	2,650.53	52.86

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
51		J-231	21.00	2,523.54	2,650.50	55.01
52		J-232	21.00	2,563.54	2,649.20	37.12
53		J-233	21.00	2,568.54	2,649.20	34.95
54		J-234	21.00	2,553.54	2,648.91	41.33
55		J-235	21.00	2,567.54	2,648.91	35.26
56		J-237	21.00	2,528.54	2,648.71	52.07
57		J-238	21.00	2,523.54	2,648.68	54.22
58		J-239	21.00	2,553.54	2,649.03	41.38
59		J-240	21.00	2,473.54	2,649.82	76.38
60		J-241	21.00	2,463.54	2,649.78	80.70
61		J-242	21.00	2,513.54	2,647.88	58.21
62		J-243	21.00	2,559.54	2,647.62	38.17
63		J-244	21.00	2,581.54	2,647.73	28.68
64		J-245	21.00	2,553.54	2,647.50	40.71
65		J-246	21.00	2,513.54	2,647.77	58.16
66		J-247	21.00	2,503.54	2,648.01	62.60
67		J-248	21.00	2,473.54	2,647.97	75.58
68		J-249	21.00	2,453.54	2,647.96	84.24
69		J-250	21.00	2,453.54	2,647.95	84.24
70		J-251	21.00	2,508.54	2,647.32	60.13
71		J-252	21.00	2,528.54	2,647.17	51.40
72		J-253	21.00	2,498.54	2,646.83	64.25
73		J-254	21.00	2,461.54	2,646.45	80.12
74		J-255	21.00	2,450.54	2,646.38	84.86
75		J-256	21.00	2,513.54	2,646.34	57.54
76		J-257	21.00	2,523.54	2,646.34	53.21
77		J-258	21.00	2,553.54	2,647.31	40.63
78		J-259	21.00	2,563.54	2,647.32	36.30
79		J-260	21.00	2,543.54	2,647.31	44.96
80		J-261	21.00	2,629.54	2,648.54	8.23
81		J-262	21.00	2,581.54	2,648.75	29.12
82		J-263	21.00	2,503.54	2,646.75	62.05
83		J-264	21.00	2,480.54	2,646.77	72.03
84		J-265	21.00	2,503.54	2,647.77	62.50
85		J-266	21.00	2,567.54	2,648.63	35.14
86		J-267	21.00	2,561.54	2,648.64	37.74
87		J-268	21.00	2,511.54	2,648.66	59.42
88		J-269	21.00	2,538.54	2,648.64	47.71
89		J-270	21.00	2,539.54	2,648.70	47.30
90		J-271	21.00	2,529.54	2,650.47	52.40
91		J-300	21.00	2,583.54	2,647.43	27.68
92		J12-10L	0.00	2,578.00	2,649.29	30.89
93		J12-11L	0.00	0.00	2,649.08	1,147.85
94		J12-1L	0.00	2,521.54	2,650.46	55.86
95		J12-2L	0.00	2,505.54	2,650.50	62.81
96		J12-3L	0.00	2,523.00	2,650.48	55.24
97		J12-4L	0.00	2,543.54	2,650.47	46.33
98		J12-7L	0.00	2,582.00	2,649.38	29.20
99		J12-9L	0.00	2,533.00	2,650.46	50.90
100		J13-10L	0.00	2,474.00	2,652.55	77.37

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
101		J13-11L	0.00	2,503.00	2,652.17	64.64
102		J13-12L	0.00	2,488.54	2,651.46	70.59
103		J13-7L	0.00	2,538.54	2,650.52	48.52
104		J13-8L	0.00	2,539.54	2,650.47	48.07
105		J13-9L	0.00	2,536.00	2,650.56	49.64
106		J14	21.00	2,512.50	2,648.68	59.01
107		J14-2L	0.00	2,523.54	2,649.76	54.69
108		J14-3L	0.00	2,506.54	2,650.74	62.48
109		J14-4L	0.00	2,503.54	2,650.86	63.84
110		J14-5L	0.00	2,521.54	2,650.69	55.96
111		J14-6L	0.00	2,448.54	2,653.82	88.95
112		J14-7L	0.00	2,475.54	2,653.81	77.25
113		J14-8L	0.00	2,504.00	2,649.53	63.06
114		J15-1L	0.00	2,483.54	2,650.78	72.46
115		J15-2L	0.00	2,468.54	2,649.96	78.61
116		J15-3L	0.00	2,453.54	2,649.90	85.08
117		J15-4L	0.00	2,483.54	2,649.32	71.83
118		J15-5L	0.00	2,453.54	2,649.79	85.04
119		J15-7L	0.00	2,443.54	2,647.96	88.57
120		J15-8L	0.00	2,468.54	2,648.25	77.87
121		J15-9L	0.00	2,478.54	2,647.77	73.33
122		J16	21.00	2,509.00	2,648.70	60.53
123		J16-1L	0.00	2,423.54	2,647.95	97.24
124		J16-2L	0.00	2,448.54	2,647.95	86.41
125		J16-3L	0.00	2,473.54	2,647.80	75.51
126		J16-4L	0.00	2,463.00	2,647.96	80.14
127		J18	21.00	2,579.00	2,647.40	29.64
128		J20	21.00	2,585.00	2,647.41	27.04
129		J22	21.00	2,589.30	2,647.40	25.17
130		J24	21.00	2,595.00	2,647.40	22.70
131		J26	21.00	2,588.00	2,647.40	25.74
132		J28	21.00	2,583.00	2,647.40	27.90
133		J30	21.00	2,588.00	2,647.56	25.81
134		J32	21.00	2,532.00	2,650.46	51.33
135		J34	21.00	2,512.00	2,648.72	59.24
136		J36	21.00	2,510.00	2,648.74	60.11
137		J38	21.00	2,517.50	2,648.68	56.84
138		J40	21.00	2,517.00	2,648.67	57.05
139		J42	21.00	2,538.00	2,648.92	48.06
140		J44	21.00	2,522.00	2,648.92	54.99
141		J46	0.00	0.00	2,649.53	1,148.04
142		J48	0.00	2,588.00	2,647.40	25.74
143		J60	0.00	2,545.00	2,650.47	45.70
144		J64	0.00	2,629.00	2,648.66	8.52
145		J66	0.00	2,545.00	2,650.48	45.70
146		J68	0.00	2,540.00	2,650.56	47.90
147		J70	0.00	2,575.00	2,650.04	32.52
148		J72	0.00	2,558.00	2,650.40	40.04
149		J74	0.00	2,584.00	2,649.25	28.27
150		K-120101	0.00	2,511.54	2,648.66	59.41

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
151		K10-1L	0.00	2,553.54	2,648.68	41.23
152		K11-10L	0.00	2,509.00	2,648.70	60.53
153		K11-11L	0.00	2,511.50	2,648.72	59.46
154		K11-12L	0.00	2,517.00	2,648.67	57.05
155		K11-1L	0.00	2,533.54	2,648.68	49.89
156		K11-2L	0.00	2,527.54	2,648.68	52.49
157		K11-3L	0.00	2,539.54	2,648.68	47.29
158		K11-4L	0.00	2,517.54	2,648.68	56.82
159		K11-5L	0.00	2,509.54	2,648.68	60.29
160		K11-6L	0.00	2,509.54	2,648.68	60.29
161		K11-9L	0.00	2,518.00	2,648.66	56.61
162		K12-2L	0.00	2,539.54	2,648.64	47.27
163		K12-3L	0.00	2,540.54	2,648.64	46.84
164		K12-4L	0.00	2,522.00	2,648.92	54.99
165		K14-10L	0.00	2,518.54	2,648.93	56.50
166		K14-2L	0.00	2,543.54	2,649.09	45.74
167		K14-3L	0.00	2,529.54	2,648.71	51.63
168		K14-4L	0.00	2,525.54	2,648.69	53.36
169		K14-5L	0.00	2,503.54	2,648.05	62.62
170		K14-7L	0.00	2,523.54	2,648.84	54.29
171		K14-8L	0.00	2,539.54	2,648.68	47.29
172		K14-9L	0.00	2,548.54	2,648.67	43.38
173		K15-10L	0.00	2,579.54	2,647.59	29.49
174		K15-11L	0.00	2,589.00	2,647.40	25.30
175		K15-12L	0.00	2,568.54	2,647.41	34.18
176		K15-13L	0.00	2,563.54	2,647.42	36.35
177		K15-14L	0.00	2,543.54	2,647.53	45.06
178		K15-15L	0.00	2,553.54	2,647.54	40.73
179		K15-16L	0.00	2,592.00	2,647.40	24.00
180		K15-17L	0.00	2,523.54	2,647.65	53.78
181		K15-18L	0.00	2,500.00	2,647.77	64.03
182		K15-1L	0.00	2,507.50	2,648.00	60.88
183		K15-2L	0.00	2,507.54	2,647.96	60.84
184		K15-3L	0.00	2,523.54	2,647.98	53.92
185		K15-4L	0.00	2,491.54	2,647.99	67.79
186		K15-5L	0.00	2,489.54	2,648.09	68.70
187		K15-6L	0.00	2,493.54	2,648.20	67.01
188		K15-7L	0.00	2,479.54	2,648.07	73.02
189		K15-8L	0.00	2,588.00	2,647.40	25.74
190		K15-9L	0.00	2,583.54	2,647.40	27.67
191		K16-2L	0.00	2,521.54	2,647.28	54.48
192		K16-3L	0.00	2,473.54	2,647.31	75.29
193		K16-4L	0.00	2,521.54	2,646.32	54.07
194		K16-5L	0.00	2,534.00	2,646.32	48.67
195		K17-1L	0.00	2,477.54	2,646.38	73.16
196		K17-2L	0.00	2,469.54	2,646.70	76.76
197		K17-3L	0.00	2,448.54	2,646.38	85.72
198		K17-4L	0.00	2,443.54	2,646.80	88.07
199		K17-5L	0.00	2,443.54	2,646.98	88.15
200		K17-6L	0.00	2,476.00	2,646.77	74.00

		ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
201		K17-7L	0.00	2,521.54	2,646.47	54.13
202		K17-8L	0.00	2,477.54	2,646.54	73.23
203		K18-1L	0.00	2,453.54	2,646.80	83.74
204		L13-1H	0.00	2,553.00	2,648.79	41.51
205		L13-2H	0.00	2,553.00	2,648.82	41.52
206		L14-3L	0.00	2,553.54	2,648.61	41.19
207		L14-4L	0.00	2,563.54	2,648.61	36.86
208		L15-3L	0.00	2,563.54	2,648.61	36.86
209		L15-4L	0.00	2,565.54	2,648.63	36.00
210		L15-5L	0.00	2,565.54	2,648.65	36.01
211		L15-6L	0.00	2,564.54	2,648.65	36.44
212		L15-7L	0.00	2,582.00	2,647.73	28.48
213		L16-1L	0.00	2,561.54	2,647.31	37.17
214		L16-2L	0.00	2,538.54	2,647.31	47.13
215		L16-3L	0.00	2,543.54	2,647.31	44.96
216		L16-4L	0.00	2,543.54	2,647.31	44.96

Low Pressure PHD 2015 Pump 7 on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,122.01	3.18	0.07	3.64	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-39.67	0.45	0.03	0.22	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	53.12	0.60	0.08	0.37	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	137.48	0.88	0.08	0.54	Open	0
5		P-104	K15-5L	K15-6L	190.00	8.00	120.00	-137.48	0.88	0.10	0.54	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-140.98	0.90	0.05	0.56	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-140.98	0.90	0.18	0.56	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	257.46	1.64	0.03	1.71	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	257.46	1.64	0.21	1.72	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	213.88	1.37	0.12	1.22	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,122.01	3.18	0.11	3.64	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	71.79	0.81	0.05	0.66	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	183.78	1.17	0.07	0.92	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	136.81	0.87	0.25	0.53	Open	0
15		P-115	J-244	J-261	875.00	8.00	120.00	-184.04	1.17	0.81	0.92	Open	0
16		P-117	J-300	J-259	220.00	6.00	120.00	63.00	0.71	0.11	0.51	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-24.15	0.27	0.01	0.09	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-924.58	2.62	0.99	2.54	Open	0
19		P-121	L16-2L	J-260	285.00	6.00	120.00	-3.15	0.04	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-3.15	0.04	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	-3.55	0.04	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-108.55	0.69	0.09	0.35	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	175.70	1.12	0.34	0.85	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	46.15	0.52	0.07	0.29	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	59.45	0.67	0.07	0.46	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	745.09	2.11	0.48	1.70	Open	0
27		P-130	J-269	K12-3L	235.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	21.00	0.13	0.01	0.02	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	42.00	0.17	0.01	0.02	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-63.00	0.26	0.01	0.04	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-63.00	0.26	0.01	0.04	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	-84.34	0.34	0.00	0.07	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	63.34	0.26	0.01	0.04	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	38.45	0.44	0.07	0.21	Open	0

Low Pressure PHD 2015 Pump 7 on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-451.82	1.28	0.19	0.67	Open	0
37		P-140	J-255	K17-3L	60.00	6.00	120.00	17.45	0.20	0.00	0.04	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	17.45	0.20	0.04	0.05	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-19.41	0.22	0.03	0.06	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	22.59	0.14	0.00	0.02	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	42.00	0.17	0.00	0.02	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	391.23	1.11	0.25	0.52	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	21.00	0.09	0.00	0.01	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-34.30	0.39	0.04	0.17	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-97.30	1.10	0.16	1.15	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	391.23	1.11	0.13	0.52	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-76.30	0.87	0.16	0.73	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	21.00	0.24	0.01	0.07	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-34.30	0.39	0.01	0.17	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-239.05	0.68	0.03	0.21	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-118.30	1.34	0.66	1.65	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-87.55	0.99	0.28	0.95	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-66.55	0.76	0.13	0.57	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	42.00	0.48	0.03	0.24	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	21.00	0.24	0.00	0.06	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	8.00	120.00	-163.04	1.04	0.30	0.74	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-239.05	0.68	0.00	0.21	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	46.96	0.30	0.01	0.07	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	-79.04	0.50	0.03	0.19	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	132.99	0.85	0.12	0.51	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	132.99	0.85	0.04	0.50	Open	0
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	6.00	120.00	58.84	0.67	0.07	0.45	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-178.63	0.51	0.07	0.12	Open	0
79		P-190	K15-3L	J-242	209.00	6.00	120.00	58.84	0.67	0.09	0.45	Open	0
80		P-191	K15-6L	K15-1L	270.00	6.00	120.00	75.95	0.86	0.20	0.73	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-18.67	0.21	0.02	0.05	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-39.67	0.45	0.03	0.22	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	20.41	0.23	0.03	0.06	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	20.41	0.23	0.02	0.06	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	41.41	0.47	0.08	0.24	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	576.80	2.36	0.26	2.58	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	41.41	0.47	0.06	0.24	Open	0
88		P-201	K15-6L	K14-10L	385.00	8.00	120.00	-272.27	1.74	0.73	1.90	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	272.27	1.74	0.35	1.90	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	39.43	0.25	0.01	0.05	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	39.43	0.25	0.02	0.05	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	-2.57	0.02	0.00	0.00	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	39.43	0.25	0.02	0.05	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	39.43	0.25	0.00	0.06	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	39.43	0.25	0.01	0.05	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	21.00	0.13	0.01	0.02	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	18.43	0.12	0.00	0.01	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-176.05	0.50	0.07	0.12	Open	0
100		P-221	J-214	J66	183.10	6.00	120.00	-86.09	0.98	0.17	0.92	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	42.00	0.48	0.02	0.24	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	-47.18	0.13	0.01	0.01	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	-68.18	0.19	0.01	0.02	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	42.00	0.17	0.00	0.02	Open	0
105		P-234	J-268	K11-5L	200.00	6.00	120.00	-20.66	0.23	0.01	0.07	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
106		P-235	J14	K11-6L	201.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	5.18	0.01	0.00	0.00	Open	0
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	-5.18	0.01	0.00	0.00	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	59.45	0.67	0.15	0.46	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	534.80	2.18	0.45	2.24	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	59.45	0.67	0.09	0.46	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	59.89	0.68	0.04	0.47	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	59.89	0.68	0.11	0.47	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	17.85	0.20	0.00	0.05	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	17.85	0.20	0.01	0.05	Open	0
117		P-245	K15-2L	K15-1L	59.00	6.00	120.00	-75.95	0.86	0.04	0.73	Open	0
118		P-246	J-242	K15-2L	101.00	6.00	120.00	-75.95	0.86	0.07	0.73	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	268.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	290.56	1.85	0.62	2.15	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	63.00	0.40	0.01	0.12	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	42.00	0.27	0.00	0.06	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	290.56	1.85	0.77	2.15	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	290.56	1.85	0.75	2.15	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-360.34	2.30	0.13	3.20	Open	0
127		P-29	J-213	J-214	187.52	8.00	120.00	233.24	1.49	0.27	1.43	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	597.80	3.82	0.49	8.17	Open	0
129		P-30	J12-7L	J-214	412.51	8.00	120.00	-298.34	1.90	0.93	2.26	Open	0
130		P-31	J74	J12-7L	82.42	8.00	120.00	-251.23	1.60	0.14	1.64	Open	0
131		P-32	J-215	J-216	851.69	12.00	120.00	330.82	0.94	0.32	0.38	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-121.16	0.49	0.03	0.14	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	-5.18	0.01	0.00	0.00	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	-26.18	0.07	0.00	0.00	Open	0
135		P-38	J12-7L	J-220	318.19	6.00	120.00	47.11	0.53	0.10	0.30	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	128.41	0.82	0.20	0.47	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	618.80	2.53	0.12	2.94	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	126.07	0.80	0.09	0.46	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	126.00	0.80	0.15	0.46	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	105.00	0.30	0.02	0.05	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
141		P-43	J-224	J-225	430.00	10.00	120.00	84.00	0.34	0.03	0.07	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	63.00	0.26	0.04	0.04	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	42.00	0.17	0.00	0.02	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	21.00	0.13	0.02	0.02	Open	0
145		P-48	J-216	J-234	405.00	10.00	120.00	42.00	0.17	0.01	0.02	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	21.00	0.13	0.01	0.02	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-639.81	1.82	0.09	1.29	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	132.46	1.50	0.39	2.04	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	43.10	0.49	0.05	0.25	Open	0
151		P-57	J68	J13-7L	113.68	10.00	120.00	176.43	0.72	0.03	0.29	Open	0
152		P-57.5	J68	J14-5L	473.31	10.00	120.00	-176.43	0.72	0.14	0.29	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	176.43	0.72	0.05	0.29	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	176.43	0.72	0.01	0.29	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-660.81	1.87	0.45	1.36	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-22.10	0.14	0.00	0.02	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-90.79	1.03	0.20	1.01	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	63.00	0.71	0.08	0.51	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	181.39	6.00	120.00	42.00	0.48	0.04	0.24	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	21.00	0.24	0.00	0.07	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-660.81	1.87	0.36	1.36	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	18.66	0.12	0.01	0.01	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	-41.93	0.48	0.06	0.24	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	20.93	0.24	0.04	0.07	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	21.00	0.24	0.01	0.07	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	21.00	0.24	0.01	0.07	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	21.00	0.24	0.00	0.07	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	-89.18	0.25	0.01	0.03	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,410.22	4.00	1.47	5.56	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	131.18	0.37	0.00	0.07	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-183.80	2.09	0.19	3.74	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	225.20	2.56	0.82	5.44	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	183.20	1.17	0.46	0.91	Open	0

Low Pressure PHD 2015 Pump 7 on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
176		P-88	J15-4L	J46	237.07	8.00	120.00	-179.49	1.15	0.21	0.88	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-362.69	2.31	1.07	3.24	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,368.21	3.88	2.88	5.25	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-221.71	1.42	0.28	1.30	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	21.00	0.13	0.00	0.02	Open	0
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-137.71	0.88	0.17	0.54	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	80.89	0.92	0.33	0.82	Open	0
183		P-97	K15-6L	K14-5L	320.00	6.00	120.00	58.84	0.67	0.14	0.45	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	225.20	0.92	0.16	0.45	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	113.79	1.29	0.26	1.54	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	555.80	2.27	0.22	2.41	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	2,092.03	5.93	1.08	11.54	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	15.10	0.04	0.00	0.00	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	13.89	0.04	0.00	0.00	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,933.06	8.32	2.12	21.57	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	841.03	2.39	7.71	2.13	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-330.99	1.35	0.04	0.92	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	1.59	0.02	0.00	0.00	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	244.90	2.78	0.76	6.35	Open	0
201		P113	J72	J70	229.97	8.00	120.00	244.90	1.56	0.36	1.56	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-244.90	1.00	0.08	0.53	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	209.23	0.59	0.00	0.15	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-19.01	0.12	0.00	0.01	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-40.01	0.26	0.00	0.06	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	-1.99	0.01	0.00	0.00	Open	0
209		P23	J24	J22	147.66	8.00	120.00	-22.99	0.15	0.00	0.02	Open	0
210		P25	J22	J20	76.49	8.00	120.00	-43.99	0.28	0.01	0.07	Open	0

Low Pressure PHD 2015 Pump 7 on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	46.96	0.30	0.01	0.07	Open	0
214		P33	J18	J20	237.74	8.00	120.00	-14.05	0.09	0.00	0.01	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	21.00	0.24	0.01	0.07	Open	0
217		P39	J36	J16	251.95	8.00	120.00	62.66	0.40	0.03	0.13	Open	0
218		P41	J16	J14	364.77	8.00	120.00	41.66	0.27	0.02	0.06	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-142.16	0.58	0.02	0.19	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-225.82	0.92	0.19	0.45	Open	0
223		P51	K11-5L	J14	78.82	6.00	120.00	-20.66	0.23	0.01	0.07	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	-105.34	0.43	0.00	0.11	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	84.34	0.34	0.00	0.07	Open	0
227		P59	J42	J44	137.81	10.00	120.00	21.00	0.09	0.00	0.01	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-179.49	1.15	0.24	0.88	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-19.01	0.12	0.00	0.02	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	244.25	1.00	0.14	0.53	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	244.25	1.00	0.17	0.53	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	244.25	1.56	0.38	1.56	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	244.25	1.56	0.21	1.56	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	244.25	2.77	1.05	6.32	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	42.00	0.48	0.01	0.24	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	440.84	12.00	110.00	142.60	0.40	0.04	0.09	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	428.44	1.22	0.12	0.61	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	412.59	1.17	0.12	0.57	Open	0

APPENDIX C

Item 7 – Water Modeling Results: Low Zone Fire Flow Year 2015; 2-, 3- & 4-Hour Fire Events

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	125.28	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.68	263.15	2,923.74	608.88	Open	1.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	993.79	2,629.54	2,647.79	82.95	18.25
2		RES-OBS-2	935.98	2,629.54	2,647.79	82.95	18.25

Low Zone 2015 MDD FF 2hr Pump 7 Tank 2647.79 - Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	J12-7L	25.25	2,640.28	4,902.52	6,479.82	J12-7L	13.00	2,611.99	4,903.96	4,902.52
2		I13-2L	3,000.00	K15-16L	22.81	2,644.64	5,044.04	8,708.16	K15-16L	9.43	2,613.77	5,044.36	5,044.04
3		I14-1L	3,000.00	K15-16L	22.91	2,644.87	5,089.74	5,887.22	K15-16L	18.19	2,633.97	5,089.79	5,089.74
4		I14-2L	3,000.00	K15-16L	23.15	2,645.42	5,115.21	14,603.32	K15-16L	-15.44	2,556.38	5,115.45	5,115.21
5		I14-3L	3,000.00	K15-16L	22.76	2,644.54	5,017.80	7,604.00	K15-16L	13.21	2,622.48	5,018.19	5,017.80
6		J12-10L	3,000.00	J12-10L	18.27	2,620.16	2,777.08	2,777.10	J12-10L	20.00	2,624.16	2,777.11	2,777.08
7		J12-11L	3,000.00	L13-1H	29.85	2,621.89	4,163.05	28,820.64	L13-1H	-731.23	865.42	4,165.85	4,163.05
8		J12-1L	3,000.00	J12-1L	-136.90	2,205.59	1,201.42	1,201.30	J12-1L	20.00	2,567.70	1,201.30	1,201.30
9		J12-2L	3,000.00	J12-2L	-38.94	2,415.68	1,876.38	1,876.37	J12-2L	20.00	2,551.70	1,876.37	1,876.37
10		J12-3L	3,000.00	J12-4L	-34.26	2,464.46	1,631.15	1,912.71	J12-4L	11.10	2,569.15	1,631.06	1,631.06
11		J12-4L	3,000.00	J12-4L	-147.82	2,202.38	1,010.50	1,010.51	J12-4L	20.00	2,589.70	1,010.51	1,010.50
12		J12-7L	3,000.00	J12-7L	19.80	2,627.69	2,968.31	2,966.11	J12-7L	20.00	2,628.16	2,966.07	2,966.07
13		J12-9L	3,000.00	J12-9L	-107.54	2,284.80	1,231.18	1,231.02	J12-9L	20.00	2,579.16	1,231.03	1,231.03
14		J13-10L	3,000.00	K15-16L	22.72	2,644.45	4,990.86	6,061.06	K15-16L	17.58	2,632.57	4,991.58	4,990.86
15		J13-11L	3,000.00	J13-11L	44.79	2,606.37	4,732.12	4,732.14	J13-11L	20.00	2,549.16	4,732.13	4,732.12
16		J13-12L	3,000.00	J12-7L	24.83	2,639.30	4,633.76	5,540.32	J12-7L	16.11	2,619.18	4,634.66	4,633.76
17		J13-7L	3,000.00	J12-7L	24.33	2,638.14	4,331.09	6,392.99	J12-7L	9.84	2,604.70	4,330.01	4,330.01
18		J13-8L	3,000.00	J13-8L	-213.95	2,045.78	890.17	890.21	J13-8L	20.00	2,585.70	890.21	890.17
19		J13-9L	3,000.00	J13-9L	27.38	2,599.19	3,507.09	3,507.33	J13-9L	20.00	2,582.16	3,507.33	3,507.09
20		J14-2L	3,000.00	K15-16L	21.54	2,641.70	3,727.99	8,992.33	K15-16L	2.14	2,596.95	3,729.70	3,727.99
21		J14-3L	3,000.00	K15-16L	21.96	2,642.67	4,159.00	9,598.94	K15-16L	1.69	2,595.90	4,156.49	4,156.49
22		J14-4L	3,000.00	K15-16L	21.93	2,642.60	4,164.24	10,309.81	K15-16L	-1.86	2,587.70	4,161.75	4,161.75
23		J14-5L	3,000.00	K15-16L	22.08	2,642.96	4,261.74	7,769.74	K15-16L	10.08	2,615.26	4,260.23	4,260.23
24		J14-6L	3,000.00	K15-16L	22.61	2,644.18	4,861.49	12,736.74	K15-16L	-8.82	2,571.64	4,862.15	4,861.49
25		J14-7L	3,000.00	J14-7L	30.03	2,544.84	3,343.04	3,343.35	J14-7L	20.00	2,521.70	3,343.35	3,343.04
26		J14-8L	3,000.00	K15-16L	20.36	2,638.99	3,144.94	3,771.84	K15-16L	18.36	2,634.37	3,145.03	3,144.94
27		J15-1L	3,000.00	K15-16L	21.64	2,641.94	3,887.12	7,628.35	K15-16L	9.15	2,613.13	3,887.69	3,887.12
28		J15-2L	3,000.00	K15-16L	20.71	2,639.80	3,312.10	5,588.72	K15-16L	13.93	2,624.15	3,312.81	3,312.10
29		J15-3L	3,000.00	K15-16L	20.62	2,639.59	3,266.43	3,306.47	K15-16L	19.91	2,637.94	3,266.90	3,266.43
30		J15-4L	3,000.00	K15-16L	19.35	2,636.66	2,775.91	7,020.32	K15-16L	2.86	2,598.60	2,776.03	2,775.91
31		J15-5L	3,000.00	J15-5L	28.59	2,519.53	3,238.34	3,238.34	J15-5L	20.00	2,499.70	3,238.34	3,238.34
32		J15-7L	3,000.00	J15-7L	-984.72	170.93	680.21	680.22	J15-7L	20.00	2,489.70	680.22	680.21
33		J15-8L	3,000.00	K15-16L	16.60	2,630.30	2,151.89	6,543.45	K15-16L	-5.23	2,579.93	2,152.15	2,151.89
34		J15-9L	3,000.00	K15-16L	14.21	2,624.80	1,826.17	2,722.79	K15-16L	15.79	2,628.44	1,824.44	1,824.44
35		J16-1L	3,000.00	K15-16L	15.97	2,628.85	2,053.49	3,176.59	K15-16L	15.08	2,626.81	2,053.53	2,053.49
36		J16-2L	3,000.00	K15-16L	15.97	2,628.85	2,053.49	2,117.51	K15-16L	19.77	2,637.62	2,053.54	2,053.49
37		J16-3L	3,000.00	K15-16L	15.43	2,627.61	1,980.73	4,407.51	K15-16L	6.93	2,608.00	1,980.47	1,980.47
38		J16-4L	3,000.00	K15-16L	15.97	2,628.85	2,053.49	3,668.25	K15-16L	12.44	2,620.70	2,053.54	2,053.49
39		K-120101	3,000.00	K12-3L	26.24	2,601.10	3,456.84	4,262.71	K12-3L	7.43	2,557.69	3,456.91	3,456.84
40		K10-1L	3,000.00	K10-1L	-90.00	2,345.84	1,126.63	1,126.47	K10-1L	20.00	2,599.70	1,126.47	1,126.47
41		K11-10L	3,000.00	K11-10L	34.01	2,587.48	3,768.25	3,768.40	K11-10L	20.00	2,555.16	3,768.40	3,768.25
42		K11-11L	3,000.00	J12-7L	23.85	2,637.04	3,963.77	4,552.60	J12-7L	17.54	2,622.49	3,963.81	3,963.77
43		K11-12L	3,000.00	J12-7L	24.13	2,637.70	4,073.66	4,853.22	J12-7L	16.87	2,620.93	4,073.72	4,073.66
44		K11-1L	3,000.00	K10-1L	29.75	2,622.20	4,164.66	5,053.93	K10-1L	11.33	2,579.70	4,166.10	4,164.66

Low Zone 2015 MDD FF 2hr Pump 7 Tank 2647.79 - Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
45		K11-2L	3,000.00	K10-1L	30.12	2,623.06	4,242.36	5,252.63	K10-1L	10.26	2,577.21	4,244.38	4,242.36
46		K11-3L	3,000.00	K11-3L	-31.15	2,467.66	1,703.91	1,703.87	K11-3L	20.00	2,585.70	1,703.87	1,703.87
47		K11-4L	3,000.00	J12-7L	24.15	2,637.74	4,081.64	5,339.00	J12-7L	14.63	2,615.77	4,081.71	4,081.64
48		K11-5L	3,000.00	K11-5L	30.88	2,580.81	3,552.85	3,552.90	K11-5L	20.00	2,555.70	3,552.90	3,552.85
49		K11-6L	3,000.00	K11-6L	-25.06	2,451.71	2,005.02	2,005.02	K11-6L	20.00	2,555.70	2,005.01	2,005.01
50		K11-9L	3,000.00	K11-9L	10.88	2,543.10	2,662.90	2,662.90	K11-9L	20.00	2,564.16	2,662.90	2,662.90
51		K12-2L	3,000.00	K12-2L	-17.28	2,499.66	1,889.30	1,889.27	K12-2L	20.00	2,585.70	1,889.27	1,889.27
52		K12-3L	3,000.00	K12-3L	-49.08	2,427.28	1,512.59	1,512.54	K12-3L	20.00	2,586.70	1,512.53	1,512.53
53		K12-4L	3,000.00	K12-4L	16.96	2,561.13	2,871.08	2,869.00	K12-4L	20.00	2,568.16	2,868.99	2,868.99
54		K14-10L	3,000.00	K15-16L	19.49	2,636.99	2,823.68	5,983.05	K15-16L	8.63	2,611.92	2,823.77	2,823.68
55		K14-2L	3,000.00	K15-16L	21.97	2,642.70	4,022.07	7,822.91	K15-16L	9.80	2,614.63	4,023.44	4,022.07
56		K14-3L	3,000.00	K14-3L	27.59	2,593.22	3,468.07	3,469.73	K14-3L	20.00	2,575.70	3,469.74	3,468.07
57		K14-4L	3,000.00	K14-4L	-23.74	2,470.76	1,912.08	1,912.06	K14-4L	20.00	2,571.70	1,912.06	1,912.06
58		K14-5L	3,000.00	K15-16L	15.51	2,627.80	1,998.14	2,998.86	K15-16L	15.52	2,627.82	1,997.96	1,997.96
59		K14-7L	3,000.00	K15-16L	22.61	2,644.18	4,522.26	9,124.05	K15-16L	8.20	2,610.91	4,522.52	4,522.26
60		K14-8L	3,000.00	K15-16L	23.21	2,645.56	5,168.20	8,776.66	K15-16L	12.94	2,621.87	5,172.49	5,168.20
61		K14-9L	3,000.00	L15-5L	24.88	2,622.97	3,631.54	4,014.56	L15-5L	16.67	2,604.02	3,633.09	3,631.54
62		K15-10L	3,000.00	K15-10L	-13.40	2,548.63	1,316.84	1,317.94	K15-10L	20.00	2,625.70	1,317.94	1,316.84
63		K15-11L	3,000.00	K15-11L	-6.93	2,573.00	1,117.06	1,117.05	K15-11L	20.00	2,635.16	1,117.03	1,117.03
64		K15-12L	3,000.00	K15-16L	7.13	2,608.46	1,332.05	2,543.74	K15-16L	11.47	2,618.47	1,331.85	1,331.85
65		K15-13L	3,000.00	K15-16L	9.96	2,614.98	1,466.61	2,950.38	K15-16L	10.37	2,615.94	1,466.51	1,466.51
66		K15-14L	3,000.00	K15-16L	11.74	2,619.09	1,584.37	3,659.21	K15-16L	6.47	2,606.94	1,584.49	1,584.37
67		K15-15L	3,000.00	K15-16L	12.52	2,620.90	1,650.65	2,743.82	K15-16L	14.23	2,624.84	1,650.58	1,650.58
68		K15-16L	3,000.00	K15-16L	-8.71	2,571.90	960.36	960.33	K15-16L	20.00	2,638.16	960.31	960.31
69		K15-17L	3,000.00	K15-16L	13.13	2,622.30	1,706.92	4,484.71	K15-16L	1.73	2,596.00	1,706.86	1,706.86
70		K15-18L	3,000.00	K15-16L	14.88	2,626.33	1,911.56	2,472.31	K15-16L	17.60	2,632.62	1,910.48	1,910.48
71		K15-1L	3,000.00	K15-16L	15.27	2,627.25	1,965.90	3,315.49	K15-16L	13.53	2,623.22	1,965.84	1,965.84
72		K15-2L	3,000.00	K15-16L	15.11	2,626.87	1,945.29	3,348.48	K15-16L	13.14	2,622.32	1,944.30	1,944.30
73		K15-3L	3,000.00	K15-16L	15.25	2,627.20	1,963.24	2,667.50	K15-16L	16.95	2,631.12	1,963.06	1,963.06
74		K15-4L	3,000.00	K15-16L	15.11	2,626.86	1,939.08	5,900.88	K15-16L	-5.39	2,579.55	1,938.36	1,938.36
75		K15-5L	3,000.00	K15-16L	15.35	2,627.43	1,976.92	5,731.54	K15-16L	-3.11	2,584.83	1,976.91	1,976.91
76		K15-6L	3,000.00	K15-16L	16.13	2,629.22	2,082.90	5,905.54	K15-16L	-1.90	2,587.61	2,083.40	2,082.90
77		K15-7L	3,000.00	K15-16L	15.50	2,627.78	1,999.66	5,956.56	K15-16L	-4.64	2,581.30	1,999.02	1,999.02
78		K15-8L	3,000.00	K15-16L	0.46	2,593.07	1,129.37	1,140.60	K15-16L	19.92	2,637.98	1,129.26	1,129.25
79		K15-9L	3,000.00	K15-16L	2.41	2,597.56	1,178.23	1,371.69	K15-16L	18.67	2,635.08	1,178.10	1,178.10
80		K16-2L	3,000.00	K15-16L	12.27	2,620.31	1,636.40	2,614.86	K15-16L	14.86	2,626.29	1,636.39	1,636.39
81		K16-3L	3,000.00	L16-1L	-60.48	2,421.95	1,157.08	1,737.14	L16-1L	1.06	2,563.99	1,158.00	1,157.08
82		K16-4L	3,000.00	K16-5L	-102.11	2,298.33	1,200.14	1,297.56	K16-5L	15.64	2,570.09	1,200.14	1,200.14
83		K16-5L	3,000.00	K16-5L	-143.64	2,202.49	1,054.85	1,054.85	K16-5L	20.00	2,580.16	1,054.86	1,054.85
84		K17-1L	3,000.00	K17-1L	-110.96	2,221.45	1,518.84	1,518.98	K17-1L	20.00	2,523.70	1,518.98	1,518.84
85		K17-2L	3,000.00	K15-16L	12.96	2,621.92	1,697.73	2,479.25	K15-16L	16.19	2,629.36	1,697.66	1,697.66
86		K17-3L	3,000.00	K15-16L	12.70	2,621.32	1,672.75	1,940.12	K15-16L	18.84	2,635.49	1,672.66	1,672.66
87		K17-4L	3,000.00	K15-16L	13.86	2,623.99	1,792.96	1,956.11	K15-16L	19.34	2,636.63	1,792.94	1,792.94
88		K17-5L	3,000.00	K15-16L	14.26	2,624.90	1,842.50	2,428.79	K15-16L	17.39	2,632.13	1,842.53	1,842.50

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
89		K17-6L	3,000.00	K15-16L	13.21	2,622.49	1,722.52	2,846.10	K15-16L	14.19	2,624.76	1,722.47	1,722.47
90		K17-7L	3,000.00	K16-5L	-45.36	2,429.31	1,550.93	1,577.82	K16-5L	19.12	2,578.13	1,551.32	1,550.93
91		K17-8L	3,000.00	K15-16L	12.84	2,621.62	1,685.22	1,952.16	K15-16L	18.85	2,635.51	1,685.14	1,685.14
92		K18-1L	3,000.00	K18-1L	-148.00	2,111.99	1,486.92	1,486.94	K18-1L	20.00	2,499.70	1,486.95	1,486.92
93		L13-1H	3,000.00	L13-1H	-25.69	2,493.71	1,615.39	1,615.20	L13-1H	20.00	2,599.16	1,615.19	1,615.19
94		L13-2H	3,000.00	L13-2H	-27.14	2,490.36	1,599.46	1,599.25	L13-2H	20.00	2,599.16	1,599.25	1,599.25
95		L14-3L	3,000.00	K15-16L	23.92	2,647.21	6,518.16	8,736.75	K15-16L	17.25	2,631.80	6,516.57	6,516.57
96		L14-4L	3,000.00	L14-4L	17.16	2,603.15	2,761.30	2,760.03	L14-4L	20.00	2,609.70	2,760.03	2,760.03
97		L15-3L	3,000.00	L15-3L	1.88	2,567.87	2,026.12	2,026.11	L15-3L	20.00	2,609.70	2,026.11	2,026.11
98		L15-4L	3,000.00	L15-4L	13.90	2,597.62	2,523.35	2,523.34	L15-4L	20.00	2,611.70	2,523.34	2,523.34
99		L15-5L	3,000.00	L15-5L	15.86	2,602.13	2,653.15	2,653.14	L15-5L	20.00	2,611.70	2,653.14	2,653.14
100		L15-6L	3,000.00	L15-5L	16.69	2,604.07	2,716.51	2,721.03	L15-5L	19.92	2,611.52	2,714.10	2,714.10
101		L15-7L	3,000.00	L15-7L	-7.18	2,565.42	1,367.83	1,368.91	L15-7L	20.00	2,628.16	1,368.91	1,367.83
102		L16-1L	3,000.00	L16-1L	-65.22	2,411.02	1,128.41	1,129.31	L16-1L	20.00	2,607.70	1,129.30	1,128.41
103		L16-2L	3,000.00	L16-1L	-57.06	2,429.86	1,179.11	1,332.85	L16-1L	15.69	2,597.74	1,180.07	1,179.11
104		L16-3L	3,000.00	L16-3L	-218.22	2,039.91	837.30	837.51	L16-3L	20.00	2,589.70	837.51	837.30
105		L16-4L	3,000.00	L16-3L	-110.17	2,289.29	1,108.53	1,108.94	L16-4L	20.00	2,589.70	1,108.93	1,108.53

Low Zone 2015 MDD FF 2hr Pump 7 Tank 2647.79 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,107.90	3.14	0.07	3.56	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-42.01	0.48	0.03	0.24	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	66.38	0.75	0.12	0.57	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	98.49	0.63	0.04	0.29	Open	0
5		P-104	K15-5L	K15-6L	190.00	8.00	120.00	-98.49	0.63	0.06	0.29	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-155.96	1.00	0.06	0.68	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-155.96	1.00	0.22	0.68	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	244.79	1.56	0.02	1.56	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	244.79	1.56	0.20	1.56	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	255.24	1.63	0.17	1.69	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,107.90	3.14	0.11	3.55	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	98.74	1.12	0.08	1.18	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	272.18	1.74	0.15	1.90	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-9.65	0.06	0.00	0.00	Open	0
15		P-115	J-244	J-261	875.00	8.00	120.00	166.03	1.06	0.67	0.76	Open	0
16		P-117	J-300	J-259	220.00	6.00	120.00	28.95	0.33	0.03	0.12	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.10	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-962.75	2.73	1.07	2.74	Open	0
19		P-121	L16-2L	J-260	285.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	-0.04	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.29	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	43.20	0.28	0.03	0.06	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-14.74	0.17	0.01	0.04	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	28.91	0.33	0.02	0.12	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	818.49	2.32	0.57	2.03	Open	0
27		P-130	J-269	K12-3L	235.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	1.21	0.00	0.00	0.00	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-10.86	0.04	0.00	0.00	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.26	0.22	0.02	0.06	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-582.66	1.65	0.30	1.08	Open	0
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.61	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.61	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-39.40	0.45	0.11	0.22	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-20.10	0.13	0.00	0.02	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	664.07	1.88	0.66	1.38	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-53.30	0.60	0.10	0.38	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-82.25	0.93	0.12	0.84	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	664.07	1.88	0.34	1.38	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-72.60	0.82	0.15	0.67	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-53.30	0.60	0.02	0.37	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-815.47	2.31	0.28	2.02	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-91.90	1.04	0.41	1.03	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.64	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.99	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	8.00	120.00	175.68	1.12	0.35	0.85	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-815.47	2.31	0.04	2.01	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	281.83	1.80	0.24	2.03	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	214.28	1.37	0.17	1.22	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	183.09	1.17	0.21	0.91	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	183.09	1.17	0.07	0.91	Open	0
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	6.00	120.00	55.74	0.63	0.07	0.41	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-679.75	1.93	0.83	1.44	Open	0
79		P-190	K15-3L	J-242	209.00	6.00	120.00	55.74	0.63	0.09	0.41	Open	0
80		P-191	K15-6L	K15-1L	270.00	6.00	120.00	71.95	0.82	0.18	0.66	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-32.36	0.37	0.05	0.15	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-42.01	0.48	0.04	0.24	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.39	0.29	0.04	0.10	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.39	0.29	0.03	0.10	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	35.04	0.40	0.06	0.17	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	541.22	2.21	0.23	2.29	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	35.04	0.40	0.05	0.17	Open	0
88		P-201	K15-6L	K14-10L	385.00	8.00	120.00	-226.17	1.44	0.52	1.35	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	226.17	1.44	0.25	1.35	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	126.07	0.80	0.12	0.46	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	126.07	0.80	0.17	0.46	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	106.77	0.68	0.20	0.34	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	126.07	0.80	0.15	0.46	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	126.07	0.80	0.02	0.46	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	126.07	0.80	0.13	0.46	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	116.42	0.74	0.04	0.39	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-786.52	2.23	1.13	1.88	Open	0
100		P-221	J-214	J66	183.10	6.00	120.00	-76.45	0.87	0.13	0.73	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	199.65	0.57	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	190.00	0.54	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.30	0.08	0.00	0.01	Open	0
105		P-234	J-268	K11-5L	200.00	6.00	120.00	-49.46	0.56	0.07	0.33	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
106		P-235	J14	K11-6L	201.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-218.95	0.62	0.08	0.18	Open	0
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	218.95	0.62	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	28.91	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	521.92	2.13	0.43	2.14	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	28.91	0.33	0.02	0.12	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	62.50	0.71	0.04	0.50	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	62.50	0.71	0.12	0.51	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	6.00	120.00	-71.95	0.82	0.04	0.66	Open	0
118		P-246	J-242	K15-2L	101.00	6.00	120.00	-71.95	0.82	0.07	0.66	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	268.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	283.18	1.81	0.59	2.05	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	28.95	0.18	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.30	0.12	0.00	0.01	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	283.18	1.81	0.74	2.05	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	283.18	1.81	0.72	2.05	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-359.51	2.29	0.13	3.19	Open	0
127		P-29	J-213	J-214	187.52	8.00	120.00	254.67	1.63	0.32	1.68	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	550.87	3.52	0.42	7.02	Open	0
129		P-30	J12-7L	J-214	412.51	8.00	120.00	-321.48	2.05	1.07	2.59	Open	0
130		P-31	J74	J12-7L	82.42	8.00	120.00	-268.54	1.71	0.15	1.86	Open	0
131		P-32	J-215	J-216	851.69	12.00	120.00	373.35	1.06	0.40	0.47	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-237.04	0.97	0.12	0.50	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	218.95	0.62	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	209.30	0.59	0.06	0.16	Open	0
135		P-38	J12-7L	J-220	318.19	6.00	120.00	52.93	0.60	0.12	0.37	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	168.26	1.07	0.34	0.78	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	560.52	2.29	0.10	2.45	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	89.94	0.57	0.05	0.24	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	57.90	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.25	0.14	0.00	0.01	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
141		P-43	J-224	J-225	430.00	10.00	120.00	38.60	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	28.95	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
145		P-48	J-216	J-234	405.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-570.18	1.62	0.07	1.04	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	143.11	1.62	0.45	2.35	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	66.23	0.75	0.12	0.56	Open	0
151		P-57	J68	J13-7L	113.68	10.00	120.00	135.50	0.55	0.02	0.18	Open	0
152		P-57.5	J68	J14-5L	473.31	10.00	120.00	-135.50	0.55	0.08	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	135.50	0.55	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	135.50	0.55	0.01	0.18	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-579.83	1.64	0.35	1.07	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-56.58	0.36	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-85.98	0.98	0.18	0.91	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	28.96	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	181.39	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-579.83	1.64	0.28	1.07	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-68.67	0.44	0.10	0.15	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	12.74	0.14	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-22.39	0.25	0.05	0.08	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	180.35	0.51	0.04	0.12	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,347.39	3.82	1.35	5.11	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-161.05	0.46	0.00	0.10	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-175.50	1.99	0.17	3.43	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	210.54	2.39	0.72	4.80	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	191.24	1.22	0.49	0.99	Open	0

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176		P-88	J15-4L	J46	237.07	8.00	120.00	-134.62	0.86	0.12	0.52	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-325.86	2.08	0.88	2.66	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,328.09	3.77	2.72	4.97	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-169.90	1.08	0.17	0.80	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-131.30	0.84	0.15	0.49	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	72.15	0.82	0.27	0.66	Open	0
183		P-97	K15-6L	K14-5L	320.00	6.00	120.00	55.74	0.63	0.13	0.41	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	210.54	0.86	0.14	0.40	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	118.04	1.34	0.28	1.64	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	531.57	2.17	0.20	2.22	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,936.87	5.49	0.93	10.00	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-491.06	1.39	0.09	0.79	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-451.84	1.28	0.09	0.67	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,923.74	8.29	2.10	21.44	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	986.87	2.80	10.36	2.87	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-335.18	1.37	0.04	0.95	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-29.75	0.34	0.07	0.13	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	258.73	2.94	0.84	7.03	Open	0
201		P113	J72	J70	229.97	8.00	120.00	258.73	1.65	0.40	1.73	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-258.73	1.06	0.08	0.58	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	249.24	0.71	0.00	0.23	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-100.41	0.64	0.04	0.30	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-110.06	0.70	0.02	0.35	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	81.11	0.52	0.07	0.20	Open	0
209		P23	J24	J22	147.66	8.00	120.00	71.46	0.46	0.02	0.16	Open	0
210		P25	J22	J20	76.49	8.00	120.00	61.81	0.39	0.01	0.12	Open	0

Low Zone 2015 MDD FF 2hr Pump 7 Tank 2647.79 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	281.83	1.80	0.31	2.03	Open	0
214		P33	J18	J20	237.74	8.00	120.00	162.12	1.03	0.17	0.73	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
217		P39	J36	J16	251.95	8.00	120.00	68.76	0.44	0.04	0.15	Open	0
218		P41	J16	J14	364.77	8.00	120.00	59.11	0.38	0.04	0.11	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-246.69	1.01	0.05	0.53	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-325.10	1.33	0.37	0.89	Open	0
223		P51	K11-5L	J14	78.82	6.00	120.00	-49.46	0.56	0.03	0.33	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	-8.44	0.03	0.00	0.00	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-1.21	0.00	0.00	0.00	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-144.27	0.92	0.16	0.59	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-90.76	0.58	0.01	0.25	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	238.74	0.98	0.13	0.50	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	238.74	0.98	0.16	0.50	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	238.74	1.52	0.36	1.49	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	238.74	1.52	0.20	1.49	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	238.74	2.71	1.01	6.06	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.30	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	440.84	12.00	110.00	133.76	0.38	0.04	0.08	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	502.73	1.43	0.16	0.82	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	484.14	1.37	0.16	0.77	Open	0

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	124.77	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.68	262.64	2,929.31	607.72	Open	1.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	996.67	2,629.54	2,646.58	77.45	17.04
2		RES-OBS-2	938.68	2,629.54	2,646.58	77.45	17.04

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	I13-1L	3,000.00	K15-16L	22.17	2,643.16	4,690.53	6,453.90	K15-16L	15.99	2,628.90	4,691.69	4,690.53
2	I13-2L	3,000.00	K15-16L	22.29	2,643.44	4,780.14	8,678.65	K15-16L	9.04	2,612.87	4,780.73	4,780.14
3	I14-1L	3,000.00	K15-16L	22.39	2,643.67	4,831.96	5,867.45	K15-16L	17.73	2,632.91	4,832.17	4,831.96
4	I14-2L	3,000.00	K15-16L	22.62	2,644.21	4,863.48	14,572.38	K15-16L	-15.76	2,555.63	4,863.67	4,863.48
5	I14-3L	3,000.00	K15-16L	22.24	2,643.34	4,751.79	7,577.20	K15-16L	12.79	2,621.51	4,752.83	4,751.79
6	J12-10L	3,000.00	J12-10L	17.75	2,618.97	2,707.94	2,707.98	J12-10L	20.00	2,624.16	2,707.98	2,707.94
7	J12-11L	3,000.00	K15-16L	21.73	2,642.14	3,989.44	28,815.65	K15-16L	-130.14	2,291.66	3,990.03	3,989.44
8	J12-1L	3,000.00	J12-1L	-137.42	2,204.40	1,191.79	1,191.68	J12-1L	20.00	2,567.70	1,191.68	1,191.68
9	J12-2L	3,000.00	J12-2L	-39.45	2,414.49	1,864.03	1,864.02	J12-2L	20.00	2,551.70	1,864.02	1,864.02
10	J12-3L	3,000.00	J12-4L	-34.78	2,463.27	1,613.46	1,897.34	J12-4L	11.10	2,569.15	1,613.35	1,613.35
11	J12-4L	3,000.00	J12-4L	-148.34	2,201.19	999.48	999.50	J12-4L	20.00	2,589.70	999.50	999.48
12	J12-7L	3,000.00	J12-7L	19.28	2,626.50	2,878.40	2,878.46	J12-7L	20.00	2,628.16	2,878.42	2,878.40
13	J12-9L	3,000.00	J12-9L	-108.06	2,283.61	1,219.69	1,219.52	J12-9L	20.00	2,579.16	1,219.52	1,219.52
14	J13-10L	3,000.00	K15-16L	22.20	2,643.25	4,722.38	6,032.97	K15-16L	17.14	2,631.56	4,723.50	4,722.38
15	J13-11L	3,000.00	K15-16L	22.14	2,643.10	4,666.08	4,702.88	K15-16L	19.94	2,638.01	4,667.25	4,666.08
16	J13-12L	3,000.00	J12-7L	24.31	2,638.10	4,496.57	5,510.79	J12-7L	15.74	2,618.33	4,497.43	4,496.57
17	J13-7L	3,000.00	J12-7L	23.81	2,636.95	4,185.57	6,334.27	J12-7L	9.68	2,604.34	4,183.50	4,183.50
18	J13-8L	3,000.00	J13-8L	-214.46	2,044.59	881.10	881.14	J13-8L	20.00	2,585.70	881.14	881.10
19	J13-9L	3,000.00	J13-9L	26.86	2,597.99	3,473.35	3,473.54	J13-9L	20.00	2,582.16	3,473.54	3,473.35
20	J14-2L	3,000.00	K15-16L	21.02	2,640.51	3,486.30	8,928.07	K15-16L	1.95	2,596.50	3,486.49	3,486.30
21	J14-3L	3,000.00	K15-16L	21.44	2,641.48	3,816.64	9,543.66	K15-16L	1.45	2,595.34	3,816.80	3,816.64
22	J14-4L	3,000.00	K15-16L	21.41	2,641.41	3,817.47	10,253.01	K15-16L	-2.08	2,587.21	3,817.83	3,817.47
23	J14-5L	3,000.00	K15-16L	21.56	2,641.76	3,913.12	7,715.20	K15-16L	9.77	2,614.55	3,913.36	3,913.12
24	J14-6L	3,000.00	K15-16L	22.09	2,642.98	4,593.41	12,693.48	K15-16L	-9.09	2,571.01	4,594.42	4,593.41
25	J14-7L	3,000.00	J14-7L	29.51	2,543.64	3,325.61	3,325.91	J14-7L	20.00	2,521.70	3,325.91	3,325.61
26	J14-8L	3,000.00	K15-16L	19.84	2,637.79	2,934.37	3,747.16	K15-16L	17.90	2,633.32	2,934.40	2,934.37
27	J15-1L	3,000.00	K15-16L	21.12	2,640.74	3,599.97	7,590.75	K15-16L	8.79	2,612.30	3,600.01	3,599.97
28	J15-2L	3,000.00	K15-16L	20.19	2,638.60	3,086.47	5,562.57	K15-16L	13.51	2,623.17	3,086.52	3,086.47
29	J15-3L	3,000.00	K15-16L	20.10	2,638.39	3,044.11	3,292.26	K15-16L	19.42	2,636.82	3,044.15	3,044.11
30	J15-4L	3,000.00	K15-16L	18.83	2,635.46	2,586.24	6,983.96	K15-16L	2.55	2,597.89	2,586.56	2,586.24
31	J15-5L	3,000.00	K15-16L	20.06	2,638.29	3,022.15	3,224.44	K15-16L	19.53	2,637.08	3,024.82	3,022.15
32	J15-7L	3,000.00	J15-7L	-985.24	169.74	677.44	677.45	J15-7L	20.00	2,489.70	677.45	677.44
33	J15-8L	3,000.00	K15-16L	16.08	2,629.11	1,996.35	6,512.07	K15-16L	-5.49	2,579.32	1,996.07	1,996.07
34	J15-9L	3,000.00	K15-16L	13.69	2,623.60	1,680.73	2,708.50	K15-16L	15.35	2,627.42	1,680.64	1,680.64
35	J16-1L	3,000.00	K15-16L	15.45	2,627.65	1,903.10	3,165.08	K15-16L	14.62	2,625.75	1,902.12	1,902.12
36	J16-2L	3,000.00	K15-16L	15.45	2,627.65	1,903.10	2,108.55	K15-16L	19.28	2,636.50	1,902.12	1,902.12
37	J16-3L	3,000.00	K15-16L	14.91	2,626.41	1,834.61	4,384.72	K15-16L	6.56	2,607.15	1,832.81	1,832.81
38	J16-4L	3,000.00	K15-16L	15.45	2,627.65	1,903.10	3,651.09	K15-16L	12.01	2,619.72	1,902.12	1,902.12
39	K-120101	3,000.00	K12-3L	25.72	2,599.91	3,420.87	4,231.51	K12-3L	7.43	2,557.69	3,420.92	3,420.87
40	K10-1L	3,000.00	K10-1L	-90.51	2,344.65	1,111.57	1,111.39	K10-1L	20.00	2,599.70	1,111.38	1,111.38
41	K11-10L	3,000.00	K11-10L	33.49	2,586.29	3,742.11	3,742.24	K11-10L	20.00	2,555.16	3,742.25	3,742.11
42	K11-11L	3,000.00	J12-7L	23.34	2,635.86	3,837.52	4,518.33	J12-7L	17.16	2,621.60	3,840.70	3,837.52
43	K11-12L	3,000.00	J12-7L	23.62	2,636.51	3,945.86	4,814.99	J12-7L	16.51	2,620.11	3,945.83	3,945.83
44	K11-1L	3,000.00	K10-1L	29.23	2,621.01	4,108.60	5,004.71	K10-1L	11.33	2,579.70	4,109.80	4,108.60
45	K11-2L	3,000.00	J12-7L	24.04	2,637.49	4,118.09	5,206.37	J12-7L	15.78	2,618.42	4,118.16	4,118.09
46	K11-3L	3,000.00	K11-3L	-31.66	2,466.47	1,686.49	1,686.45	K11-3L	20.00	2,585.70	1,686.44	1,686.44

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
47		K11-4L	3,000.00	J12-7L	23.64	2,636.56	3,953.49	5,297.88	J12-7L	14.32	2,615.06	3,953.45	3,953.45
48		K11-5L	3,000.00	K11-5L	30.37	2,579.62	3,528.19	3,528.23	K11-5L	20.00	2,555.70	3,528.23	3,528.19
49		K11-6L	3,000.00	K11-6L	-25.57	2,450.52	1,991.16	1,991.16	K11-6L	20.00	2,555.70	1,991.15	1,991.15
50		K11-9L	3,000.00	K11-9L	10.36	2,541.91	2,642.75	2,642.75	K11-9L	20.00	2,564.16	2,642.75	2,642.75
51		K12-2L	3,000.00	K12-2L	-17.80	2,498.47	1,869.96	1,869.93	K12-2L	20.00	2,585.70	1,869.92	1,869.92
52		K12-3L	3,000.00	K12-3L	-49.59	2,426.08	1,496.77	1,496.70	K12-3L	20.00	2,586.70	1,496.70	1,496.70
53		K12-4L	3,000.00	K12-4L	16.44	2,559.94	2,848.75	2,846.30	K12-4L	20.00	2,568.16	2,846.29	2,846.29
54		K14-10L	3,000.00	K15-16L	18.97	2,635.79	2,634.88	5,938.03	K15-16L	8.32	2,611.21	2,635.16	2,634.88
55		K14-2L	3,000.00	K15-16L	21.45	2,641.50	3,760.69	7,745.04	K15-16L	9.58	2,614.11	3,760.38	3,760.38
56		K14-3L	3,000.00	K14-3L	27.08	2,592.03	3,437.93	3,439.49	K14-3L	20.00	2,575.70	3,439.49	3,437.93
57		K14-4L	3,000.00	K14-4L	-24.25	2,469.57	1,895.97	1,895.95	K14-4L	20.00	2,571.70	1,895.94	1,895.94
58		K14-5L	3,000.00	K15-16L	15.00	2,626.61	1,852.66	2,979.22	K15-16L	15.10	2,626.86	1,851.28	1,851.28
59		K14-7L	3,000.00	K15-16L	22.09	2,642.99	4,226.46	9,055.30	K15-16L	7.94	2,610.32	4,226.62	4,226.46
60		K14-8L	3,000.00	K15-16L	22.69	2,644.37	4,831.32	8,691.00	K15-16L	12.66	2,621.22	4,833.46	4,831.32
61		K14-9L	3,000.00	L15-5L	24.36	2,621.77	3,568.97	3,967.18	L15-5L	16.58	2,603.81	3,570.59	3,568.97
62		K15-10L	3,000.00	K15-10L	-13.91	2,547.43	1,278.57	1,278.57	K15-10L	20.00	2,625.70	1,278.58	1,278.57
63		K15-11L	3,000.00	K15-16L	-0.39	2,591.09	1,046.90	1,059.40	K15-16L	19.92	2,637.96	1,046.78	1,046.78
64		K15-12L	3,000.00	K15-16L	6.61	2,607.26	1,236.75	2,491.91	K15-16L	11.40	2,618.32	1,236.47	1,236.47
65		K15-13L	3,000.00	K15-16L	9.44	2,613.78	1,356.91	2,898.87	K15-16L	10.28	2,615.72	1,356.63	1,356.63
66		K15-14L	3,000.00	K15-16L	11.22	2,617.89	1,460.08	3,617.75	K15-16L	6.31	2,606.56	1,459.99	1,459.99
67		K15-15L	3,000.00	K15-16L	12.00	2,619.71	1,517.20	2,706.54	K15-16L	13.95	2,624.19	1,517.35	1,517.20
68		K15-16L	3,000.00	K15-16L	-9.23	2,570.71	896.98	896.94	K15-16L	20.00	2,638.16	896.91	896.91
69		K15-17L	3,000.00	K15-16L	12.61	2,621.10	1,566.78	4,446.38	K15-16L	1.55	2,595.57	1,566.94	1,566.78
70		K15-18L	3,000.00	K15-16L	14.36	2,625.13	1,765.40	2,456.53	K15-16L	17.15	2,631.59	1,765.36	1,765.36
71		K15-1L	3,000.00	K15-16L	14.76	2,626.05	1,820.39	3,292.81	K15-16L	13.14	2,622.32	1,820.31	1,820.31
72		K15-2L	3,000.00	K15-16L	14.59	2,625.67	1,798.80	3,325.54	K15-16L	12.75	2,621.43	1,798.77	1,798.77
73		K15-3L	3,000.00	K15-16L	14.73	2,626.00	1,817.54	2,645.53	K15-16L	16.54	2,630.17	1,817.44	1,817.44
74		K15-4L	3,000.00	K15-16L	14.59	2,625.66	1,792.23	5,865.71	K15-16L	-5.60	2,579.07	1,792.14	1,792.14
75		K15-5L	3,000.00	K15-16L	14.83	2,626.23	1,832.97	5,697.93	K15-16L	-3.35	2,584.27	1,831.71	1,831.71
76		K15-6L	3,000.00	K15-16L	15.61	2,628.02	1,933.05	5,870.06	K15-16L	-2.15	2,587.05	1,932.91	1,932.91
77		K15-7L	3,000.00	K15-16L	14.99	2,626.59	1,851.84	5,924.74	K15-16L	-4.88	2,580.73	1,851.74	1,851.74
78		K15-8L	3,000.00	K15-16L	-0.06	2,591.87	1,052.63	1,085.78	K15-16L	19.78	2,637.64	1,052.50	1,052.50
79		K15-9L	3,000.00	K15-16L	1.89	2,596.36	1,097.31	1,320.93	K15-16L	18.51	2,634.71	1,097.14	1,097.14
80		K16-2L	3,000.00	K15-16L	11.75	2,619.11	1,506.40	2,593.40	K15-16L	14.47	2,625.40	1,506.51	1,506.40
81		K16-3L	3,000.00	L16-1L	-61.00	2,420.75	1,137.94	1,728.18	L16-1L	0.88	2,563.57	1,138.90	1,137.94
82		K16-4L	3,000.00	K16-5L	-102.63	2,297.14	1,188.11	1,286.58	K16-5L	15.62	2,570.05	1,188.12	1,188.11
83		K16-5L	3,000.00	K16-5L	-144.16	2,201.29	1,044.39	1,044.39	K16-5L	20.00	2,580.16	1,044.39	1,044.39
84		K17-1L	3,000.00	K17-1L	-111.48	2,220.26	1,510.60	1,510.75	K17-1L	20.00	2,523.70	1,510.75	1,510.60
85		K17-2L	3,000.00	K15-16L	12.44	2,620.72	1,559.54	2,466.80	K15-16L	15.74	2,628.32	1,559.73	1,559.54
86		K17-3L	3,000.00	K15-16L	12.19	2,620.12	1,537.40	1,931.64	K15-16L	18.36	2,634.38	1,537.59	1,537.40
87		K17-4L	3,000.00	K15-16L	13.34	2,622.79	1,650.92	1,947.93	K15-16L	18.85	2,635.51	1,650.78	1,650.78
88		K17-5L	3,000.00	K15-16L	13.74	2,623.71	1,700.21	2,418.72	K15-16L	16.92	2,631.05	1,700.12	1,700.12
89		K17-6L	3,000.00	K15-16L	12.69	2,621.29	1,582.29	2,831.09	K15-16L	13.77	2,623.77	1,582.39	1,582.29
90		K17-7L	3,000.00	K15-16L	12.04	2,619.79	1,525.55	1,564.31	K15-16L	19.85	2,637.81	1,525.72	1,525.55
91		K17-8L	3,000.00	K15-16L	12.32	2,620.42	1,548.36	1,941.62	K15-16L	18.38	2,634.41	1,548.55	1,548.36
92		K18-1L	3,000.00	K18-1L	-148.51	2,110.79	1,480.26	1,480.29	K18-1L	20.00	2,499.70	1,480.29	1,480.26

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
93	L13-1H	3,000.00	L13-1H	-26.21	2,492.52	1,593.85	1,593.64	L13-1H	20.00	2,599.16	1,593.63	1,593.63
94	L13-2H	3,000.00	L13-2H	-27.66	2,489.17	1,578.20	1,577.97	L13-2H	20.00	2,599.16	1,577.97	1,577.97
95	L14-3L	3,000.00	K15-16L	23.40	2,646.01	6,098.94	8,620.32	K15-16L	16.91	2,631.02	6,098.40	6,098.40
96	L14-4L	3,000.00	L14-4L	16.64	2,601.95	2,715.65	2,714.05	L14-4L	20.00	2,609.70	2,714.05	2,714.05
97	L15-3L	3,000.00	L15-3L	1.36	2,566.67	1,992.27	1,992.27	L15-3L	20.00	2,609.70	1,992.27	1,992.27
98	L15-4L	3,000.00	L15-4L	13.38	2,596.42	2,478.97	2,478.96	L15-4L	20.00	2,611.70	2,478.96	2,478.96
99	L15-5L	3,000.00	L15-5L	15.34	2,600.94	2,606.75	2,606.74	L15-5L	20.00	2,611.70	2,606.74	2,606.74
100	L15-6L	3,000.00	L15-5L	16.17	2,602.87	2,666.68	2,674.75	L15-5L	19.91	2,611.49	2,666.67	2,666.67
101	L15-7L	3,000.00	L15-7L	-7.71	2,564.21	1,322.22	1,323.37	L15-7L	20.00	2,628.16	1,323.37	1,322.22
102	L16-1L	3,000.00	L16-1L	-65.74	2,409.82	1,109.77	1,110.71	L16-1L	20.00	2,607.70	1,110.70	1,109.77
103	L16-2L	3,000.00	L16-1L	-57.58	2,428.66	1,159.58	1,318.87	L16-1L	15.58	2,597.49	1,160.58	1,159.58
104	L16-3L	3,000.00	L16-3L	-218.74	2,038.71	827.92	828.13	L16-3L	20.00	2,589.70	828.13	827.92
105	L16-4L	3,000.00	L16-3L	-110.69	2,288.09	1,095.98	1,096.40	L16-3L	20.00	2,589.70	1,096.40	1,095.98

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,109.95	3.15	0.07	3.56	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-42.09	0.48	0.03	0.24	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	66.51	0.75	0.12	0.57	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	98.59	0.63	0.04	0.29	Open	0
5		P-104	K15-5L	K15-6L	190.00	8.00	120.00	-98.59	0.63	0.05	0.29	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-156.27	1.00	0.06	0.68	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-156.27	1.00	0.22	0.68	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	245.20	1.57	0.02	1.56	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	245.20	1.57	0.20	1.57	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	255.74	1.63	0.17	1.69	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,109.95	3.15	0.11	3.56	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	98.95	1.12	0.08	1.19	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	272.75	1.74	0.15	1.91	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-9.92	0.06	0.00	0.00	Open	0
15		P-115	J-244	J-261	875.00	8.00	120.00	166.88	1.07	0.67	0.77	Open	0
16		P-117	J-300	J-259	220.00	6.00	120.00	28.95	0.33	0.03	0.12	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.10	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-964.62	2.74	1.07	2.75	Open	0
19		P-121	L16-2L	J-260	285.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	-0.03	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.28	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	43.06	0.27	0.03	0.06	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-14.87	0.17	0.01	0.04	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	28.92	0.33	0.02	0.12	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	820.19	2.33	0.58	2.04	Open	0
27		P-130	J-269	K12-3L	235.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.30	0.08	0.00	0.01	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	1.34	0.01	0.00	0.00	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-10.99	0.04	0.00	0.00	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.27	0.22	0.02	0.06	Open	0

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-584.05	1.66	0.30	1.09	Open	0
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.62	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.62	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-39.49	0.45	0.11	0.22	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-20.19	0.13	0.00	0.02	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	665.85	1.89	0.66	1.38	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-53.44	0.61	0.10	0.38	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-82.39	0.93	0.12	0.85	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	665.85	1.89	0.35	1.38	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-72.74	0.83	0.15	0.67	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-53.44	0.61	0.02	0.38	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-818.00	2.32	0.28	2.03	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-92.04	1.04	0.42	1.04	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.63	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.98	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	8.00	120.00	176.53	1.13	0.35	0.85	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-818.00	2.32	0.04	2.03	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	282.68	1.80	0.24	2.04	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	215.13	1.37	0.17	1.23	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	183.46	1.17	0.21	0.92	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	183.46	1.17	0.07	0.92	Open	0
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	6.00	120.00	55.83	0.63	0.07	0.41	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-681.89	1.93	0.84	1.45	Open	0
79		P-190	K15-3L	J-242	209.00	6.00	120.00	55.83	0.63	0.09	0.41	Open	0
80		P-191	K15-6L	K15-1L	270.00	6.00	120.00	72.07	0.82	0.18	0.66	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-32.44	0.37	0.05	0.15	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-42.09	0.48	0.04	0.24	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.44	0.29	0.04	0.10	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.44	0.29	0.03	0.10	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	35.09	0.40	0.06	0.17	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	542.17	2.21	0.23	2.30	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	35.09	0.40	0.05	0.17	Open	0
88		P-201	K15-6L	K14-10L	385.00	8.00	120.00	-226.48	1.45	0.52	1.35	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	226.48	1.45	0.25	1.35	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	126.45	0.81	0.12	0.46	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	126.45	0.81	0.17	0.46	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	107.15	0.68	0.20	0.34	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	126.45	0.81	0.15	0.46	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	126.45	0.81	0.02	0.46	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	126.45	0.81	0.13	0.46	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	116.80	0.75	0.04	0.40	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-789.05	2.24	1.14	1.90	Open	0
100		P-221	J-214	J66	183.10	6.00	120.00	-76.57	0.87	0.14	0.74	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	200.40	0.57	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	190.75	0.54	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	6.00	120.00	-49.59	0.56	0.07	0.33	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
106		P-235	J14	K11-6L	201.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-219.70	0.62	0.08	0.18	Open	0
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	219.70	0.62	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	28.92	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	522.87	2.14	0.43	2.15	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	28.92	0.33	0.02	0.12	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	62.63	0.71	0.04	0.51	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	62.63	0.71	0.12	0.51	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	6.00	120.00	-72.07	0.82	0.04	0.66	Open	0
118		P-246	J-242	K15-2L	101.00	6.00	120.00	-72.07	0.82	0.07	0.66	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	268.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	283.69	1.81	0.60	2.05	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	28.95	0.18	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.30	0.12	0.00	0.02	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	283.69	1.81	0.74	2.05	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	283.69	1.81	0.72	2.05	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-360.17	2.30	0.13	3.20	Open	0
127		P-29	J-213	J-214	187.52	8.00	120.00	255.19	1.63	0.32	1.69	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	551.82	3.52	0.42	7.04	Open	0
129		P-30	J12-7L	J-214	412.51	8.00	120.00	-322.11	2.06	1.07	2.60	Open	0
130		P-31	J74	J12-7L	82.42	8.00	120.00	-269.07	1.72	0.15	1.86	Open	0
131		P-32	J-215	J-216	851.69	12.00	120.00	374.10	1.06	0.41	0.48	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-237.65	0.97	0.12	0.50	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	219.70	0.62	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	210.05	0.60	0.07	0.16	Open	0
135		P-38	J12-7L	J-220	318.19	6.00	120.00	53.04	0.60	0.12	0.37	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	168.64	1.08	0.34	0.78	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	561.47	2.29	0.10	2.45	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	90.06	0.57	0.05	0.25	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	57.90	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.25	0.14	0.00	0.01	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
141		P-43	J-224	J-225	430.00	10.00	120.00	38.60	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	28.95	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
145		P-48	J-216	J-234	405.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-571.13	1.62	0.07	1.04	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	143.39	1.63	0.45	2.36	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	66.39	0.75	0.12	0.57	Open	0
151		P-57	J68	J13-7L	113.68	10.00	120.00	135.67	0.55	0.02	0.18	Open	0
152		P-57.5	J68	J14-5L	473.31	10.00	120.00	-135.67	0.55	0.08	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	135.67	0.55	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	135.67	0.55	0.01	0.18	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-580.78	1.65	0.35	1.07	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-56.74	0.36	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-86.13	0.98	0.18	0.92	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	28.95	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	181.39	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-580.78	1.65	0.28	1.07	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-68.93	0.44	0.10	0.15	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	12.86	0.15	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-22.51	0.26	0.05	0.08	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	181.10	0.51	0.04	0.12	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,349.80	3.83	1.36	5.12	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-161.80	0.46	0.01	0.10	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-175.81	1.99	0.17	3.44	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	210.91	2.39	0.72	4.82	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	191.61	1.22	0.50	0.99	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
176		P-88	J15-4L	J46	237.07	8.00	120.00	-134.79	0.86	0.12	0.52	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-326.39	2.08	0.88	2.66	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,330.50	3.77	2.73	4.99	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-170.13	1.09	0.17	0.80	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-131.53	0.84	0.15	0.50	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	72.28	0.82	0.27	0.66	Open	0
183		P-97	K15-6L	K14-5L	320.00	6.00	120.00	55.83	0.63	0.13	0.41	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	210.91	0.86	0.14	0.40	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	118.25	1.34	0.28	1.65	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	532.52	2.18	0.20	2.23	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,940.23	5.50	0.94	10.03	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-492.82	1.40	0.09	0.79	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-453.46	1.29	0.09	0.68	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,929.31	8.31	2.11	21.51	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	989.08	2.81	10.41	2.88	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-335.81	1.37	0.04	0.94	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-29.84	0.34	0.07	0.13	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	259.23	2.94	0.84	7.06	Open	0
201		P113	J72	J70	229.97	8.00	120.00	259.23	1.65	0.40	1.74	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-259.23	1.06	0.08	0.59	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	249.77	0.71	0.00	0.23	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-100.70	0.64	0.04	0.30	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-110.35	0.70	0.02	0.36	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	81.40	0.52	0.07	0.20	Open	0
209		P23	J24	J22	147.66	8.00	120.00	71.75	0.46	0.02	0.16	Open	0
210		P25	J22	J20	76.49	8.00	120.00	62.10	0.40	0.01	0.12	Open	0

Low Zone 2015 MDD FF 3hr Pump 7 Tank 2646 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	282.68	1.80	0.31	2.04	Open	0
214		P33	J18	J20	237.74	8.00	120.00	162.68	1.04	0.17	0.73	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
217		P39	J36	J16	251.95	8.00	120.00	68.89	0.44	0.04	0.15	Open	0
218		P41	J16	J14	364.77	8.00	120.00	59.24	0.38	0.04	0.11	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-247.30	1.01	0.05	0.54	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-325.85	1.33	0.37	0.90	Open	0
223		P51	K11-5L	J14	78.82	6.00	120.00	-49.59	0.56	0.03	0.33	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	-8.31	0.03	0.00	0.00	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-1.34	0.01	0.00	0.00	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-144.44	0.92	0.16	0.59	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-91.05	0.58	0.01	0.25	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	239.17	0.98	0.13	0.51	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	239.17	0.98	0.16	0.50	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	239.17	1.53	0.37	1.50	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	239.17	1.53	0.20	1.50	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	239.17	2.71	1.01	6.08	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.30	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	440.84	12.00	110.00	133.98	0.38	0.04	0.08	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	503.86	1.43	0.16	0.83	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	485.22	1.38	0.16	0.77	Open	0

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	123.41	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.69	261.29	2,944.34	604.62	Open	1.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	1,004.43	2,629.54	2,643.34	62.73	13.80
2		RES-OBS-2	945.95	2,629.54	2,643.34	62.73	13.80

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	K15-16L	20.77	2,639.94	3,769.44	6,383.97	K15-16L	14.81	2,626.18	3,766.24	3,766.24
2		I13-2L	3,000.00	K15-16L	20.89	2,640.22	3,918.41	8,599.12	K15-16L	7.99	2,610.44	3,921.02	3,918.41
3		I14-1L	3,000.00	K15-16L	20.99	2,640.45	4,006.37	5,814.18	K15-16L	16.49	2,630.06	4,008.75	4,006.37
4		I14-2L	3,000.00	K15-16L	21.22	2,640.98	4,094.41	14,489.19	K15-16L	-16.63	2,553.63	4,094.43	4,094.41
5		I14-3L	3,000.00	K15-16L	20.85	2,640.12	3,871.59	7,504.94	K15-16L	11.66	2,618.92	3,873.53	3,871.59
6		J12-10L	3,000.00	J12-10L	16.37	2,615.78	2,515.02	2,515.05	J12-10L	20.00	2,624.16	2,515.05	2,515.02
7		J12-11L	3,000.00	K15-16L	20.34	2,638.94	3,201.08	28,802.28	K15-16L	-131.08	2,289.48	3,200.92	3,200.92
8		J12-1L	3,000.00	J12-1L	-138.80	2,201.21	1,165.70	1,165.62	J12-1L	20.00	2,567.70	1,165.62	1,165.62
9		J12-2L	3,000.00	J12-2L	-40.83	2,411.30	1,830.61	1,830.59	J12-2L	20.00	2,551.70	1,830.59	1,830.59
10		J12-3L	3,000.00	J12-4L	-36.16	2,460.09	1,565.17	1,855.64	J12-4L	11.10	2,569.15	1,564.99	1,564.99
11		J12-4L	3,000.00	J12-4L	-149.72	2,198.00	969.48	969.53	J12-4L	20.00	2,589.70	969.53	969.48
12		J12-7L	3,000.00	J12-7L	17.90	2,623.31	2,632.77	2,632.86	J12-7L	20.00	2,628.16	2,632.86	2,632.77
13		J12-9L	3,000.00	J12-9L	-109.44	2,280.43	1,188.45	1,188.31	J12-9L	20.00	2,579.16	1,188.31	1,188.31
14		J13-10L	3,000.00	K15-16L	20.81	2,640.03	3,823.23	5,957.08	K15-16L	15.96	2,628.83	3,823.73	3,823.23
15		J13-11L	3,000.00	K15-16L	20.75	2,639.89	3,724.28	4,623.55	K15-16L	18.70	2,635.15	3,724.44	3,724.28
16		J13-12L	3,000.00	K15-16L	20.69	2,639.76	3,587.16	5,430.89	K15-16L	16.98	2,631.18	3,588.62	3,587.16
17		J13-7L	3,000.00	K15-16L	20.43	2,639.15	3,278.62	6,173.86	K15-16L	14.47	2,625.40	3,277.90	3,277.90
18		J13-8L	3,000.00	J13-8L	-215.84	2,041.40	856.42	856.46	J13-8L	20.00	2,585.70	856.47	856.42
19		J13-9L	3,000.00	K15-16L	20.38	2,639.04	3,246.11	3,382.03	K15-16L	19.78	2,637.65	3,243.12	3,243.12
20		J14-2L	3,000.00	K15-16L	19.63	2,637.31	2,815.04	8,753.44	K15-16L	1.43	2,595.30	2,814.98	2,814.98
21		J14-3L	3,000.00	K15-16L	20.05	2,638.28	3,029.81	9,393.87	K15-16L	0.79	2,593.83	3,028.84	3,028.84
22		J14-4L	3,000.00	K15-16L	20.02	2,638.20	3,011.37	10,099.17	K15-16L	-2.65	2,585.88	3,011.33	3,011.33
23		J14-5L	3,000.00	K15-16L	20.17	2,638.56	3,101.40	7,566.98	K15-16L	8.96	2,612.67	3,101.36	3,101.36
24		J14-6L	3,000.00	K15-16L	20.69	2,639.76	3,703.52	12,576.78	K15-16L	-9.83	2,569.32	3,704.89	3,703.52
25		J14-7L	3,000.00	J14-7L	28.12	2,540.44	3,278.99	3,279.15	J14-7L	20.00	2,521.70	3,279.15	3,278.99
26		J14-8L	3,000.00	K15-16L	18.45	2,634.59	2,306.47	3,680.56	K15-16L	16.69	2,630.52	2,306.93	2,306.47
27		J15-1L	3,000.00	K15-16L	19.73	2,637.54	2,850.19	7,489.09	K15-16L	7.83	2,610.08	2,850.24	2,850.19
28		J15-2L	3,000.00	K15-16L	18.80	2,635.40	2,421.69	5,491.87	K15-16L	12.36	2,620.53	2,422.08	2,421.69
29		J15-3L	3,000.00	K15-16L	18.71	2,635.18	2,386.52	3,253.99	K15-16L	18.12	2,633.82	2,386.89	2,386.52
30		J15-4L	3,000.00	K15-16L	17.44	2,632.26	2,007.80	6,885.61	K15-16L	1.72	2,595.98	2,006.99	2,006.99
31		J15-5L	3,000.00	K15-16L	18.67	2,635.08	2,370.37	3,186.98	K15-16L	18.23	2,634.08	2,370.74	2,370.37
32		J15-7L	3,000.00	J15-7L	-986.62	166.55	669.98	669.99	J15-7L	20.00	2,489.70	669.99	669.98
33		J15-8L	3,000.00	K15-16L	14.69	2,625.90	1,484.22	6,427.27	K15-16L	-6.20	2,577.70	1,484.30	1,484.22
34		J15-9L	3,000.00	K15-16L	12.30	2,620.39	1,249.36	2,669.92	K15-16L	14.16	2,624.69	1,248.35	1,248.35
35		J16-1L	3,000.00	K15-16L	14.06	2,624.44	1,405.52	3,134.06	K15-16L	13.39	2,622.90	1,406.49	1,405.52
36		J16-2L	3,000.00	K15-16L	14.06	2,624.44	1,405.52	2,084.37	K15-16L	17.97	2,633.48	1,406.49	1,405.52
37		J16-3L	3,000.00	K15-16L	13.52	2,623.21	1,356.51	4,323.32	K15-16L	5.58	2,604.89	1,356.85	1,356.51
38		J16-4L	3,000.00	K15-16L	14.06	2,624.44	1,405.52	3,604.84	K15-16L	10.88	2,617.12	1,406.49	1,405.52
39		K-120101	3,000.00	K12-3L	24.34	2,596.72	3,323.12	4,147.44	K12-3L	7.43	2,557.69	3,323.15	3,323.12
40		K10-1L	3,000.00	K10-1L	-91.90	2,341.46	1,070.24	1,069.99	K10-1L	20.00	2,599.70	1,069.99	1,069.99
41		K11-10L	3,000.00	K15-16L	20.55	2,639.42	3,348.30	3,671.58	K15-16L	19.47	2,636.94	3,347.79	3,347.79
42		K11-11L	3,000.00	K15-16L	20.55	2,639.42	3,348.39	4,426.52	K15-16L	18.27	2,634.16	3,347.89	3,347.89

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
43		K11-12L	3,000.00	K15-16L	20.57	2,639.47	3,360.16	4,710.35	K15-16L	17.88	2,633.26	3,359.55	3,359.55
44		K11-1L	3,000.00	K15-16L	20.62	2,639.58	3,390.65	4,869.32	K15-16L	17.66	2,632.75	3,389.80	3,389.80
45		K11-2L	3,000.00	K15-16L	20.60	2,639.55	3,382.27	5,079.87	K15-16L	17.31	2,631.95	3,381.48	3,381.48
46		K11-3L	3,000.00	K11-3L	-33.04	2,463.28	1,639.02	1,638.97	K11-3L	20.00	2,585.70	1,638.96	1,638.96
47		K11-4L	3,000.00	K15-16L	20.57	2,639.47	3,361.07	5,185.86	K15-16L	17.09	2,631.45	3,360.46	3,360.46
48		K11-5L	3,000.00	K15-16L	20.55	2,639.43	3,351.08	3,461.55	K15-16L	19.82	2,637.74	3,350.56	3,350.56
49		K11-6L	3,000.00	K11-6L	-26.95	2,447.33	1,953.62	1,953.61	K11-6L	20.00	2,555.70	1,953.61	1,953.61
50		K11-9L	3,000.00	K11-9L	8.98	2,538.73	2,588.13	2,588.13	K11-9L	20.00	2,564.16	2,588.13	2,588.13
51		K12-2L	3,000.00	K12-2L	-19.18	2,495.28	1,817.27	1,817.24	K12-2L	20.00	2,585.70	1,817.23	1,817.23
52		K12-3L	3,000.00	K12-3L	-50.97	2,422.90	1,453.62	1,453.54	K12-3L	20.00	2,586.70	1,453.54	1,453.54
53		K12-4L	3,000.00	K12-4L	15.06	2,556.75	2,784.79	2,784.79	K12-4L	20.00	2,568.16	2,784.79	2,784.79
54		K14-10L	3,000.00	K15-16L	17.59	2,632.59	2,065.51	5,815.52	K15-16L	7.50	2,609.32	2,066.30	2,065.51
55		K14-2L	3,000.00	K15-16L	20.06	2,638.31	3,037.72	7,532.06	K15-16L	8.99	2,612.74	3,035.69	3,035.69
56		K14-3L	3,000.00	K14-3L	25.69	2,588.83	3,356.09	3,357.38	K14-3L	20.00	2,575.70	3,357.39	3,356.09
57		K14-4L	3,000.00	K14-4L	-25.64	2,466.37	1,852.23	1,852.20	K14-4L	20.00	2,571.70	1,852.20	1,852.20
58		K14-5L	3,000.00	K15-16L	13.61	2,623.40	1,373.88	2,926.10	K15-16L	13.99	2,624.28	1,374.54	1,373.88
59		K14-7L	3,000.00	K15-16L	20.71	2,639.80	3,437.44	8,868.39	K15-16L	7.25	2,608.72	3,436.10	3,436.10
60		K14-8L	3,000.00	K15-16L	21.31	2,641.18	3,938.63	8,456.98	K15-16L	11.90	2,619.47	3,938.76	3,938.63
61		K14-9L	3,000.00	L15-5L	22.97	2,618.56	3,396.59	3,837.90	L15-5L	16.34	2,603.25	3,398.30	3,396.59
62		K15-10L	3,000.00	K15-10L	-15.30	2,544.23	1,169.06	1,169.05	K15-10L	20.00	2,625.70	1,169.04	1,169.04
63		K15-11L	3,000.00	K15-16L	-1.78	2,587.88	823.03	892.99	K15-16L	19.59	2,637.21	822.81	822.81
64		K15-12L	3,000.00	K15-16L	5.22	2,604.05	959.49	2,348.05	K15-16L	11.23	2,617.91	958.76	958.76
65		K15-13L	3,000.00	K15-16L	8.05	2,610.57	1,041.43	2,756.92	K15-16L	10.03	2,615.15	1,041.36	1,041.36
66		K15-14L	3,000.00	K15-16L	9.83	2,614.69	1,109.21	3,504.84	K15-16L	5.87	2,605.55	1,109.15	1,109.15
67		K15-15L	3,000.00	K15-16L	10.61	2,616.50	1,145.30	2,604.43	K15-16L	13.19	2,622.45	1,145.24	1,145.24
68		K15-16L	3,000.00	K15-16L	-10.62	2,567.50	709.06	709.00	K15-16L	20.00	2,638.16	708.98	708.98
69		K15-17L	3,000.00	K15-16L	11.22	2,617.90	1,177.10	4,342.72	K15-16L	1.05	2,594.42	1,177.03	1,177.03
70		K15-18L	3,000.00	K15-16L	12.97	2,621.93	1,308.16	2,413.82	K15-16L	15.96	2,628.84	1,307.86	1,307.86
71		K15-1L	3,000.00	K15-16L	13.37	2,622.85	1,347.56	3,231.44	K15-16L	12.10	2,619.92	1,348.01	1,347.56
72		K15-2L	3,000.00	K15-16L	13.20	2,622.47	1,330.57	3,263.46	K15-16L	11.73	2,619.06	1,330.80	1,330.57
73		K15-3L	3,000.00	K15-16L	13.34	2,622.80	1,345.26	2,585.90	K15-16L	15.43	2,627.62	1,345.68	1,345.26
74		K15-4L	3,000.00	K15-16L	13.20	2,622.46	1,325.49	5,770.35	K15-16L	-6.16	2,577.79	1,325.57	1,325.49
75		K15-5L	3,000.00	K15-16L	13.44	2,623.03	1,363.81	5,606.80	K15-16L	-3.99	2,582.80	1,364.15	1,363.81
76		K15-6L	3,000.00	K15-16L	14.22	2,624.82	1,441.26	5,773.85	K15-16L	-2.80	2,585.55	1,441.83	1,441.26
77		K15-7L	3,000.00	K15-16L	13.60	2,623.38	1,371.17	5,838.62	K15-16L	-5.54	2,579.21	1,371.87	1,371.17
78		K15-8L	3,000.00	K15-16L	-1.45	2,588.66	826.58	928.44	K15-16L	19.40	2,636.77	826.33	826.33
79		K15-9L	3,000.00	K15-16L	0.50	2,593.15	859.48	1,177.98	K15-16L	18.09	2,633.75	859.16	859.16
80		K16-2L	3,000.00	K15-16L	10.36	2,615.91	1,142.77	2,535.17	K15-16L	13.44	2,623.03	1,142.71	1,142.71
81		K16-3L	3,000.00	K15-16L	2.61	2,598.03	915.11	1,703.99	K15-16L	14.94	2,626.47	914.80	914.80
82		K16-4L	3,000.00	K15-16L	10.67	2,616.61	1,154.64	1,256.86	K15-16L	19.63	2,637.30	1,154.59	1,154.59
83		K16-5L	3,000.00	K16-5L	-145.55	2,198.10	1,015.97	1,015.98	K16-5L	20.00	2,580.16	1,015.98	1,015.97
84		K17-1L	3,000.00	K15-16L	10.81	2,616.94	1,161.97	1,488.56	K15-16L	18.79	2,635.37	1,161.93	1,161.93

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
85		K17-2L	3,000.00	K15-16L	11.05	2,617.51	1,175.41	2,433.18	K15-16L	14.54	2,625.55	1,175.36	1,175.36
86		K17-3L	3,000.00	K15-16L	10.80	2,616.92	1,161.41	1,908.77	K15-16L	17.07	2,631.40	1,161.37	1,161.37
87		K17-4L	3,000.00	K15-16L	11.95	2,619.59	1,233.48	1,925.89	K15-16L	17.55	2,632.50	1,232.53	1,232.53
88		K17-5L	3,000.00	K15-16L	12.35	2,620.50	1,266.44	2,391.56	K15-16L	15.66	2,628.15	1,265.81	1,265.81
89		K17-6L	3,000.00	K15-16L	11.30	2,618.08	1,190.86	2,790.57	K15-16L	12.63	2,621.14	1,189.68	1,189.68
90		K17-7L	3,000.00	K15-16L	10.65	2,616.58	1,153.85	1,527.73	K15-16L	18.59	2,634.91	1,153.80	1,153.80
91		K17-8L	3,000.00	K15-16L	10.93	2,617.22	1,168.34	1,913.14	K15-16L	17.11	2,631.49	1,168.28	1,168.28
92		K18-1L	3,000.00	K15-16L	11.95	2,619.59	1,233.48	1,462.37	K15-16L	19.24	2,636.40	1,232.53	1,232.53
93		L13-1H	3,000.00	L13-1H	-27.59	2,489.33	1,534.83	1,534.54	L13-1H	20.00	2,599.16	1,534.54	1,534.54
94		L13-2H	3,000.00	L13-2H	-29.04	2,485.99	1,519.96	1,519.65	L13-2H	20.00	2,599.16	1,519.64	1,519.64
95		L14-3L	3,000.00	K15-16L	22.01	2,642.80	4,987.61	8,299.11	K15-16L	15.99	2,628.90	4,989.05	4,987.61
96		L14-4L	3,000.00	L14-4L	15.25	2,598.73	2,587.38	2,587.37	L14-4L	20.00	2,609.70	2,587.36	2,587.36
97		L15-3L	3,000.00	L15-3L	-0.03	2,563.46	1,899.12	1,899.12	L15-3L	20.00	2,609.70	1,899.12	1,899.12
98		L15-4L	3,000.00	L15-4L	11.99	2,593.21	2,356.48	2,356.46	L15-4L	20.00	2,611.70	2,356.46	2,356.46
99		L15-5L	3,000.00	L15-5L	13.95	2,597.72	2,478.69	2,478.67	L15-5L	20.00	2,611.70	2,478.67	2,478.67
100		L15-6L	3,000.00	L15-5L	14.78	2,599.66	2,535.80	2,547.13	L15-5L	19.88	2,611.42	2,535.78	2,535.78
101		L15-7L	3,000.00	K15-16L	8.34	2,611.25	1,111.87	1,194.91	K15-16L	19.64	2,637.32	1,111.59	1,111.59
102		L16-1L	3,000.00	K15-16L	2.61	2,598.03	915.12	1,059.63	K15-16L	19.22	2,636.35	914.80	914.80
103		L16-2L	3,000.00	K15-16L	2.61	2,598.03	915.11	1,280.87	K15-16L	17.89	2,633.29	914.79	914.79
104		L16-3L	3,000.00	L16-3L	-220.14	2,035.49	802.36	802.58	L16-3L	20.00	2,589.70	802.58	802.36
105		L16-4L	3,000.00	K15-16L	2.61	2,598.03	915.12	1,062.26	K15-16L	19.20	2,636.32	914.80	914.80

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,115.47	3.16	0.07	3.60	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-42.29	0.48	0.03	0.25	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	66.86	0.76	0.12	0.57	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	98.86	0.63	0.04	0.29	Open	0
5		P-104	K15-5L	K15-6L	190.00	8.00	120.00	-98.86	0.63	0.06	0.29	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-157.09	1.00	0.07	0.69	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-157.09	1.00	0.23	0.69	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	246.31	1.57	0.02	1.58	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	246.31	1.57	0.20	1.58	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	257.07	1.64	0.17	1.71	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,115.47	3.16	0.11	3.60	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	99.50	1.13	0.08	1.20	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	274.29	1.75	0.15	1.93	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-10.65	0.07	0.00	0.00	Open	0
15		P-115	J-244	J-261	875.00	8.00	120.00	169.14	1.08	0.69	0.79	Open	0
16		P-117	J-300	J-259	220.00	6.00	120.00	28.95	0.33	0.03	0.12	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.10	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-969.65	2.75	1.08	2.78	Open	0
19		P-121	L16-2L	J-260	285.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.45	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.25	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	42.68	0.27	0.02	0.06	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-15.23	0.17	0.01	0.04	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	28.95	0.33	0.02	0.12	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	824.76	2.34	0.58	2.06	Open	0
27		P-130	J-269	K12-3L	235.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-28.95	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	1.72	0.01	0.00	0.00	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-11.37	0.05	0.00	0.00	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.30	0.22	0.02	0.06	Open	0

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-587.80	1.67	0.31	1.10	Open	0
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.65	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-39.71	0.45	0.11	0.22	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-20.41	0.13	0.00	0.02	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	670.63	1.90	0.67	1.40	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-53.82	0.61	0.10	0.38	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-82.77	0.94	0.12	0.85	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	670.63	1.90	0.35	1.40	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-73.12	0.83	0.15	0.68	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-53.82	0.61	0.02	0.39	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-824.79	2.34	0.29	2.06	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-92.42	1.05	0.42	1.05	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.60	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.95	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	8.00	120.00	178.79	1.14	0.36	0.87	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-824.79	2.34	0.04	2.05	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	284.94	1.82	0.25	2.07	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	217.39	1.39	0.17	1.25	Open	0

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	184.44	1.18	0.21	0.93	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	184.44	1.18	0.07	0.92	Open	0
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	6.00	120.00	56.07	0.64	0.07	0.41	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-687.67	1.95	0.85	1.47	Open	0
79		P-190	K15-3L	J-242	209.00	6.00	120.00	56.07	0.64	0.09	0.41	Open	0
80		P-191	K15-6L	K15-1L	270.00	6.00	120.00	72.38	0.82	0.18	0.66	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-32.64	0.37	0.05	0.15	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-42.29	0.48	0.04	0.25	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.59	0.29	0.04	0.10	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.59	0.29	0.03	0.10	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	35.24	0.40	0.06	0.18	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	544.73	2.23	0.23	2.32	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	35.24	0.40	0.05	0.18	Open	0
88		P-201	K15-6L	K14-10L	385.00	8.00	120.00	-227.31	1.45	0.52	1.36	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	227.31	1.45	0.25	1.36	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	127.47	0.81	0.13	0.47	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	127.47	0.81	0.18	0.47	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	108.17	0.69	0.21	0.34	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	127.47	0.81	0.16	0.47	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	127.47	0.81	0.02	0.47	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	127.47	0.81	0.13	0.47	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	117.82	0.75	0.04	0.40	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-795.84	2.26	1.16	1.93	Open	0
100		P-221	J-214	J66	183.10	6.00	120.00	-76.90	0.87	0.14	0.74	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	202.41	0.57	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	192.76	0.55	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	6.00	120.00	-49.97	0.57	0.07	0.33	Open	0

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
106		P-235	J14	K11-6L	201.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-221.71	0.63	0.08	0.18	Open	0
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	221.71	0.63	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	28.95	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	525.43	2.15	0.43	2.17	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	28.95	0.33	0.02	0.12	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	62.98	0.71	0.04	0.51	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	62.98	0.71	0.12	0.51	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.20	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	6.00	120.00	-72.38	0.82	0.04	0.67	Open	0
118		P-246	J-242	K15-2L	101.00	6.00	120.00	-72.38	0.82	0.07	0.66	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	268.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	285.08	1.82	0.60	2.07	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	28.95	0.18	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.30	0.12	0.00	0.01	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	285.08	1.82	0.75	2.07	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	285.08	1.82	0.73	2.07	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-361.97	2.31	0.13	3.23	Open	0
127		P-29	J-213	J-214	187.52	8.00	120.00	256.56	1.64	0.32	1.71	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	554.38	3.54	0.43	7.10	Open	0
129		P-30	J12-7L	J-214	412.51	8.00	120.00	-323.81	2.07	1.08	2.62	Open	0
130		P-31	J74	J12-7L	82.42	8.00	120.00	-270.48	1.73	0.16	1.88	Open	0
131		P-32	J-215	J-216	851.69	12.00	120.00	376.11	1.07	0.41	0.48	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-239.30	0.98	0.12	0.51	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	221.71	0.63	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	212.06	0.60	0.07	0.17	Open	0
135		P-38	J12-7L	J-220	318.19	6.00	120.00	53.33	0.61	0.12	0.38	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	169.68	1.08	0.34	0.79	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	564.03	2.30	0.10	2.47	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	90.39	0.58	0.05	0.25	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	57.90	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.25	0.14	0.00	0.01	Open	0

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
141		P-43	J-224	J-225	430.00	10.00	120.00	38.60	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	28.95	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
145		P-48	J-216	J-234	405.00	10.00	120.00	19.30	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-573.69	1.63	0.07	1.05	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	144.16	1.64	0.45	2.38	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	66.81	0.76	0.12	0.57	Open	0
151		P-57	J68	J13-7L	113.68	10.00	120.00	136.16	0.56	0.02	0.18	Open	0
152		P-57.5	J68	J14-5L	473.31	10.00	120.00	-136.16	0.56	0.08	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	136.16	0.56	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	136.16	0.56	0.01	0.18	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-583.34	1.65	0.36	1.08	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-57.16	0.36	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-86.53	0.98	0.19	0.93	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	28.95	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	181.39	6.00	120.00	19.30	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-583.34	1.65	0.29	1.08	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-69.64	0.44	0.10	0.15	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	13.19	0.15	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-22.84	0.26	0.05	0.08	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.65	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	183.11	0.52	0.04	0.13	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,356.31	3.85	1.37	5.17	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-163.81	0.46	0.01	0.10	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-176.65	2.00	0.17	3.47	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	211.89	2.40	0.73	4.86	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	192.59	1.23	0.50	1.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
176		P-88	J15-4L	J46	237.07	8.00	120.00	-135.24	0.86	0.12	0.52	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-327.83	2.09	0.89	2.69	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,337.01	3.79	2.76	5.03	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-170.74	1.09	0.17	0.80	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.65	0.06	0.00	0.00	Open	0
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-132.14	0.84	0.15	0.50	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	72.63	0.82	0.27	0.67	Open	0
183		P-97	K15-6L	K14-5L	320.00	6.00	120.00	56.07	0.64	0.13	0.41	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	211.89	0.87	0.14	0.40	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	118.80	1.35	0.28	1.66	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	535.08	2.19	0.20	2.24	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,949.30	5.53	0.95	10.12	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-497.54	1.41	0.10	0.81	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-457.80	1.30	0.10	0.69	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,944.34	8.35	2.13	21.72	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	995.04	2.82	10.52	2.91	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-337.49	1.38	0.05	0.96	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-30.06	0.34	0.07	0.13	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	260.58	2.96	0.85	7.13	Open	0
201		P113	J72	J70	229.97	8.00	120.00	260.58	1.66	0.40	1.76	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-260.58	1.06	0.08	0.59	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	251.18	0.71	0.00	0.23	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-101.48	0.65	0.04	0.31	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-111.13	0.71	0.03	0.36	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	82.18	0.52	0.07	0.21	Open	0
209		P23	J24	J22	147.66	8.00	120.00	72.53	0.46	0.02	0.17	Open	0
210		P25	J22	J20	76.49	8.00	120.00	62.88	0.40	0.01	0.12	Open	0

Low Zone 2015 MDD FF 4hr Pump 7 Tank 2643 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	284.94	1.82	0.32	2.07	Open	0
214		P33	J18	J20	237.74	8.00	120.00	164.16	1.05	0.18	0.75	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.65	0.11	0.00	0.01	Open	0
217		P39	J36	J16	251.95	8.00	120.00	69.27	0.44	0.04	0.15	Open	0
218		P41	J16	J14	364.77	8.00	120.00	59.62	0.38	0.04	0.11	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-248.95	1.02	0.05	0.54	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-327.86	1.34	0.37	0.91	Open	0
223		P51	K11-5L	J14	78.82	6.00	120.00	-49.97	0.57	0.03	0.33	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	-7.93	0.03	0.00	0.00	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-1.72	0.01	0.00	0.00	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.65	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-144.89	0.92	0.16	0.59	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-91.83	0.59	0.01	0.25	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	240.35	0.98	0.13	0.51	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	240.35	0.98	0.16	0.51	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	240.35	1.53	0.37	1.51	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	240.35	1.53	0.20	1.51	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	240.35	2.73	1.02	6.14	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.30	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	440.84	12.00	110.00	134.58	0.38	0.04	0.08	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	506.89	1.44	0.16	0.84	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	488.15	1.38	0.16	0.78	Open	0

APPENDIX C

Item 8 – Water Modeling Results: High Zone PHD Year 2015

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP5	2,205.70	131.22	218.34	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP6	2,134.00	27.97	250.25	0.00	0.00	Closed	0.00	0.00	0.00
3		PUMP8	1,956.00	27.67	371.82	3,486.61	794.24	Open	1.00	97.43	0.00
4		TRANSF	2,629.54	7.57	34.27	0.00	0.00	Closed	0.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		EL-OBS-HILL-TANK	187.52	2,691.54	2,708.54	85.00	17.00
2		FAIRWAYTANK	-9,064.24	2,679.54	2,708.54	90.63	29.00
3		OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone PHD 2015 Pump On - Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-102	11.09	2,584.54	2,708.93	53.90
2	J-103	11.09	2,538.54	2,708.72	73.74
3	J-104	11.09	2,538.54	2,711.55	74.97
4	J-106	11.09	2,531.54	2,711.65	78.04
5	J-110	11.09	2,561.54	2,708.78	63.80
6	J-111	11.09	2,563.54	2,708.78	62.93
7	J-112	11.09	2,551.54	2,711.27	69.21
8	J-113	11.09	2,547.54	2,711.41	71.01
9	J-114	11.09	2,535.54	2,711.55	76.27
10	J-115	11.09	2,544.54	2,711.45	72.32
11	J-116	11.09	2,558.54	2,708.62	65.03
12	J-117	11.09	2,605.54	2,709.70	45.13
13	J-118	11.09	2,592.54	2,709.49	50.68
14	J-119	11.09	2,607.54	2,709.83	44.32
15	J-121	11.09	2,560.54	2,710.99	65.19
16	J-122	11.09	2,533.54	2,702.20	73.08
17	J-123	11.09	2,551.54	2,702.22	65.29
18	J-124	11.09	2,559.54	2,711.14	65.69
19	J-125	11.09	2,508.54	2,709.59	87.12
20	J-126	11.09	2,557.54	2,709.59	65.88
21	J-127	11.09	2,600.54	2,703.05	44.42
22	J-128	11.09	2,601.54	2,703.05	43.98
23	J-129	11.09	2,579.54	2,704.72	54.24
24	J-130	11.09	2,579.54	2,704.72	54.24
25	J-131	11.09	2,562.54	2,702.19	60.51
26	J-132	11.09	2,560.54	2,702.18	61.37
27	J-133	11.09	2,601.54	2,778.35	76.61
28	J-134	11.09	2,596.54	2,778.16	78.70
29	J-135	11.09	2,548.54	2,711.41	70.57
30	J-136	11.09	2,529.54	2,706.73	76.78
31	J-137	11.09	2,573.54	2,728.98	67.35
32	J-138	11.09	2,572.54	2,729.29	67.92
33	J-139	11.09	2,566.54	2,755.62	81.93
34	J-140	11.09	2,581.54	2,778.34	85.28
35	J-141	11.09	2,544.54	2,711.41	72.30
36	J-142	11.09	2,544.54	2,711.42	72.31
37	J-143	11.09	2,563.54	2,730.87	72.50
38	J-144	11.09	2,564.54	2,731.55	72.37
39	J-145	11.09	2,538.54	2,711.58	74.98
40	J-146	11.09	2,533.54	2,711.72	77.21
41	J-147	11.09	2,554.54	2,708.49	66.71
42	J-148	11.09	2,552.54	2,708.70	67.66
43	J-149	11.09	2,557.30	2,707.07	64.90
44	J-150	11.09	2,565.54	2,707.43	61.48
45	J-151	11.09	2,565.54	2,707.44	61.49
46	J-152	11.09	2,554.00	2,706.53	66.09
47	J-153	11.09	2,554.00	2,707.04	66.31
48	J-154	11.09	2,553.54	2,710.43	67.98
49	J-155	11.09	2,560.54	2,717.21	67.89
50	J-156	11.09	2,559.54	2,739.51	77.98

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
51	J-157	11.09	2,593.54	2,702.61	47.26
52	J-158	11.09	2,595.54	2,702.74	46.45
53	J-159	11.09	2,558.54	2,752.46	84.03
54	J-160	11.09	2,551.54	2,707.96	67.78
55	J-161	11.09	2,547.54	2,707.17	69.17
56	J-162	11.09	2,593.54	2,733.14	60.49
57	J-163	11.09	2,617.54	2,731.05	49.19
58	J-164	11.09	2,559.54	2,717.21	68.32
59	J-165	11.09	2,576.54	2,733.79	68.14
60	J-166	11.09	2,590.54	2,707.06	50.49
61	J-167	11.09	2,601.54	2,707.05	45.72
62	J-168	11.09	2,579.54	2,702.19	53.14
63	J-169	11.09	2,575.54	2,707.06	56.99
64	J-169A	11.09	2,575.54	2,707.06	56.99
65	J-170	11.09	2,579.54	2,702.20	53.15
66	J-171	11.09	2,561.54	2,752.52	82.75
67	J-172	11.09	2,618.54	2,730.75	48.62
68	J-174	11.09	2,560.54	2,716.39	67.53
69	J-175	11.09	2,553.54	2,706.92	66.46
70	J-176	11.09	2,545.54	2,706.99	69.95
71	J-177	11.09	2,541.54	2,706.74	71.58
72	J-178	11.09	2,539.54	2,706.73	72.45
73	J-179	11.09	2,583.54	2,707.32	53.63
74	J-180	11.09	2,585.54	2,707.18	52.71
75	J-181	11.09	2,559.54	2,726.72	72.44
76	J-182	11.09	2,575.54	2,729.28	66.62
77	J-183	11.09	2,654.54	2,709.24	23.70
78	J-184	11.09	2,598.54	2,709.30	47.99
79	J-185	11.09	2,543.54	2,711.51	72.78
80	J-186	11.09	2,591.54	2,708.70	50.77
81	J-187	11.09	2,559.50	2,707.09	63.95
82	J-188	11.09	2,561.54	2,707.20	63.11
83	J-189	11.09	2,553.54	2,709.44	67.55
84	J-190	11.09	2,552.54	2,709.31	67.93
85	J-191	11.09	2,600.54	2,703.16	44.46
86	J-192	11.09	2,597.54	2,703.64	45.97
87	J-193	11.09	2,556.54	2,708.69	65.93
88	J-194	11.09	2,547.54	2,706.83	69.02
89	J-195	11.09	2,543.00	2,706.87	71.01
90	J-196	11.09	2,599.54	2,702.61	44.66
91	J-197	11.09	2,555.54	2,716.66	69.81
92	J-198	11.09	2,555.54	2,716.66	69.81
93	J-199	11.09	2,557.54	2,702.18	62.67
94	J-200	11.09	2,560.54	2,702.18	61.37
95	J-201	11.09	2,579.54	2,702.20	53.15
96	J-202	11.09	2,563.54	2,716.08	66.10
97	J-204	11.09	2,579.54	2,702.20	53.15
98	J-205	11.09	2,556.54	2,711.33	67.07
99	J-206	11.09	2,563.54	2,706.74	62.05
100	J-207	11.09	2,584.54	2,706.74	52.95

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
101	J-208	11.09	2,590.54	2,781.17	82.60
102	J-209	11.09	2,623.54	2,779.25	67.47
103	J-210	11.09	2,555.54	2,716.71	69.84
104	J-211	11.09	2,554.54	2,716.77	70.29
105	J-212	11.09	2,552.54	2,709.16	67.86
106	J-213	11.09	2,600.54	2,703.16	44.46
107	J-214	11.09	2,567.54	2,707.65	60.71
108	J-215	11.09	2,576.54	2,707.65	56.81
109	J-216	11.09	2,574.54	2,708.69	58.13
110	J-217	11.09	2,581.54	2,733.78	65.97
111	J-218	11.09	2,554.54	2,707.17	66.14
112	J-219	11.09	2,584.54	2,738.72	66.81
113	J-220	11.09	2,561.54	2,733.78	74.63
114	J-221	11.09	2,579.54	2,735.31	67.49
115	J-222	11.09	2,564.54	2,717.21	66.15
116	J-223	11.09	2,587.54	2,707.10	51.80
117	J-224	11.09	2,582.54	2,780.90	85.95
118	J-226	11.09	2,552.54	2,706.99	66.92
119	J-227	11.09	2,529.54	2,707.05	76.92
120	J-228	11.09	2,553.54	2,710.43	67.98
121	J-229	11.09	2,547.54	2,743.24	84.80
122	J-230	11.09	2,636.54	2,768.91	57.36
123	J-231	11.09	2,562.54	2,707.24	62.70
124	J-233	11.09	2,600.54	2,703.07	44.43
125	J-234	11.09	2,601.54	2,707.04	45.71
126	J-235	11.09	2,607.54	2,707.04	43.11
127	J-236	11.09	2,557.54	2,709.16	65.70
128	J-238	11.09	2,557.54	2,730.99	75.16
129	J-239	11.09	2,523.54	2,730.65	89.74
130	J-240	11.09	2,562.54	2,711.41	64.51
131	J-241	11.09	2,578.54	2,702.19	53.58
132	J-242	11.09	2,540.00	2,713.52	75.19
133	J-243	11.09	2,585.54	2,709.50	53.71
134	J-244	11.09	2,564.54	2,702.19	59.64
135	J-245	11.09	2,558.54	2,731.06	74.75
136	J-246	11.09	2,569.54	2,709.34	60.58
137	J-247	11.09	2,623.54	2,779.37	67.52
138	J-248	11.09	2,608.54	2,707.10	42.70
139	J-249	11.09	2,531.54	2,707.03	76.04
140	J-250	11.09	2,553.54	2,708.03	66.94
141	J-251	11.09	2,555.54	2,707.17	65.70
142	J-252	11.09	2,538.00	2,713.10	75.87
143	J-253	11.09	2,615.54	2,779.25	70.93
144	J-254	11.09	2,531.54	2,706.96	76.01
145	J-255	11.09	2,553.54	2,702.19	64.41
146	J-256	11.09	2,583.54	2,707.32	53.63
147	J-257	11.09	2,571.54	2,707.47	58.90
148	J-258	11.09	2,581.54	2,707.35	54.51
149	J-260	11.09	2,556.54	2,742.97	80.78
150	J-261	11.09	2,619.54	2,714.74	41.25

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
151	J-262	11.09	2,563.54	2,731.55	72.80
152	J-264	11.09	2,532.54	2,707.01	75.60
153	J-265	11.09	2,534.54	2,706.99	74.72
154	J-265A	11.09	2,534.54	2,706.98	74.72
155	J-266	11.09	2,563.54	2,706.73	62.04
156	J-267	11.09	2,617.54	2,726.54	47.23
157	J-270	11.09	2,509.54	2,706.59	85.38
158	J-271	11.09	2,555.54	2,716.65	69.81
159	J-272	11.09	2,547.54	2,707.97	69.51
160	J-273	11.09	2,551.54	2,702.19	65.27
161	J-274	11.09	2,557.54	2,731.89	75.55
162	J-275	11.09	2,562.54	2,731.89	73.38
163	J-276	11.09	2,557.54	2,702.00	62.59
164	J-277	11.09	2,521.54	2,729.27	90.01
165	J-278	11.09	2,545.54	2,733.93	81.63
166	J-279	11.09	2,566.54	2,702.07	58.73
167	J-280	11.09	2,560.54	2,702.00	61.30
168	J-281	11.09	2,560.54	2,702.42	61.48
169	J-282	11.09	2,562.54	2,702.49	60.64
170	J-283	11.09	2,548.54	2,711.39	70.56
171	J-284	11.09	2,565.54	2,708.73	62.05
172	J-285	11.09	2,583.54	2,708.30	54.06
173	J-286	11.09	2,548.54	2,734.33	80.50
174	J-287	11.09	2,550.54	2,706.73	67.68
175	J-288	11.09	2,561.54	2,707.14	63.09
176	J-289	11.09	2,503.54	2,729.29	97.82
177	J-292	11.09	2,575.54	2,706.73	56.84
178	J-293	11.09	2,474.54	2,716.48	104.83
179	J-294	11.09	2,486.54	2,712.40	97.87
180	J-295	11.09	2,542.54	2,732.99	82.52
181	J-295A	11.09	2,537.00	2,731.99	84.49
182	J-296	11.09	2,520.54	2,706.60	80.62
183	J-297	11.09	2,519.54	2,706.60	81.05
184	J-298	11.09	2,546.54	2,711.39	71.43
185	J-299	11.09	2,546.54	2,707.80	69.88
186	J-300	11.09	2,553.54	2,731.89	77.28
187	J-301	11.09	2,586.54	2,702.75	50.36
188	J-302	11.09	2,503.54	2,726.29	96.52
189	J-303	11.09	2,607.54	2,707.04	43.11
190	J-304	11.09	2,556.54	2,702.00	63.03
191	J-305	11.09	2,611.54	2,709.69	42.53
192	J-306	11.09	2,564.54	2,708.09	62.20
193	J-307	11.09	2,532.54	2,706.70	75.46
194	J-308	11.09	2,540.54	2,706.65	71.98
195	J-309	11.09	2,571.54	2,716.08	62.63
196	J-310	11.09	2,487.54	2,712.24	97.36
197	J-311	11.09	2,490.54	2,712.22	96.05
198	J-313	11.09	2,562.54	2,706.73	62.48
199	J-314	11.09	2,525.54	2,729.27	88.28
200	J-315	11.09	2,460.54	2,724.77	114.49

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
201	J-316	11.09	2,557.54	2,732.00	75.59
202	J-317	11.09	2,630.54	2,712.73	35.61
203	J-318	11.09	2,564.54	2,702.19	59.64
204	J-319	11.09	2,584.54	2,707.32	53.20
205	J-320	11.09	2,563.54	2,715.41	65.80
206	J-321	11.09	2,563.54	2,715.90	66.02
207	J-322	11.09	2,558.54	2,706.73	64.21
208	J-324	11.09	2,635.54	2,712.18	33.21
209	J-325	11.09	2,562.54	2,750.49	81.44
210	J-327	11.09	2,565.54	2,707.44	61.48
211	J-328	11.09	2,553.54	2,702.18	64.41
212	J-330	11.09	2,543.54	2,706.99	70.82
213	J-331	11.09	2,548.54	2,706.99	68.66
214	J-332	11.09	2,494.54	2,712.22	94.32
215	J-333	11.09	2,563.54	2,726.71	70.70
216	J-334	11.09	2,552.54	2,710.73	68.54
217	J-335	11.09	2,552.54	2,732.84	78.12
218	J-336	11.09	2,490.54	2,710.75	95.42
219	J-337	11.09	2,529.54	2,706.59	76.71
220	J-338	11.09	2,556.54	2,732.82	76.38
221	J-339	11.09	2,568.54	2,702.00	57.83
222	J-340	11.09	2,580.54	2,702.19	52.71
223	J-341	11.09	2,558.54	2,731.05	74.75
224	J-342	11.09	2,505.54	2,729.29	96.95
225	J-343	11.09	2,596.54	2,710.68	49.46
226	J-344	11.09	2,548.54	2,711.64	70.67
227	J-345	11.09	2,490.54	2,710.55	95.33
228	J-347	11.09	2,548.54	2,707.21	68.75
229	J-348	11.09	2,577.54	2,707.23	56.19
230	J-350	11.09	2,555.54	2,707.35	65.78
231	J-351	11.09	2,508.54	2,706.59	85.81
232	J-352	11.09	2,505.54	2,702.18	85.21
233	J-358	11.09	2,623.54	2,708.63	36.87
234	J-359	11.09	2,603.54	2,709.73	46.01
235	J-362	11.09	2,583.54	2,778.34	84.41
236	J-363	11.09	2,548.54	2,734.39	80.53
237	J-364	11.09	2,613.54	2,778.58	71.51
238	J-365	11.09	2,559.00	2,752.46	83.83
239	J-366	11.09	2,468.54	2,721.56	109.64
240	J-368	11.09	2,555.00	2,752.46	85.56
241	J-370	11.09	2,561.50	2,752.44	82.74
242	J-371	11.09	2,549.50	2,752.44	87.93
243	J-373	11.09	2,537.00	2,752.43	93.35
244	J-375	11.09	2,559.70	2,707.10	63.87
245	J-376	11.09	2,539.00	2,713.36	75.55
246	J-377	11.09	2,559.00	2,707.10	64.17
247	J-378	11.09	2,548.54	2,707.21	68.75
248	J-380	11.09	2,536.00	2,707.68	74.39
249	J-381	11.09	2,536.00	2,707.68	74.39
250	J-384	11.09	2,539.00	2,707.67	73.09

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
251	J-385	11.09	2,586.50	2,802.21	93.47
252	J-386	11.09	2,552.00	2,707.67	67.45
253	J-393	11.09	2,548.00	2,711.52	70.85
254	J-395	11.09	2,525.00	2,711.51	80.82
255	J-396	11.09	2,630.00	2,710.89	35.05
256	J-397	11.09	2,648.00	2,711.63	27.57
257	J-M12-6H	0.00	2,582.00	2,707.08	54.20
258	J10	11.09	2,602.00	2,708.85	46.30
259	J12	11.09	2,590.00	2,708.90	51.52
260	J12-5H	0.00	2,556.54	2,702.00	63.03
261	J12-6H	0.00	2,549.00	2,702.00	66.29
262	J13-1H	0.00	2,553.54	2,702.19	64.41
263	J13-2H	0.00	2,573.54	2,702.19	55.74
264	J13-3H	0.00	2,565.54	2,702.07	59.16
265	J13-4H	0.00	2,579.54	2,702.19	53.14
266	J13-5H	0.00	2,579.54	2,702.20	53.15
267	J13-6H	0.00	2,563.54	2,702.19	60.08
268	J14	11.09	2,593.00	2,708.86	50.20
269	J14-1H	0.00	2,533.54	2,702.20	73.08
270	J16	11.09	2,590.00	2,708.90	51.52
271	J18	11.09	2,554.00	2,707.03	66.31
272	J20	11.09	2,547.50	2,707.03	69.12
273	J22	11.09	2,547.50	2,707.03	69.12
274	J24	11.09	2,540.00	2,706.83	72.29
275	J26	11.09	2,540.00	2,706.83	72.29
276	J28	11.09	2,553.00	2,706.79	66.64
277	J30	11.09	2,585.00	2,706.74	52.75
278	J32	11.09	2,560.00	2,706.73	63.58
279	J34	11.09	2,553.00	2,706.79	66.64
280	J36	11.09	2,585.00	2,706.74	52.75
281	J38	11.09	2,579.50	2,706.74	55.13
282	J40	11.09	2,569.00	2,706.73	59.68
283	J42	11.09	2,554.00	2,709.23	67.26
284	J44	11.09	2,556.00	2,709.14	66.36
285	J46	11.09	2,468.00	2,723.64	110.77
286	J48	11.09	2,568.00	2,725.12	68.08
287	J50	11.09	2,554.00	2,702.35	64.28
288	J52	11.09	2,572.00	2,730.07	68.49
289	J54	11.09	2,568.00	2,730.05	70.22
290	J56	11.09	2,570.00	2,730.05	69.35
291	J58	11.09	2,564.00	2,730.05	71.95
292	J60	11.09	2,570.60	2,730.05	69.09
293	J64	0.00	2,620.00	2,708.77	38.46
294	J66	0.00	2,566.00	2,708.77	61.86
295	J68	0.00	2,565.00	2,708.77	62.30
296	J7-1H	0.00	2,523.54	2,706.73	79.38
297	J7-2H	0.00	2,561.54	2,706.73	62.91
298	J70	0.00	2,565.00	2,702.19	59.44
299	J72	0.00	2,568.00	2,702.19	58.14
300	J74	0.00	2,582.00	2,702.19	52.08

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
301	J76	0.00	2,581.00	2,702.19	52.51
302	J78	0.00	2,581.00	2,702.19	52.51
303	J80	0.00	2,580.00	2,702.19	52.95
304	J82	0.00	2,566.00	2,702.19	59.01
305	J84	0.00	2,551.00	2,702.19	65.51
306	J86	0.00	2,564.00	2,702.19	59.88
307	J88	0.00	2,564.00	2,702.19	59.88
308	J90	0.00	2,557.00	2,702.00	62.83
309	J92	0.00	2,551.00	2,702.00	65.43
310	J94	0.00	2,552.00	2,702.00	64.99
311	K10-2H	0.00	2,551.54	2,711.27	69.21
312	K12-1H	0.00	2,525.00	2,711.51	80.82
313	K13-1H	0.00	2,539.00	2,707.67	73.09
314	K13-2H	0.00	2,596.54	2,703.64	46.40
315	K13-3H	0.00	2,587.54	2,702.75	49.92
316	K13-4H	0.00	2,600.00	2,702.74	44.52
317	K14-1H	0.00	2,560.54	2,702.49	61.51
318	K14-6H	0.00	2,531.00	2,702.35	74.25
319	K7-10H	0.00	2,579.00	2,706.74	55.35
320	K7-11H	0.00	2,568.00	2,706.73	60.11
321	K7-1H	0.00	2,563.54	2,706.73	62.04
322	K7-2H	0.00	2,550.54	2,706.73	67.68
323	K7-3H	0.00	2,543.54	2,706.99	70.82
324	K7-4H	0.00	2,529.54	2,707.05	76.92
325	K7-5H	0.00	2,535.54	2,706.70	74.16
326	K7-6H	0.00	2,574.54	2,706.73	57.28
327	K7-7H	0.00	2,584.54	2,706.74	52.95
328	K7-8H	0.00	2,520.54	2,706.60	80.62
329	K7-9H	0.00	2,527.54	2,706.65	77.61
330	K8-1H	0.00	2,509.54	2,706.59	85.38
331	K8-2H	0.00	2,523.54	2,706.96	79.48
332	L10-1H	0.00	2,544.54	2,711.41	72.30
333	L10-2H	0.00	2,556.54	2,711.33	67.07
334	L10-4H	0.00	2,548.54	2,711.39	70.56
335	L10-5H	0.00	2,546.54	2,711.39	71.43
336	L10-6H	0.00	2,560.00	2,710.99	65.42
337	L10-7H	0.00	2,558.00	2,711.14	66.35
338	L10-8H	0.00	2,555.54	2,711.39	67.53
339	L11-1H	0.00	2,543.54	2,711.51	72.78
340	L11-2H	0.00	2,538.54	2,711.55	74.97
341	L11-3H	0.00	2,548.54	2,711.41	70.57
342	L11-4H	0.00	2,537.00	2,752.43	93.35
343	L11-5H	0.00	2,562.00	2,752.45	82.52
344	L11-6H	0.00	2,539.00	2,713.36	75.55
345	L12-3H	0.00	2,563.54	2,730.87	72.50
346	L12-4H	0.00	2,548.54	2,711.64	70.67
347	L12-6H	0.00	2,560.54	2,716.39	67.53
348	L12-7H	0.00	2,555.54	2,716.71	69.84
349	L12-8H	0.00	2,565.54	2,715.90	65.15
350	L13-10H	0.00	2,536.00	2,707.68	74.39

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
351	L13-11H	0.00	2,558.00	2,709.14	65.49
352	L13-12H	0.00	2,555.00	2,709.23	66.83
353	L13-1H	0.00	2,555.54	2,707.35	65.78
354	L13-2H	0.00	2,554.00	2,706.53	66.09
355	L13-3H	0.00	2,561.54	2,707.20	63.11
356	L13-4H	0.00	2,567.54	2,707.43	60.62
357	L13-5H	0.00	2,554.54	2,708.49	66.71
358	L13-6H	0.00	2,558.54	2,707.07	64.36
359	L13-7H	0.00	2,552.54	2,709.16	67.86
360	L13-8H	0.00	2,547.54	2,707.97	69.51
361	L13-9H	0.00	2,561.54	2,707.14	63.09
362	L14-2H	0.00	2,552.00	2,707.80	67.51
363	L14-3H	0.00	2,565.00	2,708.77	62.30
364	L7-1H	0.00	2,533.54	2,706.99	75.15
365	L7-2H	0.00	2,553.54	2,706.98	66.49
366	L7-3H	0.00	2,551.54	2,706.83	67.29
367	L7-4H	0.00	2,555.54	2,706.87	65.57
368	L7-5H	0.00	2,570.54	2,706.92	59.09
369	L8-1H	0.00	2,565.54	2,708.73	62.05
370	L9-1H	0.00	2,585.54	2,709.50	53.71
371	M11-1H	0.00	2,566.54	2,755.62	81.93
372	M11-2H	0.00	2,583.54	2,778.34	84.41
373	M11-3H	0.00	2,619.54	2,730.75	48.19
374	M11-4H	0.00	2,579.54	2,735.31	67.49
375	M11-5H	0.00	2,563.54	2,750.49	81.01
376	M11-6H	0.00	2,557.54	2,752.46	84.46
377	M12-1H	0.00	2,585.54	2,738.72	66.37
378	M12-2H	0.00	2,585.54	2,707.18	52.71
379	M12-3H	0.00	2,574.54	2,707.06	57.42
380	M12-4H	0.00	2,613.54	2,778.58	71.51
381	M12-5H	0.00	2,582.54	2,733.78	65.53
382	M12-6H	0.00	2,582.00	2,707.08	54.20
383	M12-7H	0.00	2,601.54	2,707.05	45.72
384	M12-8H	0.00	2,603.54	2,707.04	44.85
385	M13-1H	0.00	2,559.54	2,717.21	68.32
386	M13-2H	0.00	2,572.54	2,728.98	67.79
387	M13-3H	0.00	2,558.54	2,708.69	65.06
388	M13-4H	0.00	2,579.00	2,707.06	55.49
389	M13-5H	0.00	2,583.54	2,707.32	53.63
390	M14-1H	0.00	2,570.00	2,730.05	69.35
391	M14-2H	0.00	2,564.00	2,730.05	71.95
392	M14-3H	0.00	2,570.60	2,730.05	69.09
393	M6-1H	0.00	2,555.54	2,707.17	65.70
394	M7-1H	0.00	2,552.54	2,706.99	66.92
395	M7-2H	0.00	2,567.54	2,708.09	60.90
396	M8-1H	0.00	2,581.54	2,708.30	54.93
397	M8-2H	0.00	2,592.00	2,708.87	50.64
398	M8-3H	0.00	2,592.50	2,708.88	50.43
399	M8-4H	0.00	2,591.00	2,708.89	51.08
400	M8-5H	0.00	2,593.00	2,708.87	50.21

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
401	M9-1H	0.00	2,603.54	2,709.73	46.01
402	N10-1H	0.00	2,617.54	2,726.54	47.23
403	N11-1H	0.00	2,623.54	2,779.37	67.52
404	N11-2H	0.00	2,617.54	2,731.05	49.19
405	N11-3H	0.00	2,593.54	2,733.14	60.49
406	N12-1H	0.00	2,590.54	2,781.17	82.60
407	N13-1H	0.00	2,559.54	2,739.51	77.98
408	N13-2H	0.00	2,595.54	2,768.91	75.12
409	N13-3H	0.00	2,546.54	2,733.93	81.19
410	N14-1H	0.00	2,548.54	2,734.33	80.50
411	N14-2H	0.00	2,557.54	2,732.00	75.59
412	N14-3H	0.00	2,537.00	2,731.99	84.49
413	N15-1H	0.00	2,558.54	2,731.05	74.75
414	N15-2H	0.00	2,556.54	2,730.99	75.59
415	N15-3H	0.00	2,556.54	2,731.06	75.62
416	O10-1H	0.00	2,627.54	2,712.73	36.91
417	O12-1H	0.00	2,579.54	2,725.12	63.08
418	O13-1H	0.00	2,507.54	2,729.29	96.08
419	O13-2H	0.00	2,521.54	2,729.27	90.01
420	O8-1H	0.00	2,621.00	2,710.89	38.95
421	O9-1H	0.00	2,627.00	2,711.63	36.67
422	P13-1H	0.00	2,460.54	2,724.77	114.49
423	P13-2H	0.00	2,468.54	2,721.56	109.64
424	P6-1H	0.00	2,569.54	2,709.34	60.58
425	P6-2H	0.00	2,592.54	2,709.30	50.59
426	Q10-1H	0.00	2,492.00	2,712.22	95.42
427	Q10-2H	0.00	2,494.54	2,712.22	94.32
428	Q10-3H	0.00	2,488.54	2,712.40	97.00
429	Q11-1H	0.00	2,474.54	2,716.48	104.83
430	R7-1H	0.00	2,517.54	2,709.59	83.22
431	R9-1H	0.00	2,499.54	2,710.73	91.51

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	9,235.83	26.20	688.67	212.00	Open	0
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-203.46	0.58	0.21	0.18	Open	0
3		P-10	J-128	J-127	45.45	10.00	110.00	-120.31	0.49	0.01	0.17	Open	0
4		P-100	J-239	J-238	960.70	8.00	110.00	-101.40	0.65	0.34	0.36	Open	0
5		P-101	J-245	J-238	149.26	8.00	110.00	112.49	0.72	0.06	0.44	Open	0
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
7		P-103	J-233	J-158	215.33	8.00	110.00	223.48	1.43	0.33	1.55	Open	0
8		P-104	J-255	J-122	313.79	8.00	110.00	-31.59	0.20	0.01	0.04	Open	0
9		P-105	J-131	J-132	317.72	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
10		P-106	J-157	J-170	358.07	8.00	110.00	190.21	1.21	0.41	1.15	Open	0
11		P-108	J-168	J72	94.43	8.00	110.00	22.96	0.15	0.00	0.02	Open	0
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
13		P-110	J-199	J-200	69.96	8.00	110.00	-11.09	0.07	0.00	0.01	Open	0
14		P-113	J76	J-244	236.44	8.00	110.00	23.62	0.15	0.01	0.02	Open	0
15		P-114	J-244	J-131	21.10	12.00	110.00	12.53	0.04	0.00	0.01	Open	0
16		P-115	J-131	J-255	49.66	12.00	110.00	-9.65	0.03	0.00	0.00	Open	0
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
18		P-117	J-168	J74	39.57	12.00	110.00	-34.05	0.10	0.00	0.01	Open	0
19		P-118	J-168	J13-4H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
20		P-119	J-201	J-170	13.13	12.00	110.00	-70.27	0.20	0.00	0.02	Open	0
21		P-12	J-114	J-115	298.01	10.00	110.00	178.44	0.73	0.10	0.34	Open	0
22		P-120	J-241	J-201	47.80	8.00	110.00	-48.09	0.31	0.00	0.09	Open	0
23		P-121	J-158	J-157	92.45	8.00	110.00	212.39	1.36	0.13	1.41	Open	0
24		P-122	J-157	J-196	105.49	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
26		P-124	J-236	J42	42.81	8.00	110.00	-220.79	1.41	0.06	1.52	Open	0
27		P-126	L11-5H	J-371	377.96	8.00	110.00	22.18	0.14	0.01	0.02	Open	0
28		P-127	J-211	J-181	330.78	8.00	110.00	-1,107.37	7.07	9.94	30.06	Open	0
29		P-128	J-212	J-190	143.39	8.00	110.00	-179.80	1.15	0.15	1.04	Open	0
30		P-129	J-231	J-150	227.08	8.00	110.00	-163.32	1.04	0.20	0.87	Open	0
31		P-130	J-141	J-205	202.64	8.00	110.00	109.66	0.70	0.08	0.42	Open	0
32		P-131	J-115	J-205	245.54	8.00	110.00	121.88	0.78	0.12	0.51	Open	0
33		P-132	J-135	J-240	94.59	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
34		P-133	J-153	J-152	97.97	8.00	110.00	432.52	2.76	0.52	5.27	Open	0
35		P-134	J-192	J-191	110.45	8.00	110.00	388.16	2.48	0.48	4.31	Open	0
36		P-135	J-191	J-213	168.15	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
37		P-136	J-233	J-191	22.28	8.00	110.00	-365.98	2.34	0.09	3.87	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
38		P-137	J-129	J-192	239.03	8.00	110.00	399.25	2.55	1.09	4.54	Open	0
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
40		P-139	J-152	J-129	359.71	8.00	110.00	421.43	2.69	1.81	5.02	Open	0
41		P-14	J-124	J-112	235.96	10.00	110.00	-231.92	0.95	0.13	0.56	Open	0
42		P-140	J-129	J-130	160.33	8.00	110.00	11.09	0.07	0.00	0.00	Open	0
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
44		P-142	J-174	J-202	125.70	8.00	110.00	286.85	1.83	0.31	2.46	Open	0
45		P-143	J-149	J-187	185.18	12.00	110.00	-165.68	0.47	0.02	0.12	Open	0
46		P-144	J-153	J-149	224.22	12.00	110.00	-154.59	0.44	0.02	0.11	Open	0
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
48		P-146	J-375	J-188	169.96	8.00	110.00	-130.05	0.83	0.10	0.57	Open	0
49		P-146A	J-187	J-375	20.98	8.00	110.00	-107.87	0.69	0.01	0.40	Open	0
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
51		P-148	J-188	J-231	56.77	8.00	110.00	-141.14	0.90	0.04	0.66	Open	0
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
54		P-150	J-185	J-115	140.14	8.00	110.00	108.55	0.69	0.06	0.41	Open	0
55		P-151	J-146	J-114	148.95	8.00	110.00	189.53	1.21	0.17	1.14	Open	0
56		P-152	J-252	J-146	340.09	8.00	110.00	375.38	2.40	1.38	4.05	Open	0
57		P-154	J-104	J-145	309.87	8.00	110.00	-44.04	0.28	0.02	0.08	Open	0
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
59		P-156	J-185	J-145	145.41	8.00	110.00	-119.64	0.76	0.07	0.49	Open	0
60		P-157	J-145	J-146	147.46	8.00	110.00	-174.76	1.12	0.15	0.99	Open	0
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
62		P-159	J-211	J-210	17.79	8.00	110.00	342.30	2.18	0.06	3.42	Open	0
63		P-16	J-118	J-117	237.90	10.00	110.00	-292.79	1.20	0.21	0.86	Open	0
64		P-160	J-242	J-211	220.05	8.00	110.00	-753.98	4.81	3.25	14.75	Open	0
65		P-164	J-197	J-174	100.44	8.00	110.00	297.94	1.90	0.27	2.64	Open	0
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
67		P-166	J-197	J-198	101.26	8.00	110.00	11.09	0.07	0.00	0.00	Open	0
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
69		P-168	J-197	J-210	16.45	8.00	110.00	-331.21	2.11	0.05	3.22	Open	0
70		P-169	J-142	J-141	14.70	8.00	110.00	120.75	0.77	0.01	0.50	Open	0
71		P-17	J-119	J-121	661.27	10.00	110.00	-430.18	1.76	1.16	1.76	Open	0
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
74		P-172	J-205	J-121	222.07	8.00	110.00	220.44	1.41	0.34	1.51	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
77		P-175	J-243	J-118	25.00	8.00	110.00	81.94	0.52	0.01	0.24	Open	0
78		P-176	J-257	J-214	47.06	8.00	110.00	-362.95	2.32	0.18	3.81	Open	0
79		P-177	J-154	J-155	341.59	8.00	110.00	-885.54	5.65	6.79	19.87	Open	0
80		P-178	J-148	J-193	255.40	8.00	110.00	22.18	0.14	0.01	0.02	Open	0
81		P-179	J-214	J-215	156.54	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
82		P-18	J-121	J-124	286.05	10.00	110.00	-220.83	0.90	0.15	0.51	Open	0
83		P-180	J-147	J-148	45.75	8.00	110.00	-396.22	2.53	0.20	4.48	Open	0
84		P-181	J-190	J-189	25.98	8.00	110.00	-422.77	2.70	0.13	5.05	Open	0
85		P-182	J-148	J-189	142.70	8.00	110.00	-429.49	2.74	0.74	5.20	Open	0
86		P-183	J-154	J-228	71.88	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
87		P-184	J-189	J-154	51.91	8.00	110.00	-863.36	5.51	0.98	18.96	Open	0
88		P-185	J-214	J-147	198.83	8.00	110.00	-385.13	2.46	0.85	4.25	Open	0
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
90		P-187	J-257	J-258	155.58	8.00	110.00	155.27	0.99	0.12	0.79	Open	0
91		P-188	J-151	J-257	23.86	8.00	110.00	-196.59	1.25	0.03	1.23	Open	0
92		P-189	J-150	J-151	8.98	8.00	110.00	-174.41	1.11	0.01	0.98	Open	0
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
95		P-191	J-144	J-262	92.16	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
96		P-192	J-143	J-144	21.60	8.00	110.00	-1,140.64	7.28	0.69	31.76	Open	0
97		P-193	J-143	J-181	133.07	8.00	110.00	1,129.55	7.21	4.15	31.19	Open	0
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
99		P-195	J-116	J-227	1,151.95	8.00	110.00	208.35	1.33	1.57	1.36	Open	0
100		P-196	J28	J26	390.87	12.00	110.00	-146.56	0.42	0.04	0.10	Open	0
101		P-197	J-227	J-249	20.05	8.00	110.00	197.26	1.26	0.02	1.23	Open	0
102		P-198	J-249	J-254	108.97	8.00	110.00	130.71	0.83	0.06	0.57	Open	0
103		P-199	J-254	J-177	467.39	8.00	110.00	119.62	0.76	0.23	0.49	Open	0
104		P-20	J-117	J-119	128.15	10.00	110.00	-314.97	1.29	0.13	0.99	Open	0
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
107		P-202	J-136	J-178	684.02	8.00	110.00	-12.86	0.08	0.01	0.01	Open	0
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
109		P-204	J-177	J-178	21.41	8.00	110.00	30.89	0.20	0.00	0.03	Open	0
110		P-205	J-206	J-207	208.07	8.00	110.00	-29.88	0.19	0.01	0.04	Open	0
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
112		P-207	J-250	J-116	974.28	8.00	110.00	-134.38	0.86	0.59	0.60	Open	0
113		P-208	J-175	J-176	367.24	12.00	110.00	-202.01	0.57	0.07	0.18	Open	0
114		P-209	J26	J-195	293.04	12.00	110.00	-179.83	0.51	0.04	0.14	Open	0
115		P-21	J-118	J-110	557.62	10.00	110.00	363.64	1.49	0.72	1.29	Open	0
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
117		P-211	J-195	J-175	305.36	12.00	110.00	-190.92	0.54	0.05	0.16	Open	0
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
120		P-214	J-260	J-229	46.84	8.00	110.00	-456.11	2.91	0.27	5.82	Open	0
121		P-215	J-113	J-135	11.43	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
122		P-216	J-293	J-294	1,100.07	6.00	110.00	167.76	1.90	4.07	3.70	Open	0
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
124		P-218	J-334	J-343	2,036.73	6.00	110.00	11.09	0.13	0.05	0.02	Open	0
125		P-219	J-310	J-336	710.86	6.00	110.00	123.40	1.40	1.49	2.10	Open	0
126		P-22	J-110	J-111	241.32	10.00	110.00	-1.27	0.01	0.00	0.00	Open	0
127		P-220	J-310	J-311	189.35	6.00	110.00	22.18	0.25	0.02	0.09	Open	0
128		P-221	J-294	J-310	50.46	6.00	110.00	156.67	1.78	0.16	3.27	Open	0
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
130		P-222J	J-164	J-222	122.72	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
131		P-223	J-311	J-332	149.01	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
134		P-226	J-345	J-125	1,043.90	6.00	110.00	79.04	0.90	0.96	0.92	Open	0
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
136		P-23	J-110	J-116	126.11	10.00	110.00	353.81	1.45	0.15	1.23	Open	0
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
138		P-231	J-284	J-285	570.74	6.00	110.00	70.81	0.80	0.43	0.75	Open	0
139		P-232	J-306	J-250	165.38	6.00	110.00	48.63	0.55	0.06	0.37	Open	0
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
142		P-238	J-289	J-342	25.70	6.00	110.00	33.27	0.38	0.00	0.19	Open	0
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
144		P-24	J10	J-111	680.53	10.00	110.00	94.26	0.39	0.07	0.11	Open	0
145		P-241	J-261	J-267	413.65	6.00	110.00	-505.25	5.73	11.81	28.54	Open	0
146		P-242	J-230	N13-2H	414.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
147		P-243-359	J-359	J-243	751.40	8.00	110.00	93.03	0.59	0.23	0.31	Open	0
148		P-244	J-234	J-303	166.84	6.00	110.00	11.09	0.13	0.00	0.02	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
149		P-245	J-256	J-319	245.42	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
151		P-247	J-325	J-171	56.56	6.00	110.00	-571.80	6.49	2.03	35.89	Open	0
152		P-248	J-325	J-221	438.70	6.00	110.00	560.70	6.36	15.18	34.61	Open	0
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
154		P-25	J-122	J-123	485.29	10.00	110.00	-53.77	0.22	0.02	0.04	Open	0
155		P-250	J-267	J-172	141.60	6.00	110.00	-516.34	5.86	4.21	29.71	Open	0
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
157		P-252	J-277	J-314	188.74	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
158		P-252J	J-376	J-252	18.85	8.00	110.00	731.79	4.67	0.26	13.95	Open	0
159		P-253	J-342	J-277	166.27	6.00	110.00	22.18	0.25	0.01	0.09	Open	0
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
162		P-256	J48	J-302	810.53	6.00	110.00	-101.24	1.15	1.18	1.45	Open	0
163		P-257	J-261	J-317	748.38	6.00	110.00	140.99	1.60	2.01	2.68	Open	0
164		P-258	J-317	J-324	236.04	6.00	110.00	129.90	1.47	0.54	2.31	Open	0
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
166		P-259J	J-155	J-164	21.04	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
167		P-260	J-302	J-315	743.33	6.00	110.00	121.97	1.38	1.53	2.05	Open	0
168		P-261	J-289	J-302	435.87	6.00	110.00	234.30	2.66	3.00	6.88	Open	0
169		P-263	J-239	J-289	143.17	6.00	110.00	278.67	3.16	1.36	9.48	Open	0
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
171		P-265	J-245	J-341	285.59	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
172		P-266	J-245	J-274	336.66	6.00	110.00	-134.67	1.53	0.83	2.47	Open	0
173		P-267	J-274	J-275	98.71	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
174		P-268	J-274	J-300	190.70	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
175		P-269	J-316	J-274	29.78	6.00	110.00	167.94	1.91	0.11	3.71	Open	0
176		P-27	J-184	J-183	1,262.55	8.00	110.00	34.68	0.22	0.06	0.05	Open	0
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
178		P-271	J-316	J-335	200.25	6.00	110.00	-179.03	2.03	0.84	4.18	Open	0
179		P-272	J-335	J-338	749.12	6.00	110.00	11.09	0.13	0.02	0.02	Open	0
180		P-272J	J-299	J-272	49.13	6.00	110.00	-157.62	1.79	0.16	3.30	Open	0
181		P-276	J-200	J-279	215.50	6.00	110.00	55.45	0.63	0.10	0.48	Open	0
182		P-277	J-241	J-340	297.28	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
183		P-278	J13-2H	J86	130.09	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
184		P-279	J-255	J-273	210.37	8.00	110.00	10.85	0.07	0.00	0.01	Open	0
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-353.17	2.25	5.81	3.62	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
186		P-281	J-273	J-318	92.23	6.00	110.00	-11.33	0.13	0.00	0.02	Open	0
187		P-282	J-273	J-328	16.64	6.00	110.00	11.09	0.13	0.00	0.03	Open	0
188		P-283	J84	J13-1H	9.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
189		P-284	J-204	J13-5H	23.10	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
190		P-285	J90	J-280	45.86	6.00	110.00	-22.18	0.25	0.00	0.09	Open	0
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
192		P-287	J-279	J-280	228.10	6.00	110.00	44.36	0.50	0.07	0.32	Open	0
193		P-288	J-280	J-304	71.58	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
194		P-289	J-276	J-339	107.48	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
195		P-29	J-160	J-186	1,300.95	8.00	110.00	-129.91	0.83	0.74	0.57	Open	0
196		P-290	J-276	J12-5H	29.81	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
197		P-291	J-282	J-301	193.58	6.00	110.00	-98.13	1.11	0.27	1.37	Open	0
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P-294	J-301	J-128	174.52	6.00	110.00	-109.22	1.24	0.29	1.67	Open	0
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
201		P-296	J-127	J-233	8.09	6.00	110.00	-131.40	1.49	0.02	2.35	Open	0
202		P-297	J-320	J-344	514.42	6.00	110.00	242.49	2.75	3.77	7.33	Open	0
203		P-298	J-393	J-350	383.14	6.00	110.00	300.12	3.41	4.17	10.88	Open	0
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
205		P-299J	J-299	J-380	394.60	6.00	110.00	44.36	0.50	0.12	0.32	Open	0
206		P-30	J-176	J-226	104.98	8.00	110.00	11.09	0.07	0.00	0.00	Open	0
207		P-301	J-272	J-212	319.55	6.00	110.00	-168.71	1.91	1.20	3.74	Open	0
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
209		P-304	J-288	J-378	74.49	6.00	110.00	-79.99	0.91	0.07	0.94	Open	0
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
211		P-306	J-187	J-288	69.43	6.00	110.00	-68.90	0.78	0.05	0.71	Open	0
212		P-307	J-202	J-309	159.54	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
213		P-308	J-321	J-320	62.24	6.00	110.00	253.58	2.88	0.50	7.96	Open	0
214		P-309	J-321	J-202	20.82	6.00	110.00	-264.67	3.00	0.18	8.62	Open	0
215		P-31	J-161	J-218	86.18	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
217		P-312	J-231	J-348	337.95	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
218		P-313	J-197	J-271	101.59	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
219		P-314	J-142	J-298	291.39	6.00	110.00	22.18	0.25	0.03	0.09	Open	0
220		P-315	J-142	J-115	10.29	6.00	110.00	-154.02	1.75	0.03	3.16	Open	0
221		P-316	J-298	J-283	161.88	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
224		P-319	J-117	J-305	201.95	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
225		P-32	J-161	J-160	312.38	8.00	110.00	-290.73	1.86	0.79	2.53	Open	0
226		P-320	J-151	J-327	128.04	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
227		P-321	J-181	J-333	75.58	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
228		P-322	J-264	J-330	180.35	6.00	110.00	22.18	0.25	0.02	0.09	Open	0
229		P-323	J-249	J-264	162.11	8.00	110.00	55.46	0.35	0.02	0.12	Open	0
230		P-324	J-296	J-308	102.50	6.00	110.00	-55.45	0.63	0.05	0.48	Open	0
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
232		P-326	J-296	J-297	17.70	6.00	110.00	44.36	0.50	0.01	0.32	Open	0
233		P-327	J-297	J-337	338.49	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
235		P-329	J-270	J-351	32.21	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
236		P-33	J-176	J20	183.58	12.00	110.00	-224.19	0.64	0.04	0.22	Open	0
237		P-330	J-266	J-313	206.46	6.00	110.00	-7.54	0.09	0.00	0.01	Open	0
238		P-331	J32	J-322	47.22	6.00	110.00	11.09	0.13	0.00	0.03	Open	0
239		P-332	J-313	J-136	281.66	6.00	110.00	-1.77	0.02	0.00	0.00	Open	0
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
241		P-334	J-206	J-292	180.91	6.00	110.00	14.64	0.17	0.01	0.04	Open	0
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
243		P-336	J-292	J-266	321.44	6.00	110.00	3.55	0.04	0.00	0.00	Open	0
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
247		P-34	J-250	J-160	70.87	8.00	110.00	171.91	1.10	0.07	0.96	Open	0
248		P-340	J-287	J-206	239.33	6.00	110.00	-4.15	0.05	0.00	0.00	Open	0
249		P-341	J-178	J-287	70.36	6.00	110.00	6.94	0.08	0.00	0.01	Open	0
250		P-342	J-308	J-307	76.16	6.00	110.00	-66.55	0.76	0.05	0.67	Open	0
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
252		P-344	J-177	J-307	38.56	6.00	110.00	77.64	0.88	0.03	0.89	Open	0
253		P-345	J-330	J-331	66.36	6.00	110.00	11.09	0.13	0.00	0.03	Open	0
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
255		P-347	J-111	J-284	43.43	6.00	110.00	81.90	0.93	0.04	0.98	Open	0
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
257		P-349	J-265	J-264	236.64	6.00	110.00	-22.19	0.25	0.02	0.09	Open	0
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
259		P-350	J-265	J-265A	252.43	6.00	110.00	11.09	0.13	0.01	0.02	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
261		P-352	J-352	J-122	632.68	6.00	110.00	-11.09	0.13	0.02	0.02	Open	0
262		P-353	J-281	J-282	60.97	6.00	110.00	-87.04	0.99	0.07	1.10	Open	0
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
264		P-355	J-123	J50	205.02	6.00	110.00	-64.86	0.74	0.13	0.64	Open	0
265		P-356	J-297	J-270	92.80	6.00	110.00	22.18	0.25	0.01	0.09	Open	0
266		P-357	J-285	J-306	386.52	6.00	110.00	59.72	0.68	0.21	0.55	Open	0
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
268		P-36	J-218	J-251	182.80	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
269		P-361	J-295	J-295A	196.76	6.00	110.00	199.45	2.26	1.00	5.10	Open	0
270		P-361A	J-295A	J-239	291.39	6.00	110.00	188.35	2.14	1.34	4.59	Open	0
271		P-362	J-336	J-334	237.69	6.00	110.00	22.18	0.25	0.02	0.09	Open	0
272		P-363	J-336	J-345	166.85	6.00	110.00	90.13	1.02	0.20	1.17	Open	0
273		P-368J	J-365	J-368	170.87	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
274		P-369	J-278	J-295	165.68	6.00	110.00	210.54	2.39	0.93	5.64	Open	0
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
278		P-371	J-358	J64	110.10	8.00	110.00	-198.61	1.27	0.14	1.25	Open	0
279		P-373J	J-371	J-373	247.61	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
280		P-374	J-350	J-153	30.43	6.00	110.00	289.03	3.28	0.31	10.14	Open	0
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
284		P-378J	J-378	J-299	400.51	6.00	110.00	-102.17	1.16	0.59	1.48	Open	0
285		P-379	J-119	J-359	917.88	8.00	110.00	52.06	0.33	0.10	0.10	Open	0
286		P-38	J-183	J-186	1,090.53	8.00	110.00	120.22	0.77	0.54	0.49	Open	0
287		P-380	J-119	J-359	917.88	8.00	110.00	52.06	0.33	0.10	0.10	Open	0
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
289		P-381J	J-380	J-381	39.90	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
291		P-383	J-133	J-362	231.50	8.00	110.00	22.18	0.14	0.01	0.02	Open	0
292		P-384	J-362	J-140	96.16	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
293		P-384J	J-380	J-384	257.09	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
295		P-386	J-209	J-364	299.67	8.00	110.00	273.29	1.74	0.68	2.25	Open	0
296		P-386J	J-380	J-386	244.75	6.00	110.00	11.09	0.13	0.01	0.02	Open	0

High Zone PHD 2015 pump on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
297		P-387	J-364	J-133	108.75	8.00	110.00	262.20	1.67	0.23	2.09	Open	0
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
299		P-389	J-366	J-293	1,219.68	6.00	110.00	178.85	2.03	5.09	4.17	Open	0
300		P-39	J-186	J-103	638.49	8.00	110.00	-20.78	0.13	0.01	0.02	Open	0
301		P-390	J-315	J46	657.48	6.00	110.00	110.88	1.26	1.13	1.72	Open	0
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
305		P-395J	J-393	J-395	437.00	6.00	110.00	11.09	0.13	0.01	0.02	Open	0
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-96.63	1.10	1.65	1.33	Open	0
308		P-397J	J-396	J-397	453.13	6.00	110.00	-107.72	1.22	0.74	1.63	Open	0
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-118.81	0.76	0.55	0.48	Open	0
310		P-40	J-246	J-184	493.82	8.00	110.00	45.77	0.29	0.04	0.08	Open	0
311		P-401	J-363	J-278	74.61	6.00	110.00	221.63	2.51	0.46	6.20	Open	0
312		P-402	J-363	J-260	380.17	6.00	110.00	-445.02	5.05	8.58	22.56	Open	0
313		P-41	J-125	J-246	2,032.66	8.00	110.00	56.86	0.36	0.25	0.12	Open	0
314		P-42	J-217	J-220	115.87	8.00	110.00	11.09	0.07	0.00	0.00	Open	0
315		P-43	J-165	J-144	67.95	8.00	110.00	1,162.82	7.42	2.24	32.91	Open	0
316		P-44	J-258	J-256	36.00	8.00	110.00	144.18	0.92	0.02	0.69	Open	0
317		P-45	J-165	J-217	185.69	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
318		P-46	J-385	J-134	382.32	8.00	110.00	1,649.86	10.53	24.05	62.91	Open	0
319		P-47	J-224	J-247	550.17	8.00	110.00	306.57	1.96	1.53	2.79	Open	0
320		P-48	J-234	J-235	281.08	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
321		P-49	J-166	J-169	217.82	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
322		P-50	J-155	J-137	552.95	8.00	110.00	-918.81	5.86	11.76	21.28	Open	0
323		P-51	J-193	J-216	158.25	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
325		P-57	J-180	J-223	228.41	8.00	110.00	99.81	0.64	0.08	0.35	Open	0
326		P-58	J-179	J-180	323.33	8.00	110.00	110.91	0.71	0.14	0.42	Open	0
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
328		P-60	J-256	J-179	14.41	8.00	110.00	122.00	0.78	0.01	0.49	Open	0
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
331		P-63	J-223	J-248	240.64	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	77.63	0.50	0.02	0.22	Open	0
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	77.63	0.50	0.02	0.22	Open	0
335		P-65	J-166	J-167	246.95	8.00	110.00	44.36	0.28	0.02	0.08	Open	0
336		P-66	J-167	J-234	19.76	8.00	110.00	33.27	0.21	0.00	0.05	Open	0
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
338		P-68	J-230	J-229	495.46	8.00	110.00	1,485.83	9.48	25.67	51.82	Open	0
339		P-69	J-138	J-182	296.96	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
340		P-7	J-125	J-126	564.55	10.00	110.00	11.09	0.05	0.00	0.00	Open	0
341		P-70	J-137	J-138	14.05	8.00	110.00	-929.90	5.94	0.31	21.77	Open	0
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
343		P-72	J-229	J-156	144.82	8.00	110.00	1,018.62	6.50	3.73	25.75	Open	0
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
345		P-74	J52	J-156	373.92	8.00	110.00	-1,007.53	6.43	9.44	25.24	Open	0
346		P-75	J-169	J-169A	120.03	8.00	110.00	11.09	0.07	0.00	0.01	Open	0
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
349		P-78	J-208	J-230	233.19	8.00	110.00	1,496.92	9.55	12.25	52.54	Open	0
350		P-79	J-224	J-208	89.11	8.00	110.00	-317.66	2.03	0.27	2.98	Open	0
351		P-8	J-112	J-113	234.36	10.00	110.00	-243.01	0.99	0.14	0.61	Open	0
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
353		P-81	J-134	J-139	284.76	8.00	110.00	1,867.70	11.92	22.54	79.15	Open	0
354		P-82	J-139	J-219	479.01	8.00	110.00	1,207.18	7.71	16.90	35.27	Open	0
355		P-83	J-219	J-165	142.35	8.00	110.00	1,196.09	7.63	4.94	34.68	Open	0
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
358		P-86	J-171	J-159	363.43	8.00	110.00	66.54	0.42	0.06	0.16	Open	0
359		P-86A	J-159	J-365	31.79	8.00	110.00	55.45	0.35	0.00	0.12	Open	0
360		P-87	J-171	J-139	276.80	8.00	110.00	-649.43	4.15	3.10	11.19	Open	0
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
362		P-89	J-253	J-209	440.00	8.00	110.00	-11.09	0.07	0.00	0.01	Open	0
363		P-9	J-113	J-104	183.55	10.00	110.00	-276.28	1.13	0.14	0.78	Open	0
364		P-90	J-133	J-134	116.30	8.00	110.00	228.93	1.46	0.19	1.62	Open	0
365		P-93	J-209	J-247	44.60	8.00	110.00	-295.47	1.89	0.12	2.60	Open	0
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
367		P-95	J-221	J-162	263.63	8.00	110.00	549.61	3.51	2.17	8.22	Open	0
368		P-96	J-163	J-162	264.20	8.00	110.00	-538.52	3.44	2.09	7.91	Open	0
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
370		P-98	J-172	J-163	39.90	8.00	110.00	-527.43	3.37	0.30	7.61	Open	0

High Zone PHD 2015 pump on - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-187.52	1.20	0.09	1.12	Open	0
373		P-J106	J-252	J-106	417.04	8.00	110.00	345.32	2.20	1.45	3.47	Open	0
374		P-J286	J-363	J-286	10.63	6.00	110.00	212.31	2.41	0.06	5.74	Open	0
375		P-J335	J-335	J-286	287.42	6.00	110.00	-201.21	2.28	1.49	5.19	Open	0
376		P-J377	J-375	J-377	60.85	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,486.61	22.25	11.89	251.50	Open	0
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	-5,749.22	36.70	46.87	635.05	Open	0
393		P-TANK8B	J-208	J-385	277.35	8.00	110.00	-1,825.67	11.65	21.05	75.89	Open	0
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
395		P126	J-242	J-376	11.13	8.00	110.00	742.89	4.74	0.16	14.37	Open	0
396		P126B	J-365	L11-5H	324.75	8.00	110.00	33.27	0.21	0.01	0.05	Open	0
397		P128	J-344	J-393	9.32	6.00	110.00	322.30	3.66	0.12	12.42	Open	0
398		P130	J10	J14	116.51	10.00	110.00	-105.35	0.43	0.02	0.13	Open	0
399		P132	J14	M8-2H	217.35	8.00	110.00	-34.09	0.22	0.01	0.05	Open	0
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	-34.09	0.22	0.01	0.05	Open	0
401		P136	M8-3H	J16	275.97	8.00	110.00	-34.09	0.22	0.01	0.05	Open	0
402		P138	J16	J12	16.19	10.00	110.00	-127.53	0.52	0.00	0.18	Open	0
403		P140	J16	M8-4H	42.30	10.00	110.00	82.35	0.34	0.00	0.08	Open	0
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	82.35	0.34	0.02	0.08	Open	0
405		P144	M8-5H	J14	116.30	10.00	110.00	82.35	0.34	0.01	0.08	Open	0
406		P146	J12	J-102	126.72	10.00	110.00	-138.62	0.57	0.03	0.22	Open	0
407		P148	J20	J22	6.79	12.00	110.00	-246.37	0.70	0.00	0.25	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
408		P150	J22	J-161	73.04	8.00	110.00	-257.46	1.64	0.15	2.02	Open	0
409		P152	J-194	J24	40.99	8.00	110.00	-11.09	0.07	0.00	0.01	Open	0
410		P154	J26	J24	12.75	8.00	110.00	22.18	0.14	0.00	0.02	Open	0
411		P156	J32	J40	349.41	12.00	110.00	-39.04	0.11	0.00	0.01	Open	0
412		P158	J30	J28	652.66	12.00	110.00	-124.38	0.35	0.05	0.07	Open	0
413		P160	J-313	J32	17.72	6.00	110.00	-16.86	0.19	0.00	0.06	Open	0
414		P162	J30	J-207	49.17	12.00	110.00	28.59	0.08	0.00	0.00	Open	0
415		P164	J30	J36	31.14	12.00	110.00	23.47	0.07	0.00	0.01	Open	0
416		P166	J36	J-207	18.03	8.00	110.00	12.38	0.08	0.00	0.00	Open	0
417		P168	J28	J34	44.56	12.00	110.00	11.09	0.03	0.00	0.00	Open	0
418		P170	J20	J18	292.00	12.00	110.00	11.09	0.03	0.00	0.00	Open	0
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open	0
422		P178	J44	J-236	15.32	8.00	110.00	-209.70	1.34	0.02	1.37	Open	0
423		P180	J42	J-190	51.62	8.00	110.00	-231.88	1.48	0.09	1.66	Open	0
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
425		P184	J48	J46	1,260.92	6.00	110.00	90.15	1.02	1.48	1.17	Open	0
426		P186	J46	J-366	444.59	6.00	110.00	189.94	2.16	2.07	4.66	Open	0
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
428		P190	J40	J38	318.75	12.00	110.00	-50.13	0.14	0.00	0.01	Open	0
429		P192	J38	J30	286.67	12.00	110.00	-61.23	0.17	0.01	0.02	Open	0
430		P194	J50	J-281	85.58	6.00	110.00	-75.95	0.86	0.07	0.86	Open	0
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
432		P198	J52	J54	266.38	8.00	110.00	44.37	0.28	0.02	0.08	Open	0
433		P200	J54	J58	128.71	8.00	110.00	13.92	0.09	0.00	0.01	Open	0
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
435		P204	J58	J60	396.43	8.00	110.00	2.82	0.02	0.00	0.00	Open	0
436		P206	J60	J56	280.60	8.00	110.00	-8.27	0.05	0.00	0.00	Open	0
437		P208	J56	J54	23.03	8.00	110.00	-19.36	0.12	0.00	0.02	Open	0
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
440		P214	J-138	J52	34.67	8.00	110.00	-952.08	6.08	0.79	22.73	Open	0
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
444		P222	J64	J44	294.57	8.00	110.00	-198.61	1.27	0.37	1.25	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
445		P224	J-344	J-106	395.17	12.00	110.00	-90.90	0.26	0.02	0.04	Open	0
446		P226	J-106	J-104	393.05	12.00	110.00	243.33	0.69	0.10	0.25	Open	0
447		P228	J70	J-200	50.08	8.00	110.00	77.63	0.50	0.01	0.22	Open	0
448		P230	J72	J70	21.65	8.00	110.00	18.84	0.12	0.00	0.01	Open	0
449		P232	J74	J-241	28.57	12.00	110.00	-25.91	0.07	0.00	0.00	Open	0
450		P234	J-201	J-204	2.96	6.00	110.00	11.09	0.13	0.00	0.00	Open	0
451		P236	J84	J88	84.39	12.00	110.00	28.98	0.08	0.00	0.00	Open	0
452		P238	J82	J70	45.95	12.00	110.00	58.79	0.17	0.00	0.02	Open	0
453		P240	J82	J80	156.42	12.00	110.00	-48.11	0.14	0.00	0.01	Open	0
454		P242	J74	J80	48.39	12.00	110.00	-8.14	0.02	0.00	0.00	Open	0
455		P244	J80	J78	60.00	12.00	110.00	-56.26	0.16	0.00	0.02	Open	0
456		P246	J78	J84	490.51	12.00	110.00	28.98	0.08	0.00	0.00	Open	0
457		P248	J72	J-318	236.32	6.00	110.00	4.12	0.05	0.00	0.00	Open	0
458		P250	J88	J86	49.28	12.00	110.00	10.68	0.03	0.00	0.00	Open	0
459		P252	J86	J82	141.57	12.00	110.00	10.68	0.03	0.00	0.00	Open	0
460		P254	J88	J-318	25.35	6.00	110.00	18.30	0.21	0.00	0.07	Open	0
461		P256	J78	J76	5.94	12.00	110.00	-85.24	0.24	0.00	0.04	Open	0
462		P258	J-170	J76	8.58	8.00	110.00	108.85	0.69	0.00	0.40	Open	0
463		P260	J94	J92	188.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
464		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
465		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
466		P266	J90	J-276	7.38	6.00	110.00	22.18	0.25	0.00	0.10	Open	0
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
468		P304A	J-378	J-347	26.13	6.00	110.00	11.09	0.13	0.00	0.02	Open	0
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-171.59	1.10	0.18	0.95	Open	0

APPENDIX C

Item 9 – Water Modeling Results: High Zone Fire Flow Year 2015; 2-, 3- & 4-Hour Fire Events

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP5	2,205.70	131.22	222.08	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP6	2,134.00	27.97	254.27	0.00	0.00	Closed	0.00	0.00	0.00
3		PUMP8	1,956.00	0.42	372.79	3,222.30	859.38	Open	1.00	34.45	0.00
4		TRANSF	2,629.54	7.57	33.51	0.00	0.00	Closed	0.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		EL-OBS-HILL-TANK	827.66	2,691.54	2,705.40	69.30	13.86
2		FAIRWAYTANK	959.12	2,679.54	2,707.51	87.41	27.97
3		OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 2015 MDD FF 2hr Pump 8 on Tanks 2705 - Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-53.30	2,480.52	1,439.02	1,705.69	M12-8H	10.66	2,628.15	1,438.11	1,438.11
2	J12-5H	3,000.00	J12-5H	-256.72	1,964.05	996.31	996.31	J12-5H	20.00	2,602.70	996.31	996.31
3	J12-6H	3,000.00	J12-6H	-291.14	1,877.09	977.84	977.84	J12-6H	20.00	2,595.16	977.84	977.84
4	J13-1H	3,000.00	K13-4H	-70.37	2,437.60	1,277.19	1,586.70	K13-4H	8.24	2,619.02	1,277.16	1,277.16
5	J13-2H	3,000.00	J13-2H	-124.88	2,285.34	1,227.93	1,229.12	J13-2H	20.00	2,619.70	1,229.10	1,227.93
6	J13-3H	3,000.00	J13-3H	-157.94	2,201.03	1,165.03	1,165.93	J13-3H	20.00	2,611.70	1,165.91	1,165.03
7	J13-4H	3,000.00	K13-4H	-70.39	2,437.56	1,277.07	1,348.04	K13-4H	17.50	2,640.39	1,277.05	1,277.05
8	J13-5H	3,000.00	K13-4H	-70.41	2,437.51	1,276.94	1,327.04	K13-4H	18.25	2,642.11	1,276.93	1,276.93
9	J13-6H	3,000.00	K13-4H	-69.92	2,438.63	1,279.89	1,501.57	K13-4H	11.81	2,627.26	1,279.87	1,279.87
10	J14-1H	3,000.00	K13-4H	-68.67	2,441.52	1,287.57	1,707.76	K13-4H	3.67	2,608.47	1,287.57	1,287.57
11	J7-1H	3,000.00	K7-7H	11.18	2,610.33	2,647.16	2,777.03	K7-7H	16.86	2,623.46	2,647.14	2,647.14
12	J7-2H	3,000.00	K7-7H	8.37	2,603.85	2,557.34	2,644.20	K7-7H	17.84	2,625.72	2,557.31	2,557.31
13	K10-2H	3,000.00	M9-1H	33.74	2,681.40	4,228.23	4,558.63	M9-1H	15.46	2,639.21	4,226.05	4,226.04
14	K12-1H	3,000.00	K12-1H	-87.64	2,322.74	1,744.28	1,744.00	K12-1H	20.00	2,571.16	1,743.99	1,743.99
15	K13-1H	3,000.00	K13-1H	-214.40	2,044.19	1,208.12	1,207.60	K13-1H	20.00	2,585.16	1,207.60	1,207.60
16	K13-2H	3,000.00	K13-4H	-48.01	2,489.19	1,451.64	1,481.55	K13-4H	19.06	2,643.99	1,451.62	1,451.62
17	K13-3H	3,000.00	K13-3H	-93.36	2,372.09	1,266.53	1,266.55	K13-3H	20.00	2,633.70	1,266.55	1,266.53
18	K13-4H	3,000.00	K13-4H	-77.47	2,421.20	1,235.18	1,235.19	K13-4H	20.00	2,646.16	1,235.16	1,235.16
19	K14-1H	3,000.00	K13-4H	-64.41	2,451.34	1,315.66	1,428.51	K13-4H	16.08	2,637.10	1,315.63	1,315.63
20	K14-6H	3,000.00	K14-6H	-242.86	1,970.51	1,144.14	1,144.32	K14-6H	20.00	2,577.16	1,144.32	1,144.14
21	K7-1H	3,000.00	K7-1H	-17.11	2,524.05	2,140.76	2,140.75	K7-1H	20.00	2,609.70	2,140.75	2,140.75
22	K7-2H	3,000.00	K7-2H	7.81	2,568.57	2,658.24	2,658.26	K7-2H	20.00	2,596.70	2,658.23	2,658.23
23	K7-3H	3,000.00	K7-3H	-55.09	2,416.39	1,846.52	1,846.55	K7-3H	20.00	2,589.70	1,846.55	1,846.52
24	K7-4H	3,000.00	L7-2H	17.06	2,592.91	2,904.49	3,197.53	L7-2H	10.72	2,578.27	2,904.52	2,904.49
25	K7-5H	3,000.00	K7-5H	-25.34	2,477.05	2,166.60	2,166.57	K7-5H	20.00	2,581.70	2,166.57	2,166.57
26	K7-6H	3,000.00	K7-6H	-21.44	2,525.07	2,014.69	2,014.76	K7-6H	20.00	2,620.70	2,014.75	2,014.69
27	K7-7H	3,000.00	K7-7H	6.47	2,599.47	2,501.34	2,501.29	K7-7H	20.00	2,630.70	2,501.29	2,501.29
28	K7-8H	3,000.00	K7-8H	-46.42	2,413.41	2,014.21	2,014.26	K7-8H	20.00	2,566.70	2,014.26	2,014.21
29	K7-9H	3,000.00	K7-9H	-75.30	2,353.76	1,776.33	1,776.38	K7-9H	20.00	2,573.70	1,776.37	1,776.33
30	K8-1H	3,000.00	K8-1H	-79.08	2,327.04	1,824.80	1,824.87	K8-1H	20.00	2,555.70	1,824.87	1,824.80
31	K8-2H	3,000.00	L7-2H	18.72	2,596.73	2,958.68	3,072.59	L7-2H	16.50	2,591.62	2,957.18	2,957.18
32	L10-1H	3,000.00	M9-1H	33.87	2,681.72	4,243.92	4,433.13	M9-1H	17.46	2,643.84	4,244.08	4,243.92
33	L10-2H	3,000.00	L10-2H	43.68	2,657.36	4,203.00	4,199.83	L10-2H	20.00	2,602.70	4,199.77	4,199.77
34	L10-4H	3,000.00	L10-8H	-107.58	2,307.26	1,500.72	1,523.10	L10-8H	18.63	2,598.54	1,500.21	1,500.21
35	L10-5H	3,000.00	L10-8H	-53.18	2,432.80	1,835.75	1,898.92	L10-8H	16.82	2,594.37	1,835.51	1,835.51
36	L10-6H	3,000.00	M9-1H	32.68	2,678.96	4,087.62	4,576.88	M9-1H	13.00	2,633.53	4,087.42	4,087.42
37	L10-7H	3,000.00	M9-1H	33.36	2,680.53	4,178.44	4,462.01	M9-1H	16.11	2,640.73	4,178.31	4,178.31
38	L10-8H	3,000.00	L10-8H	-228.20	2,028.87	1,126.98	1,126.48	L10-8H	20.00	2,601.70	1,126.48	1,126.48
39	L11-1H	3,000.00	M9-1H	33.97	2,681.93	4,257.20	4,441.04	M9-1H	17.55	2,644.04	4,257.34	4,257.20
40	L11-2H	3,000.00	M9-1H	34.38	2,682.89	4,319.88	4,873.35	M9-1H	12.43	2,632.23	4,320.05	4,319.88
41	L11-3H	3,000.00	M9-1H	34.03	2,682.08	4,266.25	4,687.30	M9-1H	14.25	2,636.42	4,266.42	4,266.25

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		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
42		L11-4H	3,000.00	L11-4H	-130.17	2,236.58	1,538.35	1,538.20	L11-4H	20.00	2,583.16	1,538.20	1,538.20
43		L11-5H	3,000.00	L11-5H	-18.76	2,518.70	2,188.98	2,188.91	L11-5H	20.00	2,608.16	2,188.91	2,188.91
44		L11-6H	3,000.00	L11-6H	47.83	2,649.39	4,225.38	4,225.16	L11-6H	20.00	2,585.16	4,225.14	4,225.14
45		L12-3H	3,000.00	M12-5H	36.42	2,666.59	3,869.88	3,924.01	M12-5H	18.95	2,626.27	3,870.05	3,869.88
46		L12-4H	3,000.00	M9-1H	35.41	2,685.27	4,473.47	4,663.28	M9-1H	17.58	2,644.11	4,474.21	4,473.47
47		L12-6H	3,000.00	L12-6H	37.77	2,647.71	3,786.05	3,785.81	L12-6H	20.00	2,606.70	3,785.80	3,785.80
48		L12-7H	3,000.00	L12-8H	42.81	2,664.35	4,221.73	4,239.39	L12-8H	19.61	2,610.80	4,221.38	4,221.38
49		L12-8H	3,000.00	L12-8H	25.90	2,625.31	3,220.78	3,220.76	L12-8H	20.00	2,611.70	3,220.74	3,220.74
50		L13-10H	3,000.00	L13-10H	-143.29	2,205.30	1,425.22	1,424.96	L13-10H	20.00	2,582.16	1,424.96	1,424.96
51		L13-11H	3,000.00	M12-8H	34.75	2,683.74	4,535.27	5,474.86	M12-8H	8.78	2,623.81	4,537.01	4,535.27
52		L13-12H	3,000.00	L13-12H	40.11	2,647.56	4,007.92	4,008.03	L13-12H	20.00	2,601.16	4,008.04	4,007.92
53		L13-1H	3,000.00	K13-4H	18.16	2,641.91	2,894.43	3,489.49	K13-4H	8.76	2,620.23	2,894.40	2,894.40
54		L13-2H	3,000.00	K13-4H	7.01	2,616.18	2,412.30	3,256.19	K13-4H	0.55	2,601.28	2,412.12	2,412.12
55		L13-3H	3,000.00	K13-4H	21.28	2,649.10	3,080.29	3,532.73	K13-4H	12.22	2,628.19	3,080.32	3,080.29
56		L13-4H	3,000.00	M12-8H	18.22	2,645.59	2,895.64	3,473.31	M12-8H	9.48	2,625.42	2,895.64	2,895.64
57		L13-5H	3,000.00	M12-8H	24.76	2,660.69	3,338.65	4,337.62	M12-8H	3.43	2,611.47	3,338.66	3,338.65
58		L13-6H	3,000.00	K13-4H	17.01	2,639.26	2,832.55	3,274.10	K13-4H	11.75	2,627.12	2,832.55	2,832.55
59		L13-7H	3,000.00	M12-8H	31.73	2,676.76	4,060.20	4,247.09	M12-8H	17.63	2,644.23	4,060.33	4,060.20
60		L13-8H	3,000.00	L13-8H	9.14	2,568.63	2,702.36	2,702.38	L13-8H	20.00	2,593.70	2,702.38	2,702.36
61		L13-9H	3,000.00	K13-4H	20.41	2,647.09	3,022.09	3,050.45	K13-4H	19.58	2,645.19	3,024.84	3,022.09
62		L14-2H	3,000.00	L14-2H	-89.27	2,345.97	1,590.87	1,590.68	L14-2H	20.00	2,598.16	1,590.68	1,590.68
63		L14-3H	3,000.00	L14-3H	-15.84	2,528.43	2,159.49	2,159.52	L14-3H	20.00	2,611.16	2,159.53	2,159.49
64		L7-1H	3,000.00	L7-2H	-76.81	2,376.27	1,642.54	1,760.24	L7-2H	13.54	2,584.79	1,642.54	1,642.54
65		L7-2H	3,000.00	L7-2H	-171.60	2,157.52	1,247.94	1,247.72	L7-2H	20.00	2,599.70	1,247.71	1,247.71
66		L7-3H	3,000.00	K7-7H	11.58	2,611.26	2,660.93	2,938.62	K7-7H	13.17	2,614.93	2,660.93	2,660.93
67		L7-4H	3,000.00	K7-7H	12.86	2,614.22	2,705.82	2,779.01	K7-7H	18.28	2,626.74	2,705.82	2,705.82
68		L7-5H	3,000.00	L7-5H	7.85	2,588.66	2,600.54	2,600.51	L7-5H	20.00	2,616.70	2,600.51	2,600.51
69		L8-1H	3,000.00	L8-1H	35.13	2,646.63	3,764.05	3,764.06	L8-1H	20.00	2,611.70	3,764.05	3,764.05
70		L9-1H	3,000.00	M9-1H	29.55	2,671.74	3,733.95	3,980.03	M9-1H	16.28	2,641.12	3,733.49	3,733.49
71		M11-1H	3,000.00	M11-3H	32.63	2,694.84	4,269.06	4,738.89	M11-3H	14.23	2,652.37	4,269.09	4,269.06
72		M11-2H	3,000.00	M11-2H	25.77	2,643.02	3,241.10	3,238.37	M11-2H	20.00	2,629.70	3,238.35	3,238.35
73		M11-3H	3,000.00	M11-3H	-116.96	2,349.62	1,131.04	1,130.99	M11-3H	20.00	2,665.70	1,130.99	1,130.99
74		M11-4H	3,000.00	M11-3H	-21.19	2,570.63	1,810.55	2,207.45	M11-3H	7.98	2,637.95	1,810.55	1,810.55
75		M11-5H	3,000.00	M11-3H	18.38	2,661.97	2,886.29	3,117.02	M11-3H	16.62	2,657.89	2,885.56	2,885.56
76		M11-6H	3,000.00	M11-6H	5.63	2,570.54	2,620.93	2,620.91	M11-6H	20.00	2,603.70	2,620.91	2,620.91
77		M12-1H	3,000.00	M12-1H	32.14	2,659.72	3,647.49	3,647.32	M12-1H	20.00	2,631.70	3,647.31	3,647.31
78		M12-2H	3,000.00	M12-8H	-27.63	2,539.76	1,700.77	1,954.31	M12-8H	12.48	2,632.34	1,700.62	1,700.62
79		M12-3H	3,000.00	M12-8H	-60.12	2,464.78	1,386.24	1,573.30	M12-8H	13.37	2,634.39	1,385.10	1,385.10
80		M12-4H	3,000.00	M12-4H	29.47	2,681.54	3,653.24	3,653.40	M12-4H	20.00	2,659.70	3,653.38	3,653.24
81		M12-5H	3,000.00	M12-5H	17.82	2,623.68	2,921.66	2,921.66	M12-5H	20.00	2,628.70	2,921.65	2,921.65
82		M12-6H	3,000.00	M12-8H	-53.30	2,480.52	1,439.02	1,654.91	M12-8H	12.55	2,632.50	1,438.11	1,438.11

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
83		M12-7H	3,000.00	M12-8H	-80.75	2,417.18	1,252.95	1,271.68	M12-8H	19.32	2,648.13	1,252.94	1,252.94
84		M12-8H	3,000.00	M12-8H	-107.12	2,356.32	1,125.93	1,125.91	M12-8H	20.00	2,649.70	1,125.92	1,125.92
85		M13-1H	3,000.00	M13-1H	36.78	2,644.43	3,780.10	3,778.14	M13-1H	20.00	2,605.70	3,778.13	3,778.13
86		M13-2H	3,000.00	M13-2H	30.12	2,642.06	3,417.80	3,417.23	M13-2H	20.00	2,618.70	3,417.22	3,417.22
87		M13-3H	3,000.00	M13-3H	13.77	2,590.32	2,803.68	2,803.69	M13-3H	20.00	2,604.70	2,803.69	2,803.68
88		M13-4H	3,000.00	M13-4H	-144.44	2,245.65	1,180.09	1,180.08	M13-4H	20.00	2,625.16	1,180.08	1,180.08
89		M13-5H	3,000.00	M12-8H	-0.13	2,603.24	2,199.42	2,555.90	M12-8H	11.67	2,630.48	2,199.59	2,199.42
90		M14-1H	3,000.00	M14-1H	-1.00	2,567.70	2,460.79	2,459.50	M14-1H	20.00	2,616.16	2,459.51	2,459.51
91		M14-2H	3,000.00	M14-2H	6.06	2,577.98	2,628.48	2,628.12	M14-2H	20.00	2,610.16	2,628.12	2,628.12
92		M14-3H	3,000.00	M14-3H	2.97	2,577.46	2,540.71	2,539.97	M14-3H	20.00	2,616.76	2,539.96	2,539.96
93		M6-1H	3,000.00	K7-7H	19.19	2,628.83	2,964.06	3,015.61	K7-7H	18.85	2,628.05	2,962.15	2,962.15
94		M7-1H	3,000.00	K7-7H	15.87	2,621.16	2,819.52	2,942.73	K7-7H	17.20	2,624.24	2,819.53	2,819.52
95		M7-2H	3,000.00	M7-2H	8.13	2,586.29	2,626.63	2,626.62	M7-2H	20.00	2,613.70	2,626.62	2,626.62
96		M8-1H	3,000.00	M8-1H	-18.93	2,537.85	2,026.01	2,025.94	M8-1H	20.00	2,627.70	2,025.94	2,025.94
97		M8-2H	3,000.00	M8-2H	32.08	2,666.04	3,846.96	3,848.39	M8-2H	20.00	2,638.16	3,848.39	3,846.96
98		M8-3H	3,000.00	M8-3H	31.41	2,665.00	3,789.20	3,790.58	M8-3H	20.00	2,638.66	3,790.58	3,789.20
99		M8-4H	3,000.00	O10-1H	30.88	2,698.80	4,705.88	4,807.72	O10-1H	19.20	2,671.85	4,704.34	4,704.34
100		M8-5H	3,000.00	M8-5H	37.29	2,679.06	4,536.40	4,535.56	M8-5H	20.00	2,639.16	4,535.55	4,535.55
101		M9-1H	3,000.00	M9-1H	17.64	2,644.26	2,873.04	2,873.06	M9-1H	20.00	2,649.70	2,873.06	2,873.04
102		N10-1H	3,000.00	N10-1H	-33.00	2,541.38	1,692.42	1,692.22	N10-1H	20.00	2,663.70	1,692.21	1,692.21
103		N11-1H	3,000.00	N11-1H	19.93	2,669.54	2,997.77	2,995.29	N11-1H	20.00	2,669.70	2,995.30	2,995.30
104		N11-2H	3,000.00	M11-3H	-32.45	2,544.64	1,688.09	1,697.97	M11-3H	19.72	2,665.04	1,688.63	1,688.09
105		N11-3H	3,000.00	M11-3H	-26.77	2,557.75	1,744.67	1,999.53	M11-3H	12.14	2,647.56	1,746.03	1,744.67
106		N12-1H	3,000.00	N11-1H	35.70	2,705.94	4,642.92	4,667.87	N11-1H	19.72	2,669.05	4,645.34	4,642.92
107		N13-1H	3,000.00	N13-1H	42.25	2,657.04	3,939.72	3,937.41	N13-1H	20.00	2,605.70	3,937.39	3,937.39
108		N13-2H	3,000.00	N13-2H	-100.53	2,363.52	1,401.39	1,400.48	N13-2H	20.00	2,641.70	1,400.48	1,400.48
109		N13-3H	3,000.00	O12-1H	-45.50	2,474.54	1,709.90	1,737.95	O12-1H	18.93	2,623.23	1,710.27	1,709.90
110		N14-1H	3,000.00	O12-1H	-42.78	2,480.80	1,739.66	1,911.59	O12-1H	13.48	2,610.65	1,740.06	1,739.66
111		N14-2H	3,000.00	N14-2H	-104.87	2,315.52	1,482.13	1,481.95	N14-2H	20.00	2,603.70	1,481.95	1,481.95
112		N14-3H	3,000.00	O12-1H	-65.72	2,427.87	1,545.60	1,670.73	O12-1H	14.21	2,612.33	1,545.30	1,545.30
113		N15-1H	3,000.00	N15-1H	-203.89	2,087.99	1,173.35	1,173.22	N15-1H	20.00	2,604.70	1,173.22	1,173.22
114		N15-2H	3,000.00	N15-2H	-109.35	2,304.18	1,465.09	1,464.89	N15-2H	20.00	2,602.70	1,464.89	1,464.89
115		N15-3H	3,000.00	N15-3H	-146.28	2,218.95	1,332.05	1,331.88	N15-3H	20.00	2,602.70	1,331.87	1,331.87
116		O10-1H	3,000.00	O10-1H	-102.38	2,391.26	971.23	971.21	O10-1H	20.00	2,673.70	971.23	971.23
117		O12-1H	3,000.00	O12-1H	-295.32	1,897.98	922.63	922.58	O12-1H	20.00	2,625.70	922.58	922.58
118		O13-1H	3,000.00	O12-1H	-107.06	2,332.47	1,335.95	1,697.87	O12-1H	-1.75	2,575.50	1,335.59	1,335.59
119		O13-2H	3,000.00	O12-1H	-107.06	2,332.47	1,335.94	1,425.32	O12-1H	14.87	2,613.87	1,335.58	1,335.58
120		O8-1H	3,000.00	O8-1H	-129.95	2,321.09	928.84	928.85	O8-1H	20.00	2,667.16	928.85	928.84
121		O9-1H	3,000.00	O9-1H	-125.48	2,337.41	880.58	880.61	O9-1H	20.00	2,673.16	880.61	880.58
122		P13-1H	3,000.00	O12-1H	-174.98	2,175.71	1,133.48	1,530.06	O12-1H	-10.71	2,554.81	1,133.31	1,133.31
123		P13-2H	3,000.00	O12-1H	-156.04	2,219.42	1,195.84	1,468.78	O12-1H	0.28	2,580.19	1,195.68	1,195.68

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
124		P6-1H	3,000.00	P6-1H	-95.62	2,348.87	1,472.90	1,473.06	P6-1H	20.00	2,615.70	1,473.06	1,472.90
125		P6-2H	3,000.00	P6-2H	-193.50	2,145.98	1,004.88	1,004.92	P6-2H	20.00	2,638.70	1,004.92	1,004.88
126		Q10-1H	3,000.00	Q10-2H	-328.12	1,737.27	1,172.58	1,179.14	Q10-2H	19.21	2,538.86	1,172.58	1,172.58
127		Q10-2H	3,000.00	Q10-2H	-379.98	1,617.61	1,102.23	1,103.33	Q10-2H	20.00	2,540.70	1,103.32	1,102.23
128		Q10-3H	3,000.00	Q10-3H	-288.13	1,823.58	1,253.24	1,254.43	Q10-3H	20.00	2,534.70	1,254.44	1,253.24
129		Q11-1H	3,000.00	Q11-1H	-263.74	1,865.86	1,339.85	1,339.85	Q11-1H	20.00	2,520.70	1,339.85	1,339.85
130		R7-1H	3,000.00	R7-1H	-155.75	2,158.08	1,474.66	1,474.92	R7-1H	20.00	2,563.70	1,474.91	1,474.66
131		R9-1H	3,000.00	R9-1H	-335.37	1,725.54	1,146.91	1,147.62	R9-1H	20.00	2,545.70	1,147.62	1,146.91

High Zone 2015 MDD FF 2hr Pump 8 on Tanks 2705 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed	0
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-651.30	1.85	1.84	1.56	Open	0
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.23	0.23	0.00	0.04	Open	0
4		P-100	J-239	J-238	960.70	8.00	110.00	-101.35	0.65	0.34	0.36	Open	0
5		P-101	J-245	J-238	149.26	8.00	110.00	106.44	0.68	0.06	0.39	Open	0
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
7		P-103	J-233	J-158	215.33	8.00	110.00	102.58	0.65	0.08	0.37	Open	0
8		P-104	J-255	J-122	313.79	8.00	110.00	-14.50	0.09	0.00	0.01	Open	0
9		P-105	J-131	J-132	317.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
10		P-106	J-157	J-170	358.07	8.00	110.00	87.31	0.56	0.10	0.27	Open	0
11		P-108	J-168	J72	94.43	8.00	110.00	10.54	0.07	0.00	0.01	Open	0
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
13		P-110	J-199	J-200	69.96	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
14		P-113	J76	J-244	236.44	8.00	110.00	10.84	0.07	0.00	0.01	Open	0
15		P-114	J-244	J-131	21.10	12.00	110.00	5.75	0.02	0.00	0.00	Open	0
16		P-115	J-131	J-255	49.66	12.00	110.00	-4.43	0.01	0.00	0.00	Open	0
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
18		P-117	J-168	J74	39.57	12.00	110.00	-15.63	0.04	0.00	0.00	Open	0
19		P-118	J-168	J13-4H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
20		P-119	J-201	J-170	13.13	12.00	110.00	-32.26	0.09	0.00	0.00	Open	0
21		P-12	J-114	J-115	298.01	10.00	110.00	212.11	0.87	0.14	0.48	Open	0
22		P-120	J-241	J-201	47.80	8.00	110.00	-22.07	0.14	0.00	0.03	Open	0
23		P-121	J-158	J-157	92.45	8.00	110.00	97.49	0.62	0.03	0.34	Open	0
24		P-122	J-157	J-196	105.49	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
26		P-124	J-236	J42	42.81	8.00	110.00	-842.93	5.38	0.78	18.14	Open	0
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
28		P-127	J-211	J-181	330.78	8.00	110.00	-1,119.59	7.15	10.15	30.68	Open	0
29		P-128	J-212	J-190	143.39	8.00	110.00	14.18	0.09	0.00	0.01	Open	0
30		P-129	J-231	J-150	227.08	8.00	110.00	-6.63	0.04	0.00	0.00	Open	0
31		P-130	J-141	J-205	202.64	8.00	110.00	158.25	1.01	0.17	0.82	Open	0
32		P-131	J-115	J-205	245.54	8.00	110.00	166.75	1.06	0.22	0.90	Open	0
33		P-132	J-135	J-240	94.59	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
34		P-133	J-153	J-152	97.97	8.00	110.00	198.53	1.27	0.12	1.25	Open	0
35		P-134	J-192	J-191	110.45	8.00	110.00	178.17	1.14	0.11	1.02	Open	0
36		P-135	J-191	J-213	168.15	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
37		P-136	J-233	J-191	22.28	8.00	110.00	-167.99	1.07	0.02	0.92	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
38		P-137	J-129	J-192	239.03	8.00	110.00	183.26	1.17	0.26	1.07	Open	0
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
40		P-139	J-152	J-129	359.71	8.00	110.00	193.44	1.23	0.43	1.19	Open	0
41		P-14	J-124	J-112	235.96	10.00	110.00	-333.97	1.36	0.26	1.10	Open	0
42		P-140	J-129	J-130	160.33	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
44		P-142	J-174	J-202	125.70	8.00	110.00	285.05	1.82	0.31	2.43	Open	0
45		P-143	J-149	J-187	185.18	12.00	110.00	89.01	0.25	0.01	0.04	Open	0
46		P-144	J-153	J-149	224.22	12.00	110.00	94.10	0.27	0.01	0.04	Open	0
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
48		P-146	J-375	J-188	169.96	8.00	110.00	8.64	0.06	0.00	0.00	Open	0
49		P-146A	J-187	J-375	20.98	8.00	110.00	18.82	0.12	0.00	0.01	Open	0
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
51		P-148	J-188	J-231	56.77	8.00	110.00	3.55	0.02	0.00	0.00	Open	0
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
54		P-150	J-185	J-115	140.14	8.00	110.00	138.34	0.88	0.09	0.64	Open	0
55		P-151	J-146	J-114	148.95	8.00	110.00	217.20	1.39	0.22	1.47	Open	0
56		P-152	J-252	J-146	340.09	8.00	110.00	413.91	2.64	1.65	4.86	Open	0
57		P-154	J-104	J-145	309.87	8.00	110.00	-43.09	0.28	0.02	0.07	Open	0
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
59		P-156	J-185	J-145	145.41	8.00	110.00	-143.43	0.92	0.10	0.68	Open	0
60		P-157	J-145	J-146	147.46	8.00	110.00	-191.62	1.22	0.17	1.17	Open	0
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
62		P-159	J-211	J-210	17.79	8.00	110.00	310.50	1.98	0.05	2.86	Open	0
63		P-16	J-118	J-117	237.90	10.00	110.00	-472.96	1.93	0.50	2.10	Open	0
64		P-160	J-242	J-211	220.05	8.00	110.00	-804.00	5.13	3.66	16.62	Open	0
65		P-164	J-197	J-174	100.44	8.00	110.00	290.14	1.85	0.25	2.52	Open	0
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
67		P-166	J-197	J-198	101.26	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
69		P-168	J-197	J-210	16.45	8.00	110.00	-305.41	1.95	0.05	2.76	Open	0
70		P-169	J-142	J-141	14.70	8.00	110.00	163.34	1.04	0.01	0.86	Open	0
71		P-17	J-119	J-121	661.27	10.00	110.00	-643.69	2.63	2.45	3.71	Open	0
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
74		P-172	J-205	J-121	222.07	8.00	110.00	319.90	2.04	0.67	3.02	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
77		P-175	J-243	J-118	25.00	8.00	110.00	145.28	0.93	0.02	0.70	Open	0
78		P-176	J-257	J-214	47.06	8.00	110.00	-98.25	0.63	0.02	0.34	Open	0
79		P-177	J-154	J-155	341.59	8.00	110.00	-983.00	6.27	8.24	24.11	Open	0
80		P-178	J-148	J-193	255.40	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
81		P-179	J-214	J-215	156.54	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
82		P-18	J-121	J-124	286.05	10.00	110.00	-328.88	1.34	0.31	1.07	Open	0
83		P-180	J-147	J-148	45.75	8.00	110.00	-113.52	0.72	0.02	0.44	Open	0
84		P-181	J-190	J-189	25.98	8.00	110.00	-838.93	5.35	0.47	17.98	Open	0
85		P-182	J-148	J-189	142.70	8.00	110.00	-128.79	0.82	0.08	0.56	Open	0
86		P-183	J-154	J-228	71.88	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
87		P-184	J-189	J-154	51.91	8.00	110.00	-972.82	6.21	1.23	23.65	Open	0
88		P-185	J-214	J-147	198.83	8.00	110.00	-108.43	0.69	0.08	0.41	Open	0
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
90		P-187	J-257	J-258	155.58	8.00	110.00	71.26	0.45	0.03	0.19	Open	0
91		P-188	J-151	J-257	23.86	8.00	110.00	-21.90	0.14	0.00	0.02	Open	0
92		P-189	J-150	J-151	8.98	8.00	110.00	-11.72	0.07	0.00	0.03	Open	0
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
95		P-191	J-144	J-262	92.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
96		P-192	J-143	J-144	21.60	8.00	110.00	-1,134.87	7.24	0.68	31.46	Open	0
97		P-193	J-143	J-181	133.07	8.00	110.00	1,129.77	7.21	4.15	31.20	Open	0
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
99		P-195	J-116	J-227	1,151.95	8.00	110.00	130.29	0.83	0.66	0.57	Open	0
100		P-196	J28	J26	390.87	12.00	110.00	-32.60	0.09	0.00	0.01	Open	0
101		P-197	J-227	J-249	20.05	8.00	110.00	125.20	0.80	0.01	0.54	Open	0
102		P-198	J-249	J-254	108.97	8.00	110.00	94.66	0.60	0.03	0.32	Open	0
103		P-199	J-254	J-177	467.39	8.00	110.00	89.57	0.57	0.13	0.29	Open	0
104		P-20	J-117	J-119	128.15	10.00	110.00	-483.14	1.97	0.28	2.18	Open	0
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
107		P-202	J-136	J-178	684.02	8.00	110.00	-19.85	0.13	0.01	0.02	Open	0
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
109		P-204	J-177	J-178	21.41	8.00	110.00	48.85	0.31	0.00	0.09	Open	0
110		P-205	J-206	J-207	208.07	8.00	110.00	7.31	0.05	0.00	0.00	Open	0
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
112		P-207	J-250	J-116	974.28	8.00	110.00	-140.49	0.90	0.64	0.66	Open	0
113		P-208	J-175	J-176	367.24	12.00	110.00	-58.05	0.16	0.01	0.02	Open	0
114		P-209	J26	J-195	293.04	12.00	110.00	-47.87	0.14	0.00	0.01	Open	0
115		P-21	J-118	J-110	557.62	10.00	110.00	613.15	2.50	1.89	3.39	Open	0
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
117		P-211	J-195	J-175	305.36	12.00	110.00	-52.96	0.15	0.00	0.02	Open	0
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
120		P-214	J-260	J-229	46.84	8.00	110.00	-332.94	2.13	0.15	3.25	Open	0
121		P-215	J-113	J-135	11.43	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
122		P-216	J-293	J-294	1,100.07	6.00	110.00	200.59	2.28	5.67	5.16	Open	0
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.09	0.06	0.01	0.01	Open	0
125		P-219	J-310	J-336	710.86	6.00	110.00	180.23	2.05	3.01	4.23	Open	0
126		P-22	J-110	J-111	241.32	10.00	110.00	332.19	1.36	0.26	1.09	Open	0
127		P-220	J-310	J-311	189.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
128		P-221	J-294	J-310	50.46	6.00	110.00	195.50	2.22	0.25	4.92	Open	0
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
131		P-223	J-311	J-332	149.01	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
134		P-226	J-345	J-125	1,043.90	6.00	110.00	159.87	1.81	3.54	3.39	Open	0
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
136		P-23	J-110	J-116	126.11	10.00	110.00	275.87	1.13	0.10	0.77	Open	0
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
138		P-231	J-284	J-285	570.74	6.00	110.00	53.70	0.61	0.26	0.45	Open	0
139		P-232	J-306	J-250	165.38	6.00	110.00	43.52	0.49	0.05	0.30	Open	0
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
142		P-238	J-289	J-342	25.70	6.00	110.00	15.27	0.17	0.00	0.04	Open	0
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
144		P-24	J10	J-111	680.53	10.00	110.00	-268.31	1.10	0.50	0.73	Open	0
145		P-241	J-261	J-267	413.65	6.00	110.00	-542.43	6.16	13.47	32.55	Open	0
146		P-242	J-230	N13-2H	414.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
147		P-243-359	J-359	J-243	751.40	8.00	110.00	150.37	0.96	0.56	0.74	Open	0
148		P-244	J-234	J-303	166.84	6.00	110.00	5.09	0.06	0.00	0.01	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
149		P-245	J-256	J-319	245.42	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
151		P-247	J-325	J-171	56.56	6.00	110.00	-572.98	6.50	2.04	36.03	Open	0
152		P-248	J-325	J-221	438.70	6.00	110.00	567.89	6.44	15.55	35.44	Open	0
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open	0
155		P-250	J-267	J-172	141.60	6.00	110.00	-547.52	6.21	4.69	33.12	Open	0
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
157		P-252	J-277	J-314	188.74	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
158		P-252J	J-376	J-252	18.85	8.00	110.00	793.82	5.07	0.31	16.23	Open	0
159		P-253	J-342	J-277	166.27	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
162		P-256	J48	J-302	810.53	6.00	110.00	-101.77	1.15	1.19	1.47	Open	0
163		P-257	J-261	J-317	748.38	6.00	110.00	128.90	1.46	1.70	2.27	Open	0
164		P-258	J-317	J-324	236.04	6.00	110.00	123.81	1.40	0.50	2.11	Open	0
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
167		P-260	J-302	J-315	743.33	6.00	110.00	124.28	1.41	1.58	2.13	Open	0
168		P-261	J-289	J-302	435.87	6.00	110.00	231.13	2.62	2.92	6.71	Open	0
169		P-263	J-239	J-289	143.17	6.00	110.00	251.50	2.85	1.12	7.84	Open	0
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
171		P-265	J-245	J-341	285.59	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
172		P-266	J-245	J-274	336.66	6.00	110.00	-116.63	1.32	0.64	1.89	Open	0
173		P-267	J-274	J-275	98.71	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
174		P-268	J-274	J-300	190.70	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
175		P-269	J-316	J-274	29.78	6.00	110.00	131.90	1.50	0.07	2.37	Open	0
176		P-27	J-184	J-183	1,262.55	8.00	110.00	139.50	0.89	0.82	0.65	Open	0
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
178		P-271	J-316	J-335	200.25	6.00	110.00	-136.99	1.55	0.51	2.55	Open	0
179		P-272	J-335	J-338	749.12	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
180		P-272J	J-299	J-272	49.13	6.00	110.00	24.36	0.28	0.01	0.10	Open	0
181		P-276	J-200	J-279	215.50	6.00	110.00	25.46	0.29	0.02	0.11	Open	0
182		P-277	J-241	J-340	297.28	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
183		P-278	J13-2H	J86	130.09	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
184		P-279	J-255	J-273	210.37	8.00	110.00	4.98	0.03	0.00	0.00	Open	0
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-408.44	2.61	7.60	4.74	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
186		P-281	J-273	J-318	92.23	6.00	110.00	-5.20	0.06	0.00	0.01	Open	0
187		P-282	J-273	J-328	16.64	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
188		P-283	J84	J13-1H	9.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
189		P-284	J-204	J13-5H	23.10	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
190		P-285	J90	J-280	45.86	6.00	110.00	-10.19	0.12	0.00	0.02	Open	0
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
192		P-287	J-279	J-280	228.10	6.00	110.00	20.37	0.23	0.02	0.07	Open	0
193		P-288	J-280	J-304	71.58	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
194		P-289	J-276	J-339	107.48	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
195		P-29	J-160	J-186	1,300.95	8.00	110.00	75.05	0.48	0.27	0.21	Open	0
196		P-290	J-276	J12-5H	29.81	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.05	0.51	0.06	0.33	Open	0
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.14	0.57	0.07	0.39	Open	0
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.32	0.68	0.00	0.54	Open	0
202		P-297	J-320	J-344	514.42	6.00	110.00	264.69	3.00	4.43	8.62	Open	0
203		P-298	J-393	J-350	383.14	6.00	110.00	302.82	3.44	4.24	11.06	Open	0
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
205		P-299J	J-299	J-380	394.60	6.00	110.00	20.37	0.23	0.03	0.07	Open	0
206		P-30	J-176	J-226	104.98	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
207		P-301	J-272	J-212	319.55	6.00	110.00	19.27	0.22	0.02	0.07	Open	0
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
209		P-304	J-288	J-378	74.49	6.00	110.00	60.00	0.68	0.04	0.55	Open	0
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
211		P-306	J-187	J-288	69.43	6.00	110.00	65.10	0.74	0.04	0.64	Open	0
212		P-307	J-202	J-309	159.54	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
213		P-308	J-321	J-320	62.24	6.00	110.00	269.78	3.06	0.56	8.93	Open	0
214		P-309	J-321	J-202	20.82	6.00	110.00	-274.87	3.12	0.19	9.25	Open	0
215		P-31	J-161	J-218	86.18	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
217		P-312	J-231	J-348	337.95	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
218		P-313	J-197	J-271	101.59	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
219		P-314	J-142	J-298	291.39	6.00	110.00	10.18	0.12	0.01	0.02	Open	0
220		P-315	J-142	J-115	10.29	6.00	110.00	-178.61	2.03	0.04	4.15	Open	0
221		P-316	J-298	J-283	161.88	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
224		P-319	J-117	J-305	201.95	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
225		P-32	J-161	J-160	312.38	8.00	110.00	-98.77	0.63	0.11	0.34	Open	0
226		P-320	J-151	J-327	128.04	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
227		P-321	J-181	J-333	75.58	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
228		P-322	J-264	J-330	180.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
229		P-323	J-249	J-264	162.11	8.00	110.00	25.45	0.16	0.00	0.03	Open	0
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.45	0.29	0.01	0.11	Open	0
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
232		P-326	J-296	J-297	17.70	6.00	110.00	20.36	0.23	0.00	0.07	Open	0
233		P-327	J-297	J-337	338.49	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
235		P-329	J-270	J-351	32.21	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
236		P-33	J-176	J20	183.58	12.00	110.00	-68.23	0.19	0.00	0.02	Open	0
237		P-330	J-266	J-313	206.46	6.00	110.00	-3.76	0.04	0.00	0.00	Open	0
238		P-331	J32	J-322	47.22	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
239		P-332	J-313	J-136	281.66	6.00	110.00	-14.76	0.17	0.01	0.04	Open	0
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
241		P-334	J-206	J-292	180.91	6.00	110.00	6.42	0.07	0.00	0.01	Open	0
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
243		P-336	J-292	J-266	321.44	6.00	110.00	1.33	0.02	0.00	0.00	Open	0
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
247		P-34	J-250	J-160	70.87	8.00	110.00	178.92	1.14	0.07	1.03	Open	0
248		P-340	J-287	J-206	239.33	6.00	110.00	18.82	0.21	0.02	0.06	Open	0
249		P-341	J-178	J-287	70.36	6.00	110.00	23.91	0.27	0.01	0.10	Open	0
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.54	0.35	0.01	0.16	Open	0
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
252		P-344	J-177	J-307	38.56	6.00	110.00	35.64	0.40	0.01	0.21	Open	0
253		P-345	J-330	J-331	66.36	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
255		P-347	J-111	J-284	43.43	6.00	110.00	58.79	0.67	0.02	0.53	Open	0
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
257		P-349	J-265	J-264	236.64	6.00	110.00	-10.18	0.12	0.00	0.02	Open	0
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
259		P-350	J-265	J-265A	252.43	6.00	110.00	5.09	0.06	0.00	0.01	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.09	0.06	0.00	0.01	Open	0
262		P-353	J-281	J-282	60.97	6.00	110.00	-39.95	0.45	0.02	0.26	Open	0
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
264		P-355	J-123	J50	205.02	6.00	110.00	-29.77	0.34	0.03	0.15	Open	0
265		P-356	J-297	J-270	92.80	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
266		P-357	J-285	J-306	386.52	6.00	110.00	48.61	0.55	0.14	0.37	Open	0
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
268		P-36	J-218	J-251	182.80	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
269		P-361	J-295	J-295A	196.76	6.00	110.00	160.33	1.82	0.67	3.41	Open	0
270		P-361A	J-295A	J-239	291.39	6.00	110.00	155.24	1.76	0.94	3.21	Open	0
271		P-362	J-336	J-334	237.69	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
272		P-363	J-336	J-345	166.85	6.00	110.00	164.96	1.87	0.60	3.59	Open	0
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
274		P-369	J-278	J-295	165.68	6.00	110.00	165.42	1.88	0.60	3.61	Open	0
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
278		P-371	J-358	J64	110.10	8.00	110.00	-832.75	5.32	1.95	17.74	Open	0
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
280		P-374	J-350	J-153	30.43	6.00	110.00	297.72	3.38	0.33	10.72	Open	0
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
284		P-378J	J-378	J-299	400.51	6.00	110.00	49.82	0.57	0.16	0.39	Open	0
285		P-379	J-119	J-359	917.88	8.00	110.00	77.73	0.50	0.20	0.22	Open	0
286		P-38	J-183	J-186	1,090.53	8.00	110.00	242.95	1.55	1.98	1.81	Open	0
287		P-380	J-119	J-359	917.88	8.00	110.00	77.73	0.50	0.20	0.22	Open	0
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
291		P-383	J-133	J-362	231.50	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
292		P-384	J-362	J-140	96.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
293		P-384J	J-380	J-384	257.09	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
295		P-386	J-209	J-364	299.67	8.00	110.00	272.37	1.74	0.67	2.24	Open	0
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.09	0.06	0.00	0.01	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
297		P-387	J-364	J-133	108.75	8.00	110.00	267.28	1.71	0.24	2.16	Open	0
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
299		P-389	J-366	J-293	1,219.68	6.00	110.00	205.68	2.33	6.59	5.40	Open	0
300		P-39	J-186	J-103	638.49	8.00	110.00	312.91	2.00	1.85	2.89	Open	0
301		P-390	J-315	J46	657.48	6.00	110.00	119.18	1.35	1.29	1.97	Open	0
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-108.54	1.23	2.05	1.65	Open	0
308		P-397J	J-396	J-397	453.13	6.00	110.00	-113.63	1.29	0.82	1.80	Open	0
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-118.72	0.76	0.55	0.48	Open	0
310		P-40	J-246	J-184	493.82	8.00	110.00	144.59	0.92	0.34	0.69	Open	0
311		P-401	J-363	J-278	74.61	6.00	110.00	170.51	1.93	0.28	3.82	Open	0
312		P-402	J-363	J-260	380.17	6.00	110.00	-327.85	3.72	4.87	12.81	Open	0
313		P-41	J-125	J-246	2,032.66	8.00	110.00	149.69	0.96	1.50	0.74	Open	0
314		P-42	J-217	J-220	115.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
315		P-43	J-165	J-144	67.95	8.00	110.00	1,145.05	7.31	2.17	31.99	Open	0
316		P-44	J-258	J-256	36.00	8.00	110.00	66.17	0.42	0.01	0.16	Open	0
317		P-45	J-165	J-217	185.69	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
318		P-46	J-385	J-134	382.32	8.00	110.00	1,532.18	9.78	20.97	54.85	Open	0
319		P-47	J-224	J-247	550.17	8.00	110.00	287.64	1.84	1.36	2.48	Open	0
320		P-48	J-234	J-235	281.08	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
321		P-49	J-166	J-169	217.82	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
322		P-50	J-155	J-137	552.95	8.00	110.00	-998.27	6.37	13.72	24.81	Open	0
323		P-51	J-193	J-216	158.25	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
325		P-57	J-180	J-223	228.41	8.00	110.00	45.81	0.29	0.02	0.08	Open	0
326		P-58	J-179	J-180	323.33	8.00	110.00	50.90	0.32	0.03	0.10	Open	0
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
328		P-60	J-256	J-179	14.41	8.00	110.00	55.99	0.36	0.00	0.12	Open	0
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
331		P-63	J-223	J-248	240.64	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.63	0.23	0.00	0.05	Open	0
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.63	0.23	0.00	0.05	Open	0
335		P-65	J-166	J-167	246.95	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
336		P-66	J-167	J-234	19.76	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
338		P-68	J-230	J-229	495.46	8.00	110.00	1,382.12	8.82	22.45	45.32	Open	0
339		P-69	J-138	J-182	296.96	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
340		P-7	J-125	J-126	564.55	10.00	110.00	5.09	0.02	0.00	0.00	Open	0
341		P-70	J-137	J-138	14.05	8.00	110.00	-1,003.36	6.40	0.35	25.05	Open	0
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
343		P-72	J-229	J-156	144.82	8.00	110.00	1,044.08	6.66	3.90	26.96	Open	0
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
345		P-74	J52	J-156	373.92	8.00	110.00	-1,038.99	6.63	9.99	26.72	Open	0
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
349		P-78	J-208	J-230	233.19	8.00	110.00	1,387.21	8.85	10.64	45.63	Open	0
350		P-79	J-224	J-208	89.11	8.00	110.00	-292.73	1.87	0.23	2.56	Open	0
351		P-8	J-112	J-113	234.36	10.00	110.00	-339.06	1.39	0.27	1.13	Open	0
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
353		P-81	J-134	J-139	284.76	8.00	110.00	1,779.10	11.36	20.60	72.34	Open	0
354		P-82	J-139	J-219	479.01	8.00	110.00	1,165.41	7.44	15.83	33.05	Open	0
355		P-83	J-219	J-165	142.35	8.00	110.00	1,160.32	7.41	4.67	32.78	Open	0
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
358		P-86	J-171	J-159	363.43	8.00	110.00	30.54	0.19	0.01	0.04	Open	0
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.45	0.16	0.00	0.03	Open	0
360		P-87	J-171	J-139	276.80	8.00	110.00	-608.61	3.88	2.75	9.92	Open	0
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
363		P-9	J-113	J-104	183.55	10.00	110.00	-354.33	1.45	0.23	1.23	Open	0
364		P-90	J-133	J-134	116.30	8.00	110.00	252.01	1.61	0.23	1.94	Open	0
365		P-93	J-209	J-247	44.60	8.00	110.00	-282.55	1.80	0.11	2.40	Open	0
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
367		P-95	J-221	J-162	263.63	8.00	110.00	562.80	3.59	2.26	8.58	Open	0
368		P-96	J-163	J-162	264.20	8.00	110.00	-557.71	3.56	2.23	8.44	Open	0
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
370		P-98	J-172	J-163	39.90	8.00	110.00	-552.61	3.53	0.33	8.30	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-827.66	5.28	1.48	17.53	Open	0
373		P-J106	J-252	J-106	417.04	8.00	110.00	374.82	2.39	1.69	4.04	Open	0
374		P-J286	J-363	J-286	10.63	6.00	110.00	152.26	1.73	0.03	3.10	Open	0
375		P-J335	J-335	J-286	287.42	6.00	110.00	-147.17	1.67	0.84	2.91	Open	0
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,222.30	20.57	10.28	217.34	Open	0
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,222.30	20.57	16.04	217.34	Open	0
393		P-TANK8B	J-208	J-385	277.35	8.00	110.00	-1,685.03	10.76	18.14	65.42	Open	0
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
395		P126	J-242	J-376	11.13	8.00	110.00	798.91	5.10	0.18	16.43	Open	0
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
397		P128	J-344	J-393	9.32	6.00	110.00	313.00	3.55	0.11	11.76	Open	0
398		P130	J10	J14	116.51	10.00	110.00	263.22	1.08	0.08	0.71	Open	0
399		P132	J14	M8-2H	217.35	8.00	110.00	75.57	0.48	0.05	0.21	Open	0
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	75.57	0.48	0.05	0.21	Open	0
401		P136	M8-3H	J16	275.97	8.00	110.00	75.57	0.48	0.06	0.21	Open	0
402		P138	J16	J12	16.19	10.00	110.00	253.04	1.03	0.01	0.66	Open	0
403		P140	J16	M8-4H	42.30	10.00	110.00	-182.55	0.75	0.02	0.36	Open	0
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-182.55	0.75	0.10	0.36	Open	0
405		P144	M8-5H	J14	116.30	10.00	110.00	-182.55	0.75	0.04	0.36	Open	0
406		P146	J12	J-102	126.72	10.00	110.00	247.95	1.01	0.08	0.63	Open	0
407		P148	J20	J22	6.79	12.00	110.00	-78.41	0.22	0.00	0.04	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
408		P150	J22	J-161	73.04	8.00	110.00	-83.50	0.53	0.02	0.25	Open	0
409		P152	J-194	J24	40.99	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
410		P154	J26	J24	12.75	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
411		P156	J32	J40	349.41	12.00	110.00	-4.28	0.01	0.00	0.00	Open	0
412		P158	J30	J28	652.66	12.00	110.00	-22.42	0.06	0.00	0.00	Open	0
413		P160	J-313	J32	17.72	6.00	110.00	5.90	0.07	0.00	0.00	Open	0
414		P162	J30	J-207	49.17	12.00	110.00	-0.57	0.00	0.00	0.00	Open	0
415		P164	J30	J36	31.14	12.00	110.00	3.44	0.01	0.00	0.00	Open	0
416		P166	J36	J-207	18.03	8.00	110.00	-1.65	0.01	0.00	0.00	Open	0
417		P168	J28	J34	44.56	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
418		P170	J20	J18	292.00	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open	0
422		P178	J44	J-236	15.32	8.00	110.00	-837.84	5.35	0.27	17.93	Open	0
423		P180	J42	J-190	51.62	8.00	110.00	-848.03	5.41	0.95	18.34	Open	0
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
425		P184	J48	J46	1,260.92	6.00	110.00	96.68	1.10	1.68	1.33	Open	0
426		P186	J46	J-366	444.59	6.00	110.00	210.77	2.39	2.51	5.65	Open	0
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
428		P190	J40	J38	318.75	12.00	110.00	-9.37	0.03	0.00	0.00	Open	0
429		P192	J38	J30	286.67	12.00	110.00	-14.46	0.04	0.00	0.00	Open	0
430		P194	J50	J-281	85.58	6.00	110.00	-34.86	0.40	0.02	0.20	Open	0
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
432		P198	J52	J54	266.38	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
433		P200	J54	J58	128.71	8.00	110.00	6.39	0.04	0.00	0.00	Open	0
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open	0
436		P206	J60	J56	280.60	8.00	110.00	-3.79	0.02	0.00	0.00	Open	0
437		P208	J56	J54	23.03	8.00	110.00	-8.88	0.06	0.00	0.00	Open	0
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
440		P214	J-138	J52	34.67	8.00	110.00	-1,013.54	6.47	0.88	25.51	Open	0
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
444		P222	J64	J44	294.57	8.00	110.00	-832.75	5.32	5.22	17.73	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
445		P224	J-344	J-106	395.17	12.00	110.00	-53.40	0.15	0.01	0.01	Open	0
446		P226	J-106	J-104	393.05	12.00	110.00	316.33	0.90	0.16	0.41	Open	0
447		P228	J70	J-200	50.08	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
448		P230	J72	J70	21.65	8.00	110.00	8.65	0.06	0.00	0.00	Open	0
449		P232	J74	J-241	28.57	12.00	110.00	-11.89	0.03	0.00	0.00	Open	0
450		P234	J-201	J-204	2.96	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
451		P236	J84	J88	84.39	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
452		P238	J82	J70	45.95	12.00	110.00	26.99	0.08	0.00	0.00	Open	0
453		P240	J82	J80	156.42	12.00	110.00	-22.09	0.06	0.00	0.00	Open	0
454		P242	J74	J80	48.39	12.00	110.00	-3.74	0.01	0.00	0.00	Open	0
455		P244	J80	J78	60.00	12.00	110.00	-25.82	0.07	0.00	0.00	Open	0
456		P246	J78	J84	490.51	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
457		P248	J72	J-318	236.32	6.00	110.00	1.89	0.02	0.00	0.00	Open	0
458		P250	J88	J86	49.28	12.00	110.00	4.90	0.01	0.00	0.00	Open	0
459		P252	J86	J82	141.57	12.00	110.00	4.90	0.01	0.00	0.00	Open	0
460		P254	J88	J-318	25.35	6.00	110.00	8.40	0.10	0.00	0.02	Open	0
461		P256	J78	J76	5.94	12.00	110.00	-39.13	0.11	0.00	0.04	Open	0
462		P258	J-170	J76	8.58	8.00	110.00	49.97	0.32	0.00	0.09	Open	0
463		P260	J94	J92	188.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
464		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
465		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
466		P266	J90	J-276	7.38	6.00	110.00	10.18	0.12	0.00	0.03	Open	0
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
468		P304A	J-378	J-347	26.13	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-959.12	6.12	4.24	23.04	Open	0

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP5	2,205.70	131.22	219.59	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP6	2,134.00	27.97	251.95	0.00	0.00	Closed	0.00	0.00	0.00
3		PUMP8	1,956.00	0.35	370.92	3,238.03	855.21	Open	1.00	34.31	0.00
4		TRANSF	2,629.54	7.57	31.64	0.00	0.00	Closed	0.00	0.00	0.00

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	808.27	2,691.54	2,701.15	48.05	9.61
2	FAIRWAYTANK	994.23	2,679.54	2,701.15	67.53	21.61
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

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	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-55.46	2,475.54	1,375.30	1,650.43	M12-8H	10.66	2,628.15	1,374.25	1,374.25
2	J12-5H	3,000.00	J12-5H	-258.93	1,958.97	970.33	970.33	J12-5H	20.00	2,602.70	970.32	970.32
3	J12-6H	3,000.00	J12-6H	-293.34	1,872.01	954.22	954.22	J12-6H	20.00	2,595.16	954.22	954.22
4	J13-1H	3,000.00	K13-4H	-72.57	2,432.52	1,216.56	1,544.57	K13-4H	7.86	2,618.13	1,216.57	1,216.56
5	J13-2H	3,000.00	J13-2H	-127.08	2,280.26	1,189.66	1,189.69	J13-2H	20.00	2,619.70	1,189.68	1,189.66
6	J13-3H	3,000.00	J13-3H	-160.14	2,195.95	1,131.88	1,131.90	J13-3H	20.00	2,611.70	1,131.89	1,131.88
7	J13-4H	3,000.00	K13-4H	-72.59	2,432.48	1,216.45	1,300.76	K13-4H	17.12	2,639.51	1,216.46	1,216.45
8	J13-5H	3,000.00	K13-4H	-72.61	2,432.43	1,216.33	1,280.60	K13-4H	17.82	2,641.13	1,216.34	1,216.33
9	J13-6H	3,000.00	K13-4H	-72.12	2,433.55	1,219.12	1,457.63	K13-4H	11.43	2,626.39	1,219.13	1,219.12
10	J14-1H	3,000.00	K13-4H	-70.87	2,436.44	1,226.44	1,669.58	K13-4H	3.18	2,607.34	1,226.45	1,226.44
11	J7-1H	3,000.00	K7-7H	8.75	2,604.73	2,541.98	2,715.81	K7-7H	15.92	2,621.28	2,541.93	2,541.93
12	J7-2H	3,000.00	K7-7H	5.94	2,598.25	2,455.49	2,563.35	K7-7H	17.41	2,624.72	2,455.42	2,455.42
13	K10-2H	3,000.00	M9-1H	31.33	2,675.84	4,037.65	4,455.30	M9-1H	14.54	2,637.09	4,041.47	4,037.65
14	K12-1H	3,000.00	K12-1H	-89.93	2,317.46	1,707.44	1,707.02	K12-1H	20.00	2,571.16	1,707.02	1,707.02
15	K13-1H	3,000.00	K13-1H	-216.55	2,039.23	1,183.69	1,183.18	K13-1H	20.00	2,585.16	1,183.18	1,183.18
16	K13-2H	3,000.00	K13-4H	-50.21	2,484.11	1,383.38	1,416.05	K13-4H	19.01	2,643.87	1,383.35	1,383.35
17	K13-3H	3,000.00	K13-3H	-95.56	2,367.01	1,217.74	1,217.76	K13-3H	20.00	2,633.70	1,217.74	1,217.74
18	K13-4H	3,000.00	K13-4H	-79.67	2,416.12	1,176.56	1,176.57	K13-4H	20.00	2,646.16	1,176.54	1,176.54
19	K14-1H	3,000.00	K13-4H	-66.62	2,446.26	1,253.17	1,388.65	K13-4H	15.42	2,635.58	1,253.18	1,253.17
20	K14-6H	3,000.00	K14-6H	-245.06	1,965.43	1,120.43	1,120.70	K14-6H	20.00	2,577.16	1,120.69	1,120.43
21	K7-1H	3,000.00	K7-1H	-19.54	2,518.45	2,072.96	2,072.89	K7-1H	20.00	2,609.70	2,072.88	2,072.88
22	K7-2H	3,000.00	K7-7H	9.99	2,607.59	2,582.99	2,585.21	K7-7H	19.95	2,630.58	2,582.96	2,582.96
23	K7-3H	3,000.00	K7-3H	-57.51	2,410.81	1,797.48	1,797.44	K7-3H	20.00	2,589.70	1,797.44	1,797.44
24	K7-4H	3,000.00	L7-2H	14.64	2,587.33	2,823.67	3,125.09	L7-2H	10.67	2,578.16	2,823.67	2,823.67
25	K7-5H	3,000.00	K7-5H	-27.77	2,471.46	2,113.49	2,113.40	K7-5H	20.00	2,581.70	2,113.40	2,113.40
26	K7-6H	3,000.00	K7-6H	-23.86	2,519.47	1,942.27	1,942.24	K7-6H	20.00	2,620.70	1,942.24	1,942.24
27	K7-7H	3,000.00	K7-7H	4.04	2,593.87	2,401.58	2,401.48	K7-7H	20.00	2,630.70	2,401.48	2,401.48
28	K7-8H	3,000.00	K7-8H	-48.84	2,407.82	1,969.46	1,969.46	K7-8H	20.00	2,566.70	1,969.46	1,969.46
29	K7-9H	3,000.00	K7-9H	-77.72	2,348.17	1,734.26	1,734.25	K7-9H	20.00	2,573.70	1,734.25	1,734.25
30	K8-1H	3,000.00	K8-1H	-81.50	2,321.45	1,786.71	1,786.73	K8-1H	20.00	2,555.70	1,786.72	1,786.71
31	K8-2H	3,000.00	L7-2H	16.30	2,591.15	2,875.02	3,005.74	L7-2H	16.12	2,590.75	2,875.08	2,875.02
32	L10-1H	3,000.00	M9-1H	31.47	2,676.17	4,058.09	4,337.63	M9-1H	16.39	2,641.37	4,059.54	4,058.09
33	L10-2H	3,000.00	M9-1H	31.35	2,675.89	4,046.35	4,099.66	M9-1H	19.33	2,648.14	4,046.21	4,046.21
34	L10-4H	3,000.00	L10-8H	-109.87	2,301.96	1,459.06	1,483.26	L10-8H	18.55	2,598.36	1,458.27	1,458.27
35	L10-5H	3,000.00	L10-8H	-55.48	2,427.50	1,786.95	1,852.37	L10-8H	16.79	2,594.29	1,786.58	1,786.58
36	L10-6H	3,000.00	M9-1H	30.28	2,673.42	3,907.95	4,464.74	M9-1H	12.31	2,631.94	3,907.70	3,907.70
37	L10-7H	3,000.00	M9-1H	30.95	2,674.98	3,995.08	4,354.84	M9-1H	15.24	2,638.71	3,994.84	3,994.84
38	L10-8H	3,000.00	L10-8H	-230.50	2,023.58	1,094.97	1,094.35	L10-8H	20.00	2,601.70	1,094.35	1,094.35
39	L11-1H	3,000.00	M9-1H	31.56	2,676.38	4,071.51	4,346.32	M9-1H	16.46	2,641.52	4,071.60	4,071.51
40	L11-2H	3,000.00	M9-1H	31.96	2,677.30	4,130.42	4,774.46	M9-1H	11.48	2,630.03	4,131.02	4,130.42
41	L11-3H	3,000.00	M9-1H	31.62	2,676.52	4,079.93	4,584.06	M9-1H	13.34	2,634.32	4,080.05	4,079.93
42	L11-4H	3,000.00	L11-4H	-132.43	2,231.37	1,501.50	1,501.35	L11-4H	20.00	2,583.16	1,501.35	1,501.35
43	L11-5H	3,000.00	L11-5H	-21.02	2,513.49	2,135.06	2,134.98	L11-5H	20.00	2,608.16	2,134.99	2,134.99

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
44		L11-6H	3,000.00	L11-6H	45.55	2,644.12	4,139.12	4,138.87	L11-6H	20.00	2,585.16	4,138.86	4,138.86
45		L12-3H	3,000.00	M12-5H	34.18	2,661.41	3,752.80	3,821.45	M12-5H	18.64	2,625.55	3,752.84	3,752.80
46		L12-4H	3,000.00	M9-1H	32.98	2,679.64	4,279.10	4,561.20	M9-1H	16.51	2,641.65	4,279.46	4,279.10
47		L12-6H	3,000.00	L12-6H	35.50	2,642.46	3,695.07	3,694.84	L12-6H	20.00	2,606.70	3,694.84	3,694.84
48		L12-7H	3,000.00	L12-8H	40.54	2,659.10	4,116.06	4,142.70	L12-8H	19.43	2,610.38	4,115.69	4,115.69
49		L12-8H	3,000.00	L12-8H	23.63	2,620.06	3,137.57	3,137.57	L12-8H	20.00	2,611.70	3,137.56	3,137.56
50		L13-10H	3,000.00	L13-10H	-145.44	2,200.34	1,396.85	1,396.61	L13-10H	20.00	2,582.16	1,396.60	1,396.60
51		L13-11H	3,000.00	M12-8H	32.60	2,678.78	4,331.64	5,337.76	M12-8H	8.31	2,622.72	4,334.07	4,331.64
52		L13-12H	3,000.00	L13-12H	38.01	2,642.73	3,911.24	3,911.38	L13-12H	20.00	2,601.16	3,911.38	3,911.24
53		L13-1H	3,000.00	K13-4H	15.99	2,636.90	2,763.98	3,401.75	K13-4H	8.39	2,619.37	2,763.88	2,763.88
54		L13-2H	3,000.00	K13-4H	4.81	2,611.10	2,300.24	3,173.03	K13-4H	0.51	2,601.18	2,299.90	2,299.90
55		L13-3H	3,000.00	K13-4H	19.05	2,643.96	2,938.81	3,438.70	K13-4H	11.71	2,627.02	2,938.82	2,938.81
56		L13-4H	3,000.00	M12-8H	16.07	2,640.63	2,764.88	3,375.18	M12-8H	9.22	2,624.83	2,764.86	2,764.86
57		L13-5H	3,000.00	M12-8H	22.60	2,655.69	3,187.95	4,232.73	M12-8H	3.18	2,610.89	3,187.99	3,187.95
58		L13-6H	3,000.00	K13-4H	14.81	2,634.17	2,703.62	3,188.08	K13-4H	11.25	2,625.97	2,703.59	2,703.59
59		L13-7H	3,000.00	M12-8H	29.59	2,671.83	3,882.09	4,146.34	M12-8H	16.76	2,642.22	3,882.82	3,882.09
60		L13-8H	3,000.00	L13-8H	6.99	2,563.68	2,641.00	2,641.02	L13-8H	20.00	2,593.70	2,641.02	2,641.00
61		L13-9H	3,000.00	K13-4H	18.18	2,641.96	2,886.12	2,967.70	K13-4H	18.70	2,643.17	2,886.12	2,886.12
62		L14-2H	3,000.00	L14-2H	-91.42	2,341.02	1,554.76	1,554.56	L14-2H	20.00	2,598.16	1,554.56	1,554.56
63		L14-3H	3,000.00	L14-3H	-17.80	2,523.92	2,106.27	2,106.31	L14-3H	20.00	2,611.16	2,106.32	2,106.27
64		L7-1H	3,000.00	L7-2H	-79.23	2,370.69	1,594.02	1,716.79	L7-2H	13.44	2,584.56	1,593.92	1,593.92
65		L7-2H	3,000.00	L7-2H	-174.01	2,151.94	1,209.25	1,208.87	L7-2H	20.00	2,599.70	1,208.87	1,208.87
66		L7-3H	3,000.00	K7-7H	9.15	2,605.66	2,555.44	2,857.67	K7-7H	12.79	2,614.05	2,555.39	2,555.39
67		L7-4H	3,000.00	K7-7H	10.44	2,608.63	2,598.74	2,699.39	K7-7H	17.71	2,625.42	2,598.70	2,598.70
68		L7-5H	3,000.00	L7-5H	5.42	2,583.06	2,513.46	2,513.42	L7-5H	20.00	2,616.70	2,513.42	2,513.42
69		L8-1H	3,000.00	L8-1H	32.71	2,641.04	3,652.32	3,652.32	L8-1H	20.00	2,611.70	3,652.31	3,652.31
70		L9-1H	3,000.00	M9-1H	27.22	2,666.36	3,570.79	3,843.04	M9-1H	16.06	2,640.61	3,570.47	3,570.47
71		M11-1H	3,000.00	M11-3H	30.27	2,689.39	4,069.18	4,642.46	M11-3H	13.16	2,649.92	4,069.26	4,069.18
72		M11-2H	3,000.00	M11-2H	23.54	2,637.86	3,152.29	3,150.87	M11-2H	20.00	2,629.70	3,150.86	3,150.86
73		M11-3H	3,000.00	M11-3H	-119.23	2,344.37	1,066.82	1,066.72	M11-3H	20.00	2,665.70	1,066.72	1,066.72
74		M11-4H	3,000.00	M11-3H	-23.49	2,565.32	1,719.03	2,146.29	M11-3H	7.60	2,637.08	1,720.57	1,719.03
75		M11-5H	3,000.00	M11-3H	16.01	2,656.48	2,701.92	3,037.21	M11-3H	15.46	2,655.22	2,703.37	2,701.92
76		M11-6H	3,000.00	M11-6H	3.37	2,565.32	2,551.76	2,551.81	M11-6H	20.00	2,603.70	2,551.81	2,551.76
77		M12-1H	3,000.00	M12-1H	29.87	2,654.48	3,527.30	3,527.57	M12-1H	20.00	2,631.70	3,527.59	3,527.30
78		M12-2H	3,000.00	M12-8H	-29.79	2,534.78	1,625.66	1,887.77	M12-8H	12.46	2,632.30	1,625.50	1,625.50
79		M12-3H	3,000.00	M12-8H	-62.28	2,459.80	1,324.77	1,526.85	M12-8H	13.05	2,633.65	1,323.48	1,323.48
80		M12-4H	3,000.00	M12-4H	27.23	2,676.38	3,519.27	3,519.68	M12-4H	20.00	2,659.70	3,519.66	3,519.27
81		M12-5H	3,000.00	M12-5H	15.57	2,618.47	2,838.63	2,838.61	M12-5H	20.00	2,628.70	2,838.61	2,838.61
82		M12-6H	3,000.00	M12-8H	-55.46	2,475.54	1,375.30	1,601.39	M12-8H	12.44	2,632.24	1,374.23	1,374.23
83		M12-7H	3,000.00	M12-8H	-82.91	2,412.20	1,196.95	1,216.86	M12-8H	19.31	2,648.10	1,196.94	1,196.94
84		M12-8H	3,000.00	M12-8H	-109.28	2,351.34	1,075.27	1,075.24	M12-8H	20.00	2,649.70	1,075.24	1,075.24
85		M13-1H	3,000.00	M13-1H	34.60	2,639.38	3,687.32	3,686.31	M13-1H	20.00	2,605.70	3,686.31	3,686.31
86		M13-2H	3,000.00	M13-2H	27.91	2,636.96	3,331.73	3,331.34	M13-2H	20.00	2,618.70	3,331.32	3,331.32

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
87	M13-3H	3,000.00	M13-3H	11.64	2,585.40	2,734.33	2,734.34	M13-3H	20.00	2,604.70	2,734.34	2,734.33
88	M13-4H	3,000.00	M13-4H	-146.60	2,240.67	1,143.69	1,143.68	M13-4H	20.00	2,625.16	1,143.68	1,143.68
89	M13-5H	3,000.00	M12-8H	-2.29	2,598.26	2,101.38	2,469.66	M12-8H	11.65	2,630.43	2,101.69	2,101.38
90	M14-1H	3,000.00	M14-1H	-3.20	2,562.61	2,396.12	2,394.17	M14-1H	20.00	2,616.16	2,394.17	2,394.17
91	M14-2H	3,000.00	M14-2H	3.85	2,572.89	2,564.87	2,564.10	M14-2H	20.00	2,610.16	2,564.11	2,564.11
92	M14-3H	3,000.00	M14-3H	0.77	2,572.37	2,474.56	2,473.00	M14-3H	20.00	2,616.76	2,473.01	2,473.01
93	M6-1H	3,000.00	K7-7H	16.77	2,623.23	2,846.05	2,930.05	K7-7H	18.25	2,626.67	2,846.05	2,846.05
94	M7-1H	3,000.00	K7-7H	13.44	2,615.56	2,708.37	2,861.17	K7-7H	16.64	2,622.93	2,708.35	2,708.35
95	M7-2H	3,000.00	M7-2H	5.70	2,580.69	2,543.73	2,543.70	M7-2H	20.00	2,613.70	2,543.70	2,543.70
96	M8-1H	3,000.00	M8-1H	-21.35	2,532.26	1,949.70	1,949.57	M8-1H	20.00	2,627.70	1,949.57	1,949.57
97	M8-2H	3,000.00	M8-2H	29.61	2,660.33	3,689.89	3,690.35	M8-2H	20.00	2,638.16	3,690.35	3,689.88
98	M8-3H	3,000.00	M8-3H	28.93	2,659.28	3,632.86	3,633.36	M8-3H	20.00	2,638.66	3,633.36	3,632.86
99	M8-4H	3,000.00	O10-1H	28.43	2,693.14	4,380.11	4,614.40	O10-1H	18.28	2,669.74	4,379.96	4,379.96
100	M8-5H	3,000.00	M8-5H	34.82	2,673.35	4,347.99	4,348.02	M8-5H	20.00	2,639.16	4,348.00	4,347.99
101	M9-1H	3,000.00	M9-1H	15.30	2,638.84	2,740.64	2,740.63	M9-1H	20.00	2,649.70	2,740.62	2,740.62
102	N10-1H	3,000.00	N10-1H	-35.29	2,536.11	1,610.51	1,609.57	N10-1H	20.00	2,663.70	1,609.56	1,609.56
103	N11-1H	3,000.00	N11-1H	17.71	2,664.41	2,839.82	2,839.83	N11-1H	20.00	2,669.70	2,839.84	2,839.82
104	N11-2H	3,000.00	M11-3H	-34.73	2,539.40	1,606.59	1,618.18	M11-3H	19.65	2,664.90	1,606.17	1,606.17
105	N11-3H	3,000.00	M11-3H	-29.06	2,552.47	1,659.50	1,934.16	M11-3H	11.87	2,646.94	1,659.97	1,659.50
106	N12-1H	3,000.00	N11-1H	33.48	2,700.81	4,462.71	4,552.04	N11-1H	18.99	2,667.37	4,462.36	4,462.36
107	N13-1H	3,000.00	N13-1H	40.06	2,651.99	3,858.85	3,856.52	N13-1H	20.00	2,605.70	3,856.55	3,856.55
108	N13-2H	3,000.00	N13-2H	-102.72	2,358.47	1,365.52	1,364.46	N13-2H	20.00	2,641.70	1,364.46	1,364.46
109	N13-3H	3,000.00	O12-1H	-47.75	2,469.34	1,654.89	1,700.04	O12-1H	18.28	2,621.73	1,655.12	1,654.89
110	N14-1H	3,000.00	O12-1H	-45.03	2,475.61	1,683.68	1,866.68	O12-1H	13.08	2,609.73	1,683.97	1,683.68
111	N14-2H	3,000.00	N14-2H	-107.06	2,310.47	1,447.72	1,447.51	N14-2H	20.00	2,603.70	1,447.51	1,447.51
112	N14-3H	3,000.00	O12-1H	-67.97	2,422.67	1,497.51	1,636.98	O12-1H	13.62	2,610.97	1,497.11	1,497.11
113	N15-1H	3,000.00	N15-1H	-206.08	2,082.93	1,146.74	1,146.60	N15-1H	20.00	2,604.70	1,146.60	1,146.60
114	N15-2H	3,000.00	N15-2H	-111.54	2,299.11	1,431.22	1,431.00	N15-2H	20.00	2,602.70	1,430.99	1,430.99
115	N15-3H	3,000.00	N15-3H	-148.47	2,213.89	1,301.85	1,301.67	N15-3H	20.00	2,602.70	1,301.66	1,301.66
116	O10-1H	3,000.00	O10-1H	-104.76	2,385.78	876.73	876.77	O10-1H	20.00	2,673.70	876.77	876.73
117	O12-1H	3,000.00	O12-1H	-297.54	1,892.86	896.73	896.68	O12-1H	20.00	2,625.70	896.67	896.67
118	O13-1H	3,000.00	O12-1H	-109.30	2,327.30	1,296.26	1,669.28	O12-1H	-2.11	2,574.67	1,295.86	1,295.86
119	O13-2H	3,000.00	O12-1H	-109.30	2,327.30	1,296.26	1,399.76	O12-1H	14.15	2,612.20	1,295.86	1,295.86
120	O8-1H	3,000.00	O8-1H	-132.35	2,315.56	857.61	857.77	O8-1H	20.00	2,667.16	857.77	857.61
121	O9-1H	3,000.00	O9-1H	-127.86	2,331.91	802.27	801.61	O9-1H	20.00	2,673.16	801.59	801.59
122	P13-1H	3,000.00	O12-1H	-177.19	2,170.61	1,101.27	1,509.81	O12-1H	-11.21	2,553.68	1,101.09	1,101.09
123	P13-2H	3,000.00	O12-1H	-158.20	2,214.44	1,163.00	1,448.13	O12-1H	-0.32	2,578.80	1,162.83	1,162.83
124	P6-1H	3,000.00	P6-2H	-69.44	2,432.28	1,412.86	1,424.97	P6-2H	19.54	2,637.62	1,413.07	1,412.86
125	P6-2H	3,000.00	P6-2H	-195.90	2,140.43	961.04	961.15	P6-2H	20.00	2,638.70	961.15	961.04
126	Q10-1H	3,000.00	Q10-2H	-330.38	1,732.07	1,152.59	1,159.31	Q10-2H	19.20	2,538.84	1,152.59	1,152.59
127	Q10-2H	3,000.00	Q10-2H	-382.23	1,612.40	1,084.60	1,084.61	Q10-2H	20.00	2,540.70	1,084.61	1,084.60
128	Q10-3H	3,000.00	Q10-3H	-290.38	1,818.38	1,233.68	1,233.69	Q10-3H	20.00	2,534.70	1,233.68	1,233.68
129	Q11-1H	3,000.00	Q11-1H	-265.99	1,860.68	1,319.86	1,319.87	Q11-1H	20.00	2,520.70	1,319.86	1,319.86

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
130		R7-1H	3,000.00	R7-1H	-158.11	2,152.65	1,443.92	1,444.19	R7-1H	20.00	2,563.70	1,444.18	1,443.92
131		R9-1H	3,000.00	R9-1H	-337.63	1,720.33	1,126.25	1,127.05	R9-1H	20.00	2,545.70	1,127.04	1,126.25

High Zone 2015 MDD FF 3hr Pump 8 on Tanks 2701.15 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed	0
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-673.71	1.91	1.95	1.66	Open	0
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.23	0.23	0.00	0.04	Open	0
4		P-100	J-239	J-238	960.70	8.00	110.00	-102.80	0.66	0.35	0.37	Open	0
5		P-101	J-245	J-238	149.26	8.00	110.00	107.89	0.69	0.06	0.40	Open	0
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
7		P-103	J-233	J-158	215.33	8.00	110.00	102.59	0.65	0.08	0.37	Open	0
8		P-104	J-255	J-122	313.79	8.00	110.00	-14.50	0.09	0.00	0.01	Open	0
9		P-105	J-131	J-132	317.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
10		P-106	J-157	J-170	358.07	8.00	110.00	87.31	0.56	0.10	0.27	Open	0
11		P-108	J-168	J72	94.43	8.00	110.00	10.54	0.07	0.00	0.01	Open	0
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
13		P-110	J-199	J-200	69.96	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
14		P-113	J76	J-244	236.44	8.00	110.00	10.84	0.07	0.00	0.01	Open	0
15		P-114	J-244	J-131	21.10	12.00	110.00	5.75	0.02	0.00	0.00	Open	0
16		P-115	J-131	J-255	49.66	12.00	110.00	-4.43	0.01	0.00	0.00	Open	0
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
18		P-117	J-168	J74	39.57	12.00	110.00	-15.63	0.04	0.00	0.00	Open	0
19		P-118	J-168	J13-4H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
20		P-119	J-201	J-170	13.13	12.00	110.00	-32.26	0.09	0.00	0.02	Open	0
21		P-12	J-114	J-115	298.01	10.00	110.00	217.10	0.89	0.15	0.50	Open	0
22		P-120	J-241	J-201	47.80	8.00	110.00	-22.07	0.14	0.00	0.02	Open	0
23		P-121	J-158	J-157	92.45	8.00	110.00	97.49	0.62	0.03	0.33	Open	0
24		P-122	J-157	J-196	105.49	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
26		P-124	J-236	J42	42.81	8.00	110.00	-823.54	5.26	0.74	17.38	Open	0
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
28		P-127	J-211	J-181	330.78	8.00	110.00	-1,125.77	7.19	10.25	31.00	Open	0
29		P-128	J-212	J-190	143.39	8.00	110.00	7.97	0.05	0.00	0.00	Open	0
30		P-129	J-231	J-150	227.08	8.00	110.00	-19.93	0.13	0.00	0.02	Open	0
31		P-130	J-141	J-205	202.64	8.00	110.00	163.95	1.05	0.18	0.87	Open	0
32		P-131	J-115	J-205	245.54	8.00	110.00	172.62	1.10	0.24	0.96	Open	0
33		P-132	J-135	J-240	94.59	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
34		P-133	J-153	J-152	97.97	8.00	110.00	198.53	1.27	0.12	1.25	Open	0
35		P-134	J-192	J-191	110.45	8.00	110.00	178.17	1.14	0.11	1.02	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
36		P-135	J-191	J-213	168.15	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
37		P-136	J-233	J-191	22.28	8.00	110.00	-167.99	1.07	0.02	0.91	Open	0
38		P-137	J-129	J-192	239.03	8.00	110.00	183.26	1.17	0.26	1.07	Open	0
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
40		P-139	J-152	J-129	359.71	8.00	110.00	193.44	1.23	0.43	1.19	Open	0
41		P-14	J-124	J-112	235.96	10.00	110.00	-348.11	1.42	0.28	1.19	Open	0
42		P-140	J-129	J-130	160.33	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
44		P-142	J-174	J-202	125.70	8.00	110.00	286.25	1.83	0.31	2.45	Open	0
45		P-143	J-149	J-187	185.18	12.00	110.00	69.48	0.20	0.00	0.03	Open	0
46		P-144	J-153	J-149	224.22	12.00	110.00	74.57	0.21	0.01	0.03	Open	0
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
48		P-146	J-375	J-188	169.96	8.00	110.00	-4.66	0.03	0.00	0.00	Open	0
49		P-146A	J-187	J-375	20.98	8.00	110.00	5.52	0.04	0.00	0.00	Open	0
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
51		P-148	J-188	J-231	56.77	8.00	110.00	-9.75	0.06	0.00	0.00	Open	0
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
54		P-150	J-185	J-115	140.14	8.00	110.00	144.92	0.93	0.10	0.70	Open	0
55		P-151	J-146	J-114	148.95	8.00	110.00	222.19	1.42	0.23	1.54	Open	0
56		P-152	J-252	J-146	340.09	8.00	110.00	418.32	2.67	1.69	4.96	Open	0
57		P-154	J-104	J-145	309.87	8.00	110.00	-35.93	0.23	0.02	0.05	Open	0
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
59		P-156	J-185	J-145	145.41	8.00	110.00	-150.01	0.96	0.11	0.74	Open	0
60		P-157	J-145	J-146	147.46	8.00	110.00	-191.04	1.22	0.17	1.16	Open	0
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
62		P-159	J-211	J-210	17.79	8.00	110.00	311.70	1.99	0.05	2.87	Open	0
63		P-16	J-118	J-117	237.90	10.00	110.00	-492.47	2.01	0.54	2.26	Open	0
64		P-160	J-242	J-211	220.05	8.00	110.00	-808.97	5.16	3.70	16.81	Open	0
65		P-164	J-197	J-174	100.44	8.00	110.00	291.34	1.86	0.25	2.54	Open	0
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
67		P-166	J-197	J-198	101.26	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
69		P-168	J-197	J-210	16.45	8.00	110.00	-306.61	1.96	0.05	2.79	Open	0
70		P-169	J-142	J-141	14.70	8.00	110.00	169.05	1.08	0.01	0.91	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
71		P-17	J-119	J-121	661.27	10.00	110.00	-669.41	2.73	2.64	3.99	Open	0
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
74		P-172	J-205	J-121	222.07	8.00	110.00	331.48	2.12	0.72	3.22	Open	0
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
77		P-175	J-243	J-118	25.00	8.00	110.00	151.48	0.97	0.02	0.75	Open	0
78		P-176	J-257	J-214	47.06	8.00	110.00	-111.57	0.71	0.02	0.43	Open	0
79		P-177	J-154	J-155	341.59	8.00	110.00	-983.14	6.28	8.24	24.12	Open	0
80		P-178	J-148	J-193	255.40	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
81		P-179	J-214	J-215	156.54	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
82		P-18	J-121	J-124	286.05	10.00	110.00	-343.02	1.40	0.33	1.16	Open	0
83		P-180	J-147	J-148	45.75	8.00	110.00	-126.84	0.81	0.02	0.54	Open	0
84		P-181	J-190	J-189	25.98	8.00	110.00	-825.76	5.27	0.45	17.46	Open	0
85		P-182	J-148	J-189	142.70	8.00	110.00	-142.11	0.91	0.10	0.67	Open	0
86		P-183	J-154	J-228	71.88	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
87		P-184	J-189	J-154	51.91	8.00	110.00	-972.96	6.21	1.23	23.66	Open	0
88		P-185	J-214	J-147	198.83	8.00	110.00	-121.75	0.78	0.10	0.50	Open	0
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
90		P-187	J-257	J-258	155.58	8.00	110.00	71.27	0.45	0.03	0.19	Open	0
91		P-188	J-151	J-257	23.86	8.00	110.00	-35.21	0.22	0.00	0.05	Open	0
92		P-189	J-150	J-151	8.98	8.00	110.00	-25.03	0.16	0.00	0.03	Open	0
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
95		P-191	J-144	J-262	92.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
96		P-192	J-143	J-144	21.60	8.00	110.00	-1,141.04	7.28	0.69	31.78	Open	0
97		P-193	J-143	J-181	133.07	8.00	110.00	1,135.95	7.25	4.19	31.52	Open	0
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
99		P-195	J-116	J-227	1,151.95	8.00	110.00	132.86	0.85	0.68	0.59	Open	0
100		P-196	J28	J26	390.87	12.00	110.00	-30.03	0.09	0.00	0.01	Open	0
101		P-197	J-227	J-249	20.05	8.00	110.00	127.77	0.82	0.01	0.56	Open	0
102		P-198	J-249	J-254	108.97	8.00	110.00	97.23	0.62	0.04	0.33	Open	0
103		P-199	J-254	J-177	467.39	8.00	110.00	92.14	0.59	0.14	0.30	Open	0
104		P-20	J-117	J-119	128.15	10.00	110.00	-502.65	2.05	0.30	2.35	Open	0
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
107		P-202	J-136	J-178	684.02	8.00	110.00	-21.00	0.13	0.01	0.02	Open	0
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
109		P-204	J-177	J-178	21.41	8.00	110.00	51.41	0.33	0.00	0.10	Open	0
110		P-205	J-206	J-207	208.07	8.00	110.00	8.68	0.06	0.00	0.00	Open	0
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
112		P-207	J-250	J-116	974.28	8.00	110.00	-145.27	0.93	0.68	0.70	Open	0
113		P-208	J-175	J-176	367.24	12.00	110.00	-55.49	0.16	0.01	0.02	Open	0
114		P-209	J26	J-195	293.04	12.00	110.00	-45.31	0.13	0.00	0.01	Open	0
115		P-21	J-118	J-110	557.62	10.00	110.00	638.86	2.61	2.04	3.66	Open	0
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
117		P-211	J-195	J-175	305.36	12.00	110.00	-50.40	0.14	0.00	0.01	Open	0
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
120		P-214	J-260	J-229	46.84	8.00	110.00	-336.23	2.15	0.15	3.30	Open	0
121		P-215	J-113	J-135	11.43	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
122		P-216	J-293	J-294	1,100.07	6.00	110.00	203.88	2.31	5.85	5.32	Open	0
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.09	0.06	0.01	0.01	Open	0
125		P-219	J-310	J-336	710.86	6.00	110.00	183.52	2.08	3.11	4.37	Open	0
126		P-22	J-110	J-111	241.32	10.00	110.00	350.55	1.43	0.29	1.20	Open	0
127		P-220	J-310	J-311	189.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
128		P-221	J-294	J-310	50.46	6.00	110.00	198.79	2.26	0.26	5.08	Open	0
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
131		P-223	J-311	J-332	149.01	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
134		P-226	J-345	J-125	1,043.90	6.00	110.00	163.16	1.85	3.67	3.52	Open	0
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
136		P-23	J-110	J-116	126.11	10.00	110.00	283.23	1.16	0.10	0.81	Open	0
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
138		P-231	J-284	J-285	570.74	6.00	110.00	54.75	0.62	0.27	0.47	Open	0
139		P-232	J-306	J-250	165.38	6.00	110.00	44.57	0.51	0.05	0.32	Open	0
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
142		P-238	J-289	J-342	25.70	6.00	110.00	15.27	0.17	0.00	0.04	Open	0
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
144		P-24	J10	J-111	680.53	10.00	110.00	-285.61	1.17	0.56	0.82	Open	0
145		P-241	J-261	J-267	413.65	6.00	110.00	-548.54	6.22	13.75	33.24	Open	0
146		P-242	J-230	N13-2H	414.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
147		P-243-359	J-359	J-243	751.40	8.00	110.00	156.57	1.00	0.60	0.80	Open	0
148		P-244	J-234	J-303	166.84	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
149		P-245	J-256	J-319	245.42	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
151		P-247	J-325	J-171	56.56	6.00	110.00	-579.09	6.57	2.08	36.75	Open	0
152		P-248	J-325	J-221	438.70	6.00	110.00	574.00	6.51	15.86	36.15	Open	0
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open	0
155		P-250	J-267	J-172	141.60	6.00	110.00	-553.63	6.28	4.79	33.81	Open	0
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
157		P-252	J-277	J-314	188.74	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
158		P-252J	J-376	J-252	18.85	8.00	110.00	798.79	5.10	0.31	16.41	Open	0
159		P-253	J-342	J-277	166.27	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
162		P-256	J48	J-302	810.53	6.00	110.00	-103.24	1.17	1.22	1.51	Open	0
163		P-257	J-261	J-317	748.38	6.00	110.00	129.90	1.47	1.73	2.31	Open	0
164		P-258	J-317	J-324	236.04	6.00	110.00	124.81	1.42	0.51	2.14	Open	0
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
167		P-260	J-302	J-315	743.33	6.00	110.00	126.09	1.43	1.62	2.18	Open	0
168		P-261	J-289	J-302	435.87	6.00	110.00	234.42	2.66	3.00	6.88	Open	0
169		P-263	J-239	J-289	143.17	6.00	110.00	254.78	2.89	1.15	8.03	Open	0
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
171		P-265	J-245	J-341	285.59	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
172		P-266	J-245	J-274	336.66	6.00	110.00	-118.08	1.34	0.65	1.93	Open	0
173		P-267	J-274	J-275	98.71	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
174		P-268	J-274	J-300	190.70	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
175		P-269	J-316	J-274	29.78	6.00	110.00	133.35	1.51	0.07	2.42	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
176		P-27	J-184	J-183	1,262.55	8.00	110.00	142.79	0.91	0.85	0.68	Open	0
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
178		P-271	J-316	J-335	200.25	6.00	110.00	-138.44	1.57	0.52	2.60	Open	0
179		P-272	J-335	J-338	749.12	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
180		P-272J	J-299	J-272	49.13	6.00	110.00	18.15	0.21	0.00	0.06	Open	0
181		P-276	J-200	J-279	215.50	6.00	110.00	25.46	0.29	0.02	0.11	Open	0
182		P-277	J-241	J-340	297.28	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
183		P-278	J13-2H	J86	130.09	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
184		P-279	J-255	J-273	210.37	8.00	110.00	4.98	0.03	0.00	0.00	Open	0
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-413.55	2.64	7.78	4.85	Open	0
186		P-281	J-273	J-318	92.23	6.00	110.00	-5.20	0.06	0.00	0.01	Open	0
187		P-282	J-273	J-328	16.64	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
188		P-283	J84	J13-1H	9.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
189		P-284	J-204	J13-5H	23.10	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
190		P-285	J90	J-280	45.86	6.00	110.00	-10.18	0.12	0.00	0.02	Open	0
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
192		P-287	J-279	J-280	228.10	6.00	110.00	20.36	0.23	0.02	0.07	Open	0
193		P-288	J-280	J-304	71.58	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
194		P-289	J-276	J-339	107.48	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
195		P-29	J-160	J-186	1,300.95	8.00	110.00	83.46	0.53	0.33	0.25	Open	0
196		P-290	J-276	J12-5H	29.81	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.05	0.51	0.06	0.32	Open	0
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.14	0.57	0.07	0.40	Open	0
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.32	0.68	0.00	0.57	Open	0
202		P-297	J-320	J-344	514.42	6.00	110.00	265.89	3.02	4.47	8.69	Open	0
203		P-298	J-393	J-350	383.14	6.00	110.00	283.28	3.21	3.74	9.77	Open	0
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
205		P-299J	J-299	J-380	394.60	6.00	110.00	20.36	0.23	0.03	0.07	Open	0
206		P-30	J-176	J-226	104.98	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
207		P-301	J-272	J-212	319.55	6.00	110.00	13.06	0.15	0.01	0.03	Open	0
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
209		P-304	J-288	J-378	74.49	6.00	110.00	53.78	0.61	0.03	0.45	Open	0
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
211		P-306	J-187	J-288	69.43	6.00	110.00	58.87	0.67	0.04	0.53	Open	0
212		P-307	J-202	J-309	159.54	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
213		P-308	J-321	J-320	62.24	6.00	110.00	270.98	3.07	0.56	9.00	Open	0
214		P-309	J-321	J-202	20.82	6.00	110.00	-276.07	3.13	0.19	9.32	Open	0
215		P-31	J-161	J-218	86.18	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
217		P-312	J-231	J-348	337.95	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
218		P-313	J-197	J-271	101.59	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
219		P-314	J-142	J-298	291.39	6.00	110.00	10.18	0.12	0.01	0.02	Open	0
220		P-315	J-142	J-115	10.29	6.00	110.00	-184.32	2.09	0.05	4.41	Open	0
221		P-316	J-298	J-283	161.88	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
224		P-319	J-117	J-305	201.95	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
225		P-32	J-161	J-160	312.38	8.00	110.00	-96.21	0.61	0.10	0.33	Open	0
226		P-320	J-151	J-327	128.04	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
227		P-321	J-181	J-333	75.58	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
228		P-322	J-264	J-330	180.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
229		P-323	J-249	J-264	162.11	8.00	110.00	25.45	0.16	0.00	0.03	Open	0
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.45	0.29	0.01	0.11	Open	0
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
232		P-326	J-296	J-297	17.70	6.00	110.00	20.36	0.23	0.00	0.08	Open	0
233		P-327	J-297	J-337	338.49	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
235		P-329	J-270	J-351	32.21	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
236		P-33	J-176	J20	183.58	12.00	110.00	-65.67	0.19	0.00	0.02	Open	0
237		P-330	J-266	J-313	206.46	6.00	110.00	-3.72	0.04	0.00	0.00	Open	0
238		P-331	J32	J-322	47.22	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
239		P-332	J-313	J-136	281.66	6.00	110.00	-15.91	0.18	0.01	0.05	Open	0
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
241		P-334	J-206	J-292	180.91	6.00	110.00	6.46	0.07	0.00	0.01	Open	0
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
243		P-336	J-292	J-266	321.44	6.00	110.00	1.37	0.02	0.00	0.00	Open	0
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
247		P-34	J-250	J-160	70.87	8.00	110.00	184.75	1.18	0.08	1.09	Open	0
248		P-340	J-287	J-206	239.33	6.00	110.00	20.23	0.23	0.02	0.07	Open	0
249		P-341	J-178	J-287	70.36	6.00	110.00	25.32	0.29	0.01	0.11	Open	0
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.54	0.35	0.01	0.16	Open	0
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
252		P-344	J-177	J-307	38.56	6.00	110.00	35.63	0.40	0.01	0.21	Open	0
253		P-345	J-330	J-331	66.36	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
255		P-347	J-111	J-284	43.43	6.00	110.00	59.84	0.68	0.02	0.55	Open	0
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
257		P-349	J-265	J-264	236.64	6.00	110.00	-10.18	0.12	0.00	0.02	Open	0
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
259		P-350	J-265	J-265A	252.43	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.09	0.06	0.00	0.01	Open	0
262		P-353	J-281	J-282	60.97	6.00	110.00	-39.96	0.45	0.02	0.26	Open	0
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
264		P-355	J-123	J50	205.02	6.00	110.00	-29.77	0.34	0.03	0.15	Open	0
265		P-356	J-297	J-270	92.80	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
266		P-357	J-285	J-306	386.52	6.00	110.00	49.66	0.56	0.15	0.39	Open	0
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
268		P-36	J-218	J-251	182.80	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
269		P-361	J-295	J-295A	196.76	6.00	110.00	162.16	1.84	0.68	3.48	Open	0
270		P-361A	J-295A	J-239	291.39	6.00	110.00	157.07	1.78	0.96	3.28	Open	0
271		P-362	J-336	J-334	237.69	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
272		P-363	J-336	J-345	166.85	6.00	110.00	168.25	1.91	0.62	3.72	Open	0
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
274		P-369	J-278	J-295	165.68	6.00	110.00	167.25	1.90	0.61	3.68	Open	0
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.09	0.06	0.00	0.02	Open	0
278		P-371	J-358	J64	110.10	8.00	110.00	-813.36	5.19	1.87	16.98	Open	0
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
280		P-374	J-350	J-153	30.43	6.00	110.00	278.19	3.16	0.29	9.45	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
284		P-378J	J-378	J-299	400.51	6.00	110.00	43.60	0.49	0.12	0.31	Open	0
285		P-379	J-119	J-359	917.88	8.00	110.00	80.83	0.52	0.22	0.24	Open	0
286		P-38	J-183	J-186	1,090.53	8.00	110.00	247.24	1.58	2.04	1.87	Open	0
287		P-380	J-119	J-359	917.88	8.00	110.00	80.83	0.52	0.22	0.24	Open	0
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
291		P-383	J-133	J-362	231.50	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
292		P-384	J-362	J-140	96.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
293		P-384J	J-380	J-384	257.09	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
295		P-386	J-209	J-364	299.67	8.00	110.00	276.16	1.76	0.69	2.30	Open	0
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
297		P-387	J-364	J-133	108.75	8.00	110.00	271.07	1.73	0.24	2.22	Open	0
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
299		P-389	J-366	J-293	1,219.68	6.00	110.00	208.97	2.37	6.79	5.56	Open	0
300		P-39	J-186	J-103	638.49	8.00	110.00	325.60	2.08	1.99	3.12	Open	0
301		P-390	J-315	J46	657.48	6.00	110.00	121.00	1.37	1.33	2.02	Open	0
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-109.54	1.24	2.09	1.68	Open	0
308		P-397J	J-396	J-397	453.13	6.00	110.00	-114.63	1.30	0.83	1.83	Open	0
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-119.72	0.76	0.56	0.49	Open	0
310		P-40	J-246	J-184	493.82	8.00	110.00	147.88	0.94	0.36	0.72	Open	0
311		P-401	J-363	J-278	74.61	6.00	110.00	172.34	1.96	0.29	3.89	Open	0
312		P-402	J-363	J-260	380.17	6.00	110.00	-331.14	3.76	4.96	13.05	Open	0
313		P-41	J-125	J-246	2,032.66	8.00	110.00	152.97	0.98	1.56	0.77	Open	0
314		P-42	J-217	J-220	115.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
315		P-43	J-165	J-144	67.95	8.00	110.00	1,151.22	7.35	2.20	32.30	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
316		P-44	J-258	J-256	36.00	8.00	110.00	66.18	0.42	0.01	0.16	Open	0
317		P-45	J-165	J-217	185.69	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
318		P-46	J-385	J-134	382.32	8.00	110.00	1,540.68	9.83	21.19	55.42	Open	0
319		P-47	J-224	J-247	550.17	8.00	110.00	291.44	1.86	1.40	2.54	Open	0
320		P-48	J-234	J-235	281.08	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
321		P-49	J-166	J-169	217.82	8.00	110.00	10.19	0.07	0.00	0.00	Open	0
322		P-50	J-155	J-137	552.95	8.00	110.00	-998.41	6.37	13.72	24.82	Open	0
323		P-51	J-193	J-216	158.25	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
325		P-57	J-180	J-223	228.41	8.00	110.00	45.82	0.29	0.02	0.08	Open	0
326		P-58	J-179	J-180	323.33	8.00	110.00	50.91	0.32	0.03	0.10	Open	0
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
328		P-60	J-256	J-179	14.41	8.00	110.00	56.00	0.36	0.00	0.12	Open	0
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
331		P-63	J-223	J-248	240.64	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
335		P-65	J-166	J-167	246.95	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
336		P-66	J-167	J-234	19.76	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
338		P-68	J-230	J-229	495.46	8.00	110.00	1,385.55	8.84	22.56	45.53	Open	0
339		P-69	J-138	J-182	296.96	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
340		P-7	J-125	J-126	564.55	10.00	110.00	5.09	0.02	0.00	0.00	Open	0
341		P-70	J-137	J-138	14.05	8.00	110.00	-1,003.50	6.41	0.35	25.05	Open	0
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
343		P-72	J-229	J-156	144.82	8.00	110.00	1,044.22	6.67	3.91	26.96	Open	0
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
345		P-74	J52	J-156	373.92	8.00	110.00	-1,039.13	6.63	9.99	26.72	Open	0
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
349		P-78	J-208	J-230	233.19	8.00	110.00	1,390.64	8.88	10.69	45.84	Open	0
350		P-79	J-224	J-208	89.11	8.00	110.00	-296.53	1.89	0.23	2.62	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
351		P-8	J-112	J-113	234.36	10.00	110.00	-353.20	1.44	0.29	1.22	Open	0
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
353		P-81	J-134	J-139	284.76	8.00	110.00	1,791.40	11.43	20.86	73.27	Open	0
354		P-82	J-139	J-219	479.01	8.00	110.00	1,171.58	7.48	15.99	33.37	Open	0
355		P-83	J-219	J-165	142.35	8.00	110.00	1,166.49	7.45	4.71	33.10	Open	0
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
358		P-86	J-171	J-159	363.43	8.00	110.00	30.55	0.19	0.01	0.04	Open	0
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.45	0.16	0.00	0.03	Open	0
360		P-87	J-171	J-139	276.80	8.00	110.00	-614.73	3.92	2.80	10.11	Open	0
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
363		P-9	J-113	J-104	183.55	10.00	110.00	-368.47	1.51	0.24	1.32	Open	0
364		P-90	J-133	J-134	116.30	8.00	110.00	255.80	1.63	0.23	1.99	Open	0
365		P-93	J-209	J-247	44.60	8.00	110.00	-286.34	1.83	0.11	2.46	Open	0
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
367		P-95	J-221	J-162	263.63	8.00	110.00	568.91	3.63	2.31	8.76	Open	0
368		P-96	J-163	J-162	264.20	8.00	110.00	-563.81	3.60	2.28	8.61	Open	0
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
370		P-98	J-172	J-163	39.90	8.00	110.00	-558.72	3.57	0.34	8.47	Open	0
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-808.27	5.16	1.41	16.78	Open	0
373		P-J106	J-252	J-106	417.04	8.00	110.00	375.38	2.40	1.69	4.05	Open	0
374		P-J286	J-363	J-286	10.63	6.00	110.00	153.71	1.74	0.03	3.17	Open	0
375		P-J335	J-335	J-286	287.42	6.00	110.00	-148.62	1.69	0.85	2.96	Open	0
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,238.03	20.67	10.37	219.31	Open	0
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,238.02	20.67	16.18	219.30	Open	0
393		P-TANK8B	J-208	J-385	277.35	8.00	110.00	-1,692.25	10.80	18.29	65.94	Open	0
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
395		P126	J-242	J-376	11.13	8.00	110.00	803.88	5.13	0.18	16.61	Open	0
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
397		P128	J-344	J-393	9.32	6.00	110.00	293.46	3.33	0.10	10.45	Open	0
398		P130	J10	J14	116.51	10.00	110.00	280.52	1.15	0.09	0.80	Open	0
399		P132	J14	M8-2H	217.35	8.00	110.00	80.64	0.51	0.05	0.23	Open	0
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	80.64	0.51	0.06	0.24	Open	0
401		P136	M8-3H	J16	275.97	8.00	110.00	80.64	0.51	0.06	0.24	Open	0
402		P138	J16	J12	16.19	10.00	110.00	270.34	1.10	0.01	0.74	Open	0
403		P140	J16	M8-4H	42.30	10.00	110.00	-194.80	0.80	0.02	0.41	Open	0
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-194.80	0.80	0.11	0.41	Open	0
405		P144	M8-5H	J14	116.30	10.00	110.00	-194.80	0.80	0.05	0.41	Open	0
406		P146	J12	J-102	126.72	10.00	110.00	265.25	1.08	0.09	0.72	Open	0
407		P148	J20	J22	6.79	12.00	110.00	-75.85	0.22	0.00	0.00	Open	0
408		P150	J22	J-161	73.04	8.00	110.00	-80.94	0.52	0.02	0.24	Open	0
409		P152	J-194	J24	40.99	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
410		P154	J26	J24	12.75	8.00	110.00	10.18	0.06	0.00	0.02	Open	0
411		P156	J32	J40	349.41	12.00	110.00	-3.08	0.01	0.00	0.00	Open	0
412		P158	J30	J28	652.66	12.00	110.00	-19.85	0.06	0.00	0.00	Open	0
413		P160	J-313	J32	17.72	6.00	110.00	7.10	0.08	0.00	0.01	Open	0
414		P162	J30	J-207	49.17	12.00	110.00	-1.73	0.00	0.00	0.00	Open	0
415		P164	J30	J36	31.14	12.00	110.00	3.23	0.01	0.00	0.00	Open	0
416		P166	J36	J-207	18.03	8.00	110.00	-1.86	0.01	0.00	0.00	Open	0
417		P168	J28	J34	44.56	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
418		P170	J20	J18	292.00	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open	0
422		P178	J44	J-236	15.32	8.00	110.00	-818.45	5.22	0.26	17.17	Open	0
423		P180	J42	J-190	51.62	8.00	110.00	-828.64	5.29	0.91	17.57	Open	0
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
425		P184	J48	J46	1,260.92	6.00	110.00	98.15	1.11	1.73	1.37	Open	0
426		P186	J46	J-366	444.59	6.00	110.00	214.06	2.43	2.59	5.82	Open	0
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
428		P190	J40	J38	318.75	12.00	110.00	-8.17	0.02	0.00	0.00	Open	0
429		P192	J38	J30	286.67	12.00	110.00	-13.26	0.04	0.00	0.00	Open	0
430		P194	J50	J-281	85.58	6.00	110.00	-34.87	0.40	0.02	0.20	Open	0
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
432		P198	J52	J54	266.38	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
433		P200	J54	J58	128.71	8.00	110.00	6.39	0.04	0.00	0.00	Open	0
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open	0
436		P206	J60	J56	280.60	8.00	110.00	-3.79	0.02	0.00	0.00	Open	0
437		P208	J56	J54	23.03	8.00	110.00	-8.88	0.06	0.00	0.00	Open	0
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
440		P214	J-138	J52	34.67	8.00	110.00	-1,013.68	6.47	0.88	25.52	Open	0
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
444		P222	J64	J44	294.57	8.00	110.00	-813.36	5.19	5.00	16.98	Open	0
445		P224	J-344	J-106	395.17	12.00	110.00	-32.66	0.09	0.00	0.01	Open	0
446		P226	J-106	J-104	393.05	12.00	110.00	337.63	0.96	0.18	0.46	Open	0
447		P228	J70	J-200	50.08	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
448		P230	J72	J70	21.65	8.00	110.00	8.65	0.06	0.00	0.01	Open	0
449		P232	J74	J-241	28.57	12.00	110.00	-11.89	0.03	0.00	0.00	Open	0
450		P234	J-201	J-204	2.96	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
451		P236	J84	J88	84.39	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
452		P238	J82	J70	45.95	12.00	110.00	26.99	0.08	0.00	0.01	Open	0
453		P240	J82	J80	156.42	12.00	110.00	-22.09	0.06	0.00	0.00	Open	0
454		P242	J74	J80	48.39	12.00	110.00	-3.74	0.01	0.00	0.00	Open	0
455		P244	J80	J78	60.00	12.00	110.00	-25.83	0.07	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
456		P246	J78	J84	490.51	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
457		P248	J72	J-318	236.32	6.00	110.00	1.89	0.02	0.00	0.00	Open	0
458		P250	J88	J86	49.28	12.00	110.00	4.90	0.01	0.00	0.00	Open	0
459		P252	J86	J82	141.57	12.00	110.00	4.90	0.01	0.00	0.00	Open	0
460		P254	J88	J-318	25.35	6.00	110.00	8.40	0.10	0.00	0.01	Open	0
461		P256	J78	J76	5.94	12.00	110.00	-39.13	0.11	0.00	0.00	Open	0
462		P258	J-170	J76	8.58	8.00	110.00	49.97	0.32	0.00	0.11	Open	0
463		P260	J94	J92	188.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
464		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
465		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
466		P266	J90	J-276	7.38	6.00	110.00	10.18	0.12	0.00	0.03	Open	0
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
468		P304A	J-378	J-347	26.13	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-994.23	6.35	4.53	24.62	Open	0

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP5	2,205.70	131.22	215.32	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP6	2,134.00	27.97	247.86	0.00	0.00	Closed	0.00	0.00	0.00
3		PUMP8	1,956.00	0.24	367.59	3,266.38	847.79	Open	1.00	34.06	0.00
4		TRANSF	2,629.54	7.57	27.89	0.00	0.00	Closed	0.00	0.00	0.00

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		EL-OBS-HILL-TANK	796.52	2,691.54	2,692.52	4.90	0.98
2		FAIRWAYTANK	1,034.35	2,679.54	2,690.56	34.44	11.02
3		OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

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		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		J-M12-6H	3,000.00	M12-8H	-59.44	2,466.35	1,243.40	1,541.25	M12-8H	10.66	2,628.15	1,243.39	1,243.39
2		J12-5H	3,000.00	J12-5H	-262.96	1,949.67	919.32	919.31	J12-5H	20.00	2,602.70	919.30	919.30
3		J12-6H	3,000.00	J12-6H	-297.37	1,862.71	907.94	907.93	J12-6H	20.00	2,595.16	907.92	907.92
4		J13-1H	3,000.00	K13-4H	-76.60	2,423.22	1,093.62	1,463.46	K13-4H	7.14	2,616.49	1,093.60	1,093.60
5		J13-2H	3,000.00	K13-4H	-76.60	2,423.22	1,093.63	1,111.16	K13-4H	19.46	2,644.92	1,093.61	1,093.61
6		J13-3H	3,000.00	J13-3H	-164.17	2,186.65	1,064.49	1,064.49	J13-3H	20.00	2,611.70	1,064.49	1,064.49
7		J13-4H	3,000.00	K13-4H	-76.62	2,423.18	1,093.53	1,207.24	K13-4H	16.40	2,637.86	1,093.51	1,093.51
8		J13-5H	3,000.00	K13-4H	-76.64	2,423.13	1,093.42	1,188.56	K13-4H	17.01	2,639.26	1,093.40	1,093.40
9		J13-6H	3,000.00	K13-4H	-76.15	2,424.25	1,095.91	1,372.34	K13-4H	10.72	2,624.74	1,095.89	1,095.89
10		J14-1H	3,000.00	K13-4H	-74.90	2,427.14	1,102.43	1,596.80	K13-4H	2.27	2,605.24	1,102.42	1,102.42
11		J7-1H	3,000.00	K7-7H	4.51	2,594.95	2,347.73	2,605.71	K7-7H	14.27	2,617.47	2,347.56	2,347.56
12		J7-2H	3,000.00	K7-7H	1.70	2,588.47	2,267.39	2,416.15	K7-7H	16.65	2,622.96	2,267.16	2,267.16
13		K10-2H	3,000.00	M9-1H	27.11	2,666.12	3,694.79	4,265.82	M9-1H	12.96	2,633.45	3,694.47	3,694.47
14		K12-1H	3,000.00	K12-1H	-94.00	2,308.05	1,639.75	1,639.07	K12-1H	20.00	2,571.16	1,639.07	1,639.07
15		K13-1H	3,000.00	K13-1H	-220.52	2,030.07	1,134.67	1,134.06	K13-1H	20.00	2,585.16	1,134.06	1,134.06
16		K13-2H	3,000.00	K13-4H	-54.24	2,474.81	1,246.98	1,286.06	K13-4H	18.91	2,643.65	1,246.97	1,246.97
17		K13-3H	3,000.00	K13-3H	-99.59	2,357.71	1,119.85	1,119.86	K13-3H	20.00	2,633.70	1,119.84	1,119.84
18		K13-4H	3,000.00	K13-4H	-83.70	2,406.82	1,058.14	1,058.10	K13-4H	20.00	2,646.16	1,058.09	1,058.09
19		K14-1H	3,000.00	K13-4H	-70.65	2,436.96	1,126.61	1,311.00	K13-4H	14.17	2,632.71	1,126.62	1,126.61
20		K14-6H	3,000.00	K14-6H	-249.09	1,956.13	1,073.73	1,074.25	K14-6H	20.00	2,577.16	1,074.24	1,073.73
21		K7-1H	3,000.00	K7-1H	-23.77	2,508.68	1,949.55	1,949.39	K7-1H	20.00	2,609.70	1,949.39	1,949.39
22		K7-2H	3,000.00	K7-7H	5.75	2,597.81	2,385.84	2,452.77	K7-7H	18.58	2,627.43	2,385.69	2,385.69
23		K7-3H	3,000.00	K7-3H	-61.74	2,401.05	1,709.35	1,709.20	K7-3H	20.00	2,589.70	1,709.19	1,709.19
24		K7-4H	3,000.00	L7-2H	10.41	2,577.57	2,676.91	2,994.39	L7-2H	10.59	2,577.97	2,676.89	2,676.89
25		K7-5H	3,000.00	K7-5H	-32.00	2,461.69	2,017.64	2,017.52	K7-5H	20.00	2,581.70	2,017.52	2,017.52
26		K7-6H	3,000.00	K7-6H	-28.10	2,509.69	1,809.97	1,809.75	K7-6H	20.00	2,620.70	1,809.75	1,809.75
27		K7-7H	3,000.00	K7-7H	-0.19	2,584.09	2,217.29	2,217.02	K7-7H	20.00	2,630.70	2,217.02	2,217.02
28		K7-8H	3,000.00	K7-8H	-53.07	2,398.05	1,889.34	1,889.29	K7-8H	20.00	2,566.70	1,889.28	1,889.28
29		K7-9H	3,000.00	K7-9H	-81.95	2,338.40	1,659.23	1,659.12	K7-9H	20.00	2,573.70	1,659.11	1,659.11
30		K8-1H	3,000.00	K8-1H	-85.73	2,311.69	1,718.99	1,718.94	K8-1H	20.00	2,555.70	1,718.95	1,718.95
31		K8-2H	3,000.00	K7-7H	14.14	2,617.16	2,699.23	2,885.34	K7-7H	16.44	2,622.47	2,699.22	2,699.22
32		L10-1H	3,000.00	M9-1H	27.26	2,666.46	3,712.66	4,162.81	M9-1H	14.55	2,637.11	3,712.37	3,712.37
33		L10-2H	3,000.00	M9-1H	27.14	2,666.17	3,699.04	3,915.41	M9-1H	17.46	2,643.83	3,698.70	3,698.70
34		L10-4H	3,000.00	L10-8H	-113.96	2,292.53	1,382.77	1,410.53	L10-8H	18.41	2,598.03	1,381.83	1,381.83
35		L10-5H	3,000.00	L10-8H	-59.57	2,418.07	1,696.81	1,766.62	L10-8H	16.73	2,594.16	1,696.10	1,696.10
36		L10-6H	3,000.00	M9-1H	26.08	2,663.73	3,569.64	4,258.57	M9-1H	11.14	2,629.24	3,569.33	3,569.33
37		L10-7H	3,000.00	M9-1H	26.74	2,665.26	3,650.34	4,157.84	M9-1H	13.75	2,635.27	3,650.01	3,650.01
38		L10-8H	3,000.00	L10-8H	-234.59	2,014.14	1,036.79	1,036.16	L10-8H	20.00	2,601.70	1,036.16	1,036.16
39		L11-1H	3,000.00	M9-1H	27.36	2,666.68	3,723.39	4,172.95	M9-1H	14.58	2,637.18	3,723.15	3,723.15
40		L11-2H	3,000.00	M9-1H	27.74	2,667.57	3,777.26	4,593.94	M9-1H	9.86	2,626.28	3,776.95	3,776.95
41		L11-3H	3,000.00	M9-1H	27.41	2,666.80	3,730.81	4,395.00	M9-1H	11.79	2,630.74	3,730.56	3,730.56
42		L11-4H	3,000.00	L11-4H	-136.48	2,222.01	1,434.00	1,434.24	L11-4H	20.00	2,583.16	1,434.24	1,434.00
43		L11-5H	3,000.00	L11-5H	-25.07	2,504.13	2,037.13	2,037.05	L11-5H	20.00	2,608.16	2,037.06	2,037.06
44		L11-6H	3,000.00	M9-1H	28.21	2,668.65	3,850.36	3,981.06	M9-1H	18.54	2,646.34	3,849.92	3,849.92

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
45	L12-3H	3,000.00	M12-5H	30.19	2,652.22	3,548.35	3,643.87	M12-5H	18.14	2,624.40	3,549.44	3,548.35
46	L12-4H	3,000.00	M9-1H	28.74	2,669.87	3,915.97	4,374.03	M9-1H	14.70	2,637.46	3,915.79	3,915.79
47	L12-6H	3,000.00	L12-6H	31.45	2,633.12	3,527.61	3,527.43	L12-6H	20.00	2,606.70	3,527.41	3,527.41
48	L12-7H	3,000.00	L12-8H	36.49	2,649.76	3,922.20	3,965.96	L12-8H	19.10	2,609.63	3,921.78	3,921.78
49	L12-8H	3,000.00	L12-8H	19.57	2,610.70	2,983.96	2,983.21	L12-8H	20.00	2,611.70	2,983.20	2,983.20
50	L13-10H	3,000.00	L13-10H	-149.41	2,191.18	1,340.79	1,340.49	L13-10H	20.00	2,582.16	1,340.49	1,340.49
51	L13-11H	3,000.00	M12-8H	28.65	2,669.65	3,942.23	5,075.82	M12-8H	7.53	2,620.91	3,944.12	3,942.23
52	L13-12H	3,000.00	L13-12H	34.10	2,633.69	3,726.90	3,727.06	L13-12H	20.00	2,601.16	3,727.04	3,726.90
53	L13-1H	3,000.00	K13-4H	11.99	2,627.67	2,508.48	3,234.76	K13-4H	7.68	2,617.73	2,508.22	2,508.22
54	L13-2H	3,000.00	K13-4H	0.78	2,601.80	2,082.01	3,014.27	K13-4H	0.44	2,601.01	2,082.54	2,082.01
55	L13-3H	3,000.00	K13-4H	15.00	2,634.62	2,665.39	3,258.28	K13-4H	10.79	2,624.91	2,665.24	2,665.24
56	L13-4H	3,000.00	M12-8H	12.09	2,631.45	2,509.85	3,187.87	M12-8H	8.75	2,623.73	2,510.07	2,509.85
57	L13-5H	3,000.00	M12-8H	18.61	2,646.50	2,896.45	4,033.12	M12-8H	2.74	2,609.86	2,896.46	2,896.45
58	L13-6H	3,000.00	K13-4H	10.77	2,624.86	2,452.33	3,023.52	K13-4H	10.34	2,623.87	2,451.91	2,451.91
59	L13-7H	3,000.00	M12-8H	25.64	2,662.71	3,536.84	3,954.08	M12-8H	15.16	2,638.53	3,537.29	3,536.84
60	L13-8H	3,000.00	L13-8H	3.03	2,554.53	2,524.02	2,524.07	L13-8H	20.00	2,593.70	2,524.06	2,524.02
61	L13-9H	3,000.00	K13-4H	14.14	2,632.63	2,617.56	2,810.63	K13-4H	17.13	2,639.53	2,617.36	2,617.36
62	L14-2H	3,000.00	L14-2H	-95.39	2,331.85	1,483.68	1,483.42	L14-2H	20.00	2,598.16	1,483.42	1,483.42
63	L14-3H	3,000.00	L14-3H	-21.61	2,515.13	1,997.81	1,997.86	L14-3H	20.00	2,611.16	1,997.87	1,997.81
64	L7-1H	3,000.00	L7-2H	-83.46	2,360.93	1,506.86	1,639.10	L7-2H	13.27	2,584.16	1,506.55	1,506.55
65	L7-2H	3,000.00	L7-2H	-178.24	2,142.18	1,140.57	1,140.09	L7-2H	20.00	2,599.70	1,140.09	1,140.09
66	L7-3H	3,000.00	K7-7H	4.92	2,595.88	2,360.51	2,710.91	K7-7H	12.13	2,612.52	2,360.35	2,360.35
67	L7-4H	3,000.00	K7-7H	6.20	2,598.85	2,400.87	2,554.84	K7-7H	16.71	2,623.11	2,400.73	2,400.73
68	L7-5H	3,000.00	L7-5H	1.19	2,573.27	2,354.26	2,354.15	L7-5H	20.00	2,616.70	2,354.14	2,354.14
69	L8-1H	3,000.00	L8-1H	28.48	2,631.27	3,448.21	3,448.21	L8-1H	20.00	2,611.70	3,448.20	3,448.20
70	L9-1H	3,000.00	M9-1H	23.08	2,656.81	3,257.45	3,587.07	M9-1H	15.66	2,639.67	3,257.42	3,257.42
71	M11-1H	3,000.00	M11-3H	26.12	2,679.82	3,689.56	4,464.47	M11-3H	11.34	2,645.71	3,689.67	3,689.56
72	M11-2H	3,000.00	M11-2H	19.50	2,628.54	2,976.90	2,976.85	M11-2H	20.00	2,629.70	2,976.85	2,976.85
73	M11-3H	3,000.00	M11-3H	-123.27	2,335.06	945.23	944.65	M11-3H	20.00	2,665.70	944.66	944.66
74	M11-4H	3,000.00	M11-3H	-27.57	2,555.91	1,551.58	2,034.45	M11-3H	6.95	2,635.58	1,550.27	1,550.27
75	M11-5H	3,000.00	M11-3H	11.80	2,646.77	2,383.68	2,879.87	M11-3H	13.44	2,650.55	2,383.30	2,383.30
76	M11-6H	3,000.00	M11-6H	-0.68	2,555.97	2,430.76	2,430.70	M11-6H	20.00	2,603.70	2,430.70	2,430.70
77	M12-1H	3,000.00	M12-1H	25.85	2,645.19	3,306.82	3,308.41	M12-1H	20.00	2,631.70	3,308.39	3,306.82
78	M12-2H	3,000.00	M12-8H	-33.77	2,525.59	1,474.91	1,757.56	M12-8H	12.43	2,632.22	1,474.18	1,474.18
79	M12-3H	3,000.00	M12-8H	-66.26	2,450.62	1,196.70	1,434.84	M12-8H	12.44	2,632.25	1,196.71	1,196.70
80	M12-4H	3,000.00	M12-4H	23.17	2,667.00	3,254.49	3,254.90	M12-4H	20.00	2,659.70	3,254.89	3,254.49
81	M12-5H	3,000.00	M12-5H	11.56	2,609.22	2,685.07	2,684.83	M12-5H	20.00	2,628.70	2,684.82	2,684.82
82	M12-6H	3,000.00	M12-8H	-59.44	2,466.35	1,243.39	1,495.39	M12-8H	12.23	2,631.75	1,243.39	1,243.39
83	M12-7H	3,000.00	M12-8H	-86.89	2,403.01	1,080.20	1,103.18	M12-8H	19.28	2,648.03	1,080.15	1,080.15
84	M12-8H	3,000.00	M12-8H	-113.26	2,342.15	970.07	970.12	M12-8H	20.00	2,649.70	970.12	970.07
85	M13-1H	3,000.00	M13-1H	30.62	2,630.22	3,506.97	3,508.49	M13-1H	20.00	2,605.70	3,508.50	3,506.97
86	M13-2H	3,000.00	M13-2H	23.95	2,627.80	3,169.84	3,169.78	M13-2H	20.00	2,618.70	3,169.80	3,169.80
87	M13-3H	3,000.00	M13-3H	7.69	2,576.28	2,601.83	2,601.86	M13-3H	20.00	2,604.70	2,601.86	2,601.83
88	M13-4H	3,000.00	M13-4H	-150.58	2,231.48	1,069.27	1,069.27	M13-4H	20.00	2,625.16	1,069.27	1,069.27

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
89		M13-5H	3,000.00	M12-8H	-6.27	2,589.07	1,908.46	2,303.43	M12-8H	11.61	2,630.33	1,908.96	1,908.46
90		M14-1H	3,000.00	M14-1H	-7.17	2,553.46	2,275.66	2,275.45	M14-1H	20.00	2,616.16	2,275.44	2,275.44
91		M14-2H	3,000.00	M14-2H	-0.11	2,563.74	2,443.95	2,442.11	M14-2H	20.00	2,610.16	2,442.10	2,442.10
92		M14-3H	3,000.00	M14-3H	-3.20	2,563.22	2,348.80	2,347.77	M14-3H	20.00	2,616.76	2,347.76	2,347.76
93		M6-1H	3,000.00	K7-7H	12.53	2,613.46	2,631.70	2,774.73	K7-7H	17.20	2,624.24	2,631.65	2,631.65
94		M7-1H	3,000.00	K7-7H	9.20	2,605.78	2,503.16	2,713.26	K7-7H	15.64	2,620.64	2,503.07	2,503.07
95		M7-2H	3,000.00	M7-2H	1.46	2,570.91	2,392.42	2,392.35	M7-2H	20.00	2,613.70	2,392.35	2,392.35
96		M8-1H	3,000.00	M8-1H	-25.58	2,522.49	1,809.51	1,809.22	M8-1H	20.00	2,627.70	1,809.21	1,809.21
97		M8-2H	3,000.00	M8-2H	25.32	2,650.43	3,397.79	3,399.19	M8-2H	20.00	2,638.16	3,399.20	3,397.79
98		M8-3H	3,000.00	M8-3H	24.64	2,649.36	3,342.40	3,343.72	M8-3H	20.00	2,638.66	3,343.72	3,342.40
99		M8-4H	3,000.00	O10-1H	24.18	2,683.33	3,736.17	4,258.31	O10-1H	16.63	2,665.91	3,736.13	3,736.13
100		M8-5H	3,000.00	O10-1H	24.35	2,683.74	3,768.57	4,003.09	O10-1H	18.50	2,670.23	3,768.37	3,768.37
101		M9-1H	3,000.00	M9-1H	11.14	2,629.25	2,489.42	2,489.29	M9-1H	20.00	2,649.70	2,489.29	2,489.29
102		N10-1H	3,000.00	N10-1H	-39.33	2,526.76	1,453.14	1,453.11	N10-1H	20.00	2,663.70	1,453.11	1,453.11
103		N11-1H	3,000.00	N11-1H	13.66	2,655.08	2,565.78	2,564.62	N11-1H	20.00	2,669.70	2,564.63	2,564.63
104		N11-2H	3,000.00	M11-3H	-38.77	2,530.07	1,449.96	1,467.68	M11-3H	19.55	2,664.65	1,449.91	1,449.91
105		N11-3H	3,000.00	M11-3H	-33.12	2,543.10	1,497.10	1,814.22	M11-3H	11.40	2,645.85	1,497.07	1,497.07
106		N12-1H	3,000.00	N11-1H	29.50	2,691.62	4,078.98	4,321.52	N11-1H	17.56	2,664.05	4,078.70	4,078.70
107		N13-1H	3,000.00	N13-1H	36.13	2,642.93	3,708.49	3,706.71	N13-1H	20.00	2,605.70	3,706.69	3,706.69
108		N13-2H	3,000.00	N13-2H	-106.63	2,349.45	1,298.29	1,298.28	N13-2H	20.00	2,641.70	1,298.28	1,298.28
109		N13-3H	3,000.00	O12-1H	-51.75	2,460.10	1,551.68	1,627.05	O12-1H	17.13	2,619.08	1,551.56	1,551.56
110		N14-1H	3,000.00	O12-1H	-49.03	2,466.37	1,579.05	1,781.17	O12-1H	12.41	2,608.17	1,578.22	1,578.22
111		N14-2H	3,000.00	N14-2H	-111.00	2,301.38	1,383.06	1,382.77	N14-2H	20.00	2,603.70	1,382.76	1,382.76
112		N14-3H	3,000.00	O12-1H	-71.98	2,413.41	1,408.14	1,573.00	O12-1H	12.60	2,608.62	1,407.48	1,407.48
113		N15-1H	3,000.00	N15-1H	-210.03	2,073.82	1,097.33	1,097.18	N15-1H	20.00	2,604.70	1,097.19	1,097.19
114		N15-2H	3,000.00	N15-2H	-115.49	2,290.00	1,367.85	1,367.56	N15-2H	20.00	2,602.70	1,367.55	1,367.55
115		N15-3H	3,000.00	N15-3H	-152.42	2,204.78	1,245.58	1,245.36	N15-3H	20.00	2,602.70	1,245.35	1,245.35
116		O10-1H	3,000.00	O10-1H	-108.92	2,376.16	707.49	707.59	O10-1H	20.00	2,673.70	707.59	707.49
117		O12-1H	3,000.00	O12-1H	-301.53	1,883.64	849.12	849.07	O12-1H	20.00	2,625.70	849.06	849.06
118		O13-1H	3,000.00	O12-1H	-113.30	2,318.05	1,222.98	1,615.73	O12-1H	-2.73	2,573.24	1,222.48	1,222.48
119		O13-2H	3,000.00	O12-1H	-113.30	2,318.05	1,222.98	1,352.45	O12-1H	12.87	2,609.25	1,222.47	1,222.47
120		O8-1H	3,000.00	O8-1H	-136.54	2,305.88	728.63	728.62	O8-1H	20.00	2,667.16	728.62	728.62
121		O9-1H	3,000.00	O9-1H	-132.05	2,322.25	657.02	656.97	O9-1H	20.00	2,673.16	656.98	656.98
122		P13-1H	3,000.00	O12-1H	-181.18	2,161.40	1,042.02	1,472.92	O12-1H	-12.10	2,551.62	1,041.81	1,041.81
123		P13-2H	3,000.00	O12-1H	-162.15	2,205.32	1,102.55	1,410.96	O12-1H	-1.44	2,576.21	1,102.35	1,102.35
124		P6-1H	3,000.00	P6-2H	-73.66	2,422.53	1,296.13	1,339.10	P6-2H	18.44	2,635.09	1,296.19	1,296.13
125		P6-2H	3,000.00	P6-2H	-200.10	2,130.73	882.95	883.15	P6-2H	20.00	2,638.70	883.15	882.95
126		Q10-1H	3,000.00	Q10-2H	-334.47	1,722.64	1,117.31	1,124.34	Q10-2H	19.18	2,538.80	1,117.31	1,117.31
127		Q10-2H	3,000.00	Q10-2H	-386.32	1,602.97	1,051.53	1,051.54	Q10-2H	20.00	2,540.70	1,051.54	1,051.53
128		Q10-3H	3,000.00	Q10-3H	-294.47	1,808.95	1,197.09	1,197.10	Q10-3H	20.00	2,534.70	1,197.10	1,197.09
129		Q11-1H	3,000.00	Q11-1H	-270.08	1,851.24	1,284.37	1,284.38	Q11-1H	20.00	2,520.70	1,284.38	1,284.37
130		R7-1H	3,000.00	P6-2H	-57.35	2,460.17	1,385.64	1,389.99	P6-2H	19.87	2,638.41	1,386.12	1,385.64
131		R9-1H	3,000.00	R9-1H	-341.72	1,710.89	1,090.01	1,090.90	R9-1H	20.00	2,545.70	1,090.89	1,090.01

High Zone 2015 MDD FF 4hr Pump 8 on Tanks 2690.56 - Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed	0
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-699.37	1.98	2.09	1.78	Open	0
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.23	0.23	0.00	0.04	Open	0
4		P-100	J-239	J-238	960.70	8.00	110.00	-104.60	0.67	0.37	0.38	Open	0
5		P-101	J-245	J-238	149.26	8.00	110.00	109.69	0.70	0.06	0.42	Open	0
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
7		P-103	J-233	J-158	215.33	8.00	110.00	102.59	0.65	0.08	0.37	Open	0
8		P-104	J-255	J-122	313.79	8.00	110.00	-14.50	0.09	0.00	0.01	Open	0
9		P-105	J-131	J-132	317.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
10		P-106	J-157	J-170	358.07	8.00	110.00	87.32	0.56	0.10	0.27	Open	0
11		P-108	J-168	J72	94.43	8.00	110.00	10.54	0.07	0.00	0.01	Open	0
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
13		P-110	J-199	J-200	69.96	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
14		P-113	J76	J-244	236.44	8.00	110.00	10.84	0.07	0.00	0.01	Open	0
15		P-114	J-244	J-131	21.10	12.00	110.00	5.75	0.02	0.00	0.00	Open	0
16		P-115	J-131	J-255	49.66	12.00	110.00	-4.43	0.01	0.00	0.00	Open	0
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
18		P-117	J-168	J74	39.57	12.00	110.00	-15.63	0.04	0.00	0.01	Open	0
19		P-118	J-168	J13-4H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
20		P-119	J-201	J-170	13.13	12.00	110.00	-32.26	0.09	0.00	0.00	Open	0
21		P-12	J-114	J-115	298.01	10.00	110.00	222.91	0.91	0.16	0.52	Open	0
22		P-120	J-241	J-201	47.80	8.00	110.00	-22.07	0.14	0.00	0.02	Open	0
23		P-121	J-158	J-157	92.45	8.00	110.00	97.50	0.62	0.03	0.34	Open	0
24		P-122	J-157	J-196	105.49	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
26		P-124	J-236	J42	42.81	8.00	110.00	-811.79	5.18	0.72	16.92	Open	0
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
28		P-127	J-211	J-181	330.78	8.00	110.00	-1,136.56	7.25	10.44	31.55	Open	0
29		P-128	J-212	J-190	143.39	8.00	110.00	1.83	0.01	0.00	0.00	Open	0
30		P-129	J-231	J-150	227.08	8.00	110.00	-30.68	0.20	0.01	0.04	Open	0
31		P-130	J-141	J-205	202.64	8.00	110.00	170.22	1.09	0.19	0.94	Open	0
32		P-131	J-115	J-205	245.54	8.00	110.00	179.06	1.14	0.25	1.03	Open	0
33		P-132	J-135	J-240	94.59	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
34		P-133	J-153	J-152	97.97	8.00	110.00	198.53	1.27	0.12	1.25	Open	0
35		P-134	J-192	J-191	110.45	8.00	110.00	178.17	1.14	0.11	1.02	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
36		P-135	J-191	J-213	168.15	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
37		P-136	J-233	J-191	22.28	8.00	110.00	-167.99	1.07	0.02	0.91	Open	0
38		P-137	J-129	J-192	239.03	8.00	110.00	183.26	1.17	0.26	1.07	Open	0
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
40		P-139	J-152	J-129	359.71	8.00	110.00	193.44	1.23	0.43	1.19	Open	0
41		P-14	J-124	J-112	235.96	10.00	110.00	-363.07	1.48	0.30	1.29	Open	0
42		P-140	J-129	J-130	160.33	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
44		P-142	J-174	J-202	125.70	8.00	110.00	288.67	1.84	0.31	2.49	Open	0
45		P-143	J-149	J-187	185.18	12.00	110.00	52.61	0.15	0.00	0.01	Open	0
46		P-144	J-153	J-149	224.22	12.00	110.00	57.70	0.16	0.00	0.02	Open	0
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
48		P-146	J-375	J-188	169.96	8.00	110.00	-15.41	0.10	0.00	0.01	Open	0
49		P-146A	J-187	J-375	20.98	8.00	110.00	-5.23	0.03	0.00	0.00	Open	0
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
51		P-148	J-188	J-231	56.77	8.00	110.00	-20.50	0.13	0.00	0.02	Open	0
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
54		P-150	J-185	J-115	140.14	8.00	110.00	151.82	0.97	0.11	0.76	Open	0
55		P-151	J-146	J-114	148.95	8.00	110.00	228.00	1.46	0.24	1.61	Open	0
56		P-152	J-252	J-146	340.09	8.00	110.00	424.42	2.71	1.73	5.09	Open	0
57		P-154	J-104	J-145	309.87	8.00	110.00	-29.33	0.19	0.01	0.04	Open	0
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
59		P-156	J-185	J-145	145.41	8.00	110.00	-156.91	1.00	0.12	0.81	Open	0
60		P-157	J-145	J-146	147.46	8.00	110.00	-191.33	1.22	0.17	1.16	Open	0
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
62		P-159	J-211	J-210	17.79	8.00	110.00	314.12	2.00	0.05	2.91	Open	0
63		P-16	J-118	J-117	237.90	10.00	110.00	-513.46	2.10	0.58	2.44	Open	0
64		P-160	J-242	J-211	220.05	8.00	110.00	-817.35	5.22	3.77	17.13	Open	0
65		P-164	J-197	J-174	100.44	8.00	110.00	293.76	1.87	0.26	2.57	Open	0
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
67		P-166	J-197	J-198	101.26	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
69		P-168	J-197	J-210	16.45	8.00	110.00	-309.03	1.97	0.05	2.83	Open	0
70		P-169	J-142	J-141	14.70	8.00	110.00	175.31	1.12	0.01	0.98	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
71		P-17	J-119	J-121	661.27	10.00	110.00	-697.07	2.85	2.84	4.30	Open	0
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
74		P-172	J-205	J-121	222.07	8.00	110.00	344.18	2.20	0.77	3.45	Open	0
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
77		P-175	J-243	J-118	25.00	8.00	110.00	158.16	1.01	0.02	0.81	Open	0
78		P-176	J-257	J-214	47.06	8.00	110.00	-122.31	0.78	0.02	0.51	Open	0
79		P-177	J-154	J-155	341.59	8.00	110.00	-988.26	6.31	8.32	24.35	Open	0
80		P-178	J-148	J-193	255.40	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
81		P-179	J-214	J-215	156.54	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
82		P-18	J-121	J-124	286.05	10.00	110.00	-357.98	1.46	0.36	1.25	Open	0
83		P-180	J-147	J-148	45.75	8.00	110.00	-137.58	0.88	0.03	0.63	Open	0
84		P-181	J-190	J-189	25.98	8.00	110.00	-820.14	5.23	0.45	17.24	Open	0
85		P-182	J-148	J-189	142.70	8.00	110.00	-152.85	0.98	0.11	0.77	Open	0
86		P-183	J-154	J-228	71.88	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
87		P-184	J-189	J-154	51.91	8.00	110.00	-978.08	6.24	1.24	23.89	Open	0
88		P-185	J-214	J-147	198.83	8.00	110.00	-132.49	0.85	0.12	0.59	Open	0
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
90		P-187	J-257	J-258	155.58	8.00	110.00	71.27	0.45	0.03	0.19	Open	0
91		P-188	J-151	J-257	23.86	8.00	110.00	-45.95	0.29	0.00	0.08	Open	0
92		P-189	J-150	J-151	8.98	8.00	110.00	-35.77	0.23	0.00	0.05	Open	0
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open	0
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
95		P-191	J-144	J-262	92.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
96		P-192	J-143	J-144	21.60	8.00	110.00	-1,151.83	7.35	0.70	32.34	Open	0
97		P-193	J-143	J-181	133.07	8.00	110.00	1,146.74	7.32	4.27	32.07	Open	0
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
99		P-195	J-116	J-227	1,151.95	8.00	110.00	135.63	0.87	0.71	0.62	Open	0
100		P-196	J28	J26	390.87	12.00	110.00	-27.25	0.08	0.00	0.00	Open	0
101		P-197	J-227	J-249	20.05	8.00	110.00	130.54	0.83	0.01	0.57	Open	0
102		P-198	J-249	J-254	108.97	8.00	110.00	100.00	0.64	0.04	0.35	Open	0
103		P-199	J-254	J-177	467.39	8.00	110.00	94.91	0.61	0.15	0.32	Open	0
104		P-20	J-117	J-119	128.15	10.00	110.00	-523.64	2.14	0.32	2.53	Open	0
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
107		P-202	J-136	J-178	684.02	8.00	110.00	-22.25	0.14	0.01	0.02	Open	0
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
109		P-204	J-177	J-178	21.41	8.00	110.00	54.19	0.35	0.00	0.10	Open	0
110		P-205	J-206	J-207	208.07	8.00	110.00	10.13	0.06	0.00	0.00	Open	0
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
112		P-207	J-250	J-116	974.28	8.00	110.00	-150.36	0.96	0.73	0.74	Open	0
113		P-208	J-175	J-176	367.24	12.00	110.00	-52.70	0.15	0.01	0.01	Open	0
114		P-209	J26	J-195	293.04	12.00	110.00	-42.52	0.12	0.00	0.01	Open	0
115		P-21	J-118	J-110	557.62	10.00	110.00	666.52	2.72	2.21	3.96	Open	0
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
117		P-211	J-195	J-175	305.36	12.00	110.00	-47.61	0.14	0.00	0.01	Open	0
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
120		P-214	J-260	J-229	46.84	8.00	110.00	-340.29	2.17	0.16	3.38	Open	0
121		P-215	J-113	J-135	11.43	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
122		P-216	J-293	J-294	1,100.07	6.00	110.00	207.94	2.36	6.06	5.51	Open	0
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.09	0.06	0.01	0.01	Open	0
125		P-219	J-310	J-336	710.86	6.00	110.00	187.57	2.13	3.24	4.56	Open	0
126		P-22	J-110	J-111	241.32	10.00	110.00	370.35	1.51	0.32	1.33	Open	0
127		P-220	J-310	J-311	189.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
128		P-221	J-294	J-310	50.46	6.00	110.00	202.84	2.30	0.27	5.26	Open	0
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
131		P-223	J-311	J-332	149.01	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
134		P-226	J-345	J-125	1,043.90	6.00	110.00	167.21	1.90	3.84	3.68	Open	0
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
136		P-23	J-110	J-116	126.11	10.00	110.00	291.08	1.19	0.11	0.85	Open	0
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
138		P-231	J-284	J-285	570.74	6.00	110.00	55.83	0.63	0.28	0.48	Open	0
139		P-232	J-306	J-250	165.38	6.00	110.00	45.65	0.52	0.05	0.33	Open	0
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
142		P-238	J-289	J-342	25.70	6.00	110.00	15.27	0.17	0.00	0.04	Open	0
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
144		P-24	J10	J-111	680.53	10.00	110.00	-304.34	1.24	0.63	0.93	Open	0
145		P-241	J-261	J-267	413.65	6.00	110.00	-556.93	6.32	14.14	34.18	Open	0
146		P-242	J-230	N13-2H	414.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
147		P-243-359	J-359	J-243	751.40	8.00	110.00	163.25	1.04	0.65	0.87	Open	0
148		P-244	J-234	J-303	166.84	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
149		P-245	J-256	J-319	245.42	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
151		P-247	J-325	J-171	56.56	6.00	110.00	-587.47	6.67	2.13	37.73	Open	0
152		P-248	J-325	J-221	438.70	6.00	110.00	582.38	6.61	16.29	37.13	Open	0
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open	0
155		P-250	J-267	J-172	141.60	6.00	110.00	-562.02	6.38	4.92	34.76	Open	0
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
157		P-252	J-277	J-314	188.74	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
158		P-252J	J-376	J-252	18.85	8.00	110.00	807.17	5.15	0.32	16.73	Open	0
159		P-253	J-342	J-277	166.27	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
162		P-256	J48	J-302	810.53	6.00	110.00	-105.06	1.19	1.26	1.56	Open	0
163		P-257	J-261	J-317	748.38	6.00	110.00	131.36	1.49	1.76	2.36	Open	0
164		P-258	J-317	J-324	236.04	6.00	110.00	126.27	1.43	0.52	2.19	Open	0
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
167		P-260	J-302	J-315	743.33	6.00	110.00	128.34	1.46	1.68	2.26	Open	0
168		P-261	J-289	J-302	435.87	6.00	110.00	238.48	2.71	3.10	7.11	Open	0
169		P-263	J-239	J-289	143.17	6.00	110.00	258.84	2.94	1.18	8.27	Open	0
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
171		P-265	J-245	J-341	285.59	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
172		P-266	J-245	J-274	336.66	6.00	110.00	-119.87	1.36	0.67	1.99	Open	0
173		P-267	J-274	J-275	98.71	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
174		P-268	J-274	J-300	190.70	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
175		P-269	J-316	J-274	29.78	6.00	110.00	135.14	1.53	0.07	2.48	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
176		P-27	J-184	J-183	1,262.55	8.00	110.00	146.85	0.94	0.90	0.71	Open	0
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
178		P-271	J-316	J-335	200.25	6.00	110.00	-140.23	1.59	0.53	2.66	Open	0
179		P-272	J-335	J-338	749.12	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
180		P-272J	J-299	J-272	49.13	6.00	110.00	12.02	0.14	0.00	0.03	Open	0
181		P-276	J-200	J-279	215.50	6.00	110.00	25.46	0.29	0.02	0.11	Open	0
182		P-277	J-241	J-340	297.28	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
183		P-278	J13-2H	J86	130.09	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
184		P-279	J-255	J-273	210.37	8.00	110.00	4.98	0.03	0.00	0.00	Open	0
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-420.47	2.68	8.02	5.00	Open	0
186		P-281	J-273	J-318	92.23	6.00	110.00	-5.20	0.06	0.00	0.01	Open	0
187		P-282	J-273	J-328	16.64	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
188		P-283	J84	J13-1H	9.58	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
189		P-284	J-204	J13-5H	23.10	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
190		P-285	J90	J-280	45.86	6.00	110.00	-10.19	0.12	0.00	0.02	Open	0
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
192		P-287	J-279	J-280	228.10	6.00	110.00	20.37	0.23	0.02	0.07	Open	0
193		P-288	J-280	J-304	71.58	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
194		P-289	J-276	J-339	107.48	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
195		P-29	J-160	J-186	1,300.95	8.00	110.00	92.40	0.59	0.39	0.30	Open	0
196		P-290	J-276	J12-5H	29.81	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.05	0.51	0.06	0.32	Open	0
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.14	0.57	0.07	0.40	Open	0
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.32	0.68	0.00	0.57	Open	0
202		P-297	J-320	J-344	514.42	6.00	110.00	268.31	3.04	4.55	8.84	Open	0
203		P-298	J-393	J-350	383.14	6.00	110.00	266.41	3.02	3.34	8.72	Open	0
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
205		P-299J	J-299	J-380	394.60	6.00	110.00	20.36	0.23	0.03	0.07	Open	0
206		P-30	J-176	J-226	104.98	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
207		P-301	J-272	J-212	319.55	6.00	110.00	6.92	0.08	0.00	0.01	Open	0
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
209		P-304	J-288	J-378	74.49	6.00	110.00	47.66	0.54	0.03	0.36	Open	0
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
211		P-306	J-187	J-288	69.43	6.00	110.00	52.75	0.60	0.03	0.43	Open	0
212		P-307	J-202	J-309	159.54	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
213		P-308	J-321	J-320	62.24	6.00	110.00	273.40	3.10	0.57	9.15	Open	0
214		P-309	J-321	J-202	20.82	6.00	110.00	-278.49	3.16	0.20	9.47	Open	0
215		P-31	J-161	J-218	86.18	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
217		P-312	J-231	J-348	337.95	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
218		P-313	J-197	J-271	101.59	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
219		P-314	J-142	J-298	291.39	6.00	110.00	10.18	0.12	0.01	0.02	Open	0
220		P-315	J-142	J-115	10.29	6.00	110.00	-190.58	2.16	0.05	4.70	Open	0
221		P-316	J-298	J-283	161.88	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
224		P-319	J-117	J-305	201.95	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
225		P-32	J-161	J-160	312.38	8.00	110.00	-93.43	0.60	0.10	0.31	Open	0
226		P-320	J-151	J-327	128.04	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
227		P-321	J-181	J-333	75.58	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
228		P-322	J-264	J-330	180.35	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
229		P-323	J-249	J-264	162.11	8.00	110.00	25.45	0.16	0.00	0.03	Open	0
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.45	0.29	0.01	0.11	Open	0
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
232		P-326	J-296	J-297	17.70	6.00	110.00	20.36	0.23	0.00	0.08	Open	0
233		P-327	J-297	J-337	338.49	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
235		P-329	J-270	J-351	32.21	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
236		P-33	J-176	J20	183.58	12.00	110.00	-62.89	0.18	0.00	0.02	Open	0
237		P-330	J-266	J-313	206.46	6.00	110.00	-3.65	0.04	0.00	0.00	Open	0
238		P-331	J32	J-322	47.22	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
239		P-332	J-313	J-136	281.66	6.00	110.00	-17.16	0.19	0.02	0.05	Open	0
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
241		P-334	J-206	J-292	180.91	6.00	110.00	6.53	0.07	0.00	0.01	Open	0
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
243		P-336	J-292	J-266	321.44	6.00	110.00	1.44	0.02	0.00	0.00	Open	0
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
247		P-34	J-250	J-160	70.87	8.00	110.00	190.92	1.22	0.08	1.16	Open	0
248		P-340	J-287	J-206	239.33	6.00	110.00	21.76	0.25	0.02	0.08	Open	0
249		P-341	J-178	J-287	70.36	6.00	110.00	26.85	0.30	0.01	0.12	Open	0
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.54	0.35	0.01	0.16	Open	0
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
252		P-344	J-177	J-307	38.56	6.00	110.00	35.63	0.40	0.01	0.21	Open	0
253		P-345	J-330	J-331	66.36	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
255		P-347	J-111	J-284	43.43	6.00	110.00	60.92	0.69	0.02	0.57	Open	0
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
257		P-349	J-265	J-264	236.64	6.00	110.00	-10.18	0.12	0.00	0.02	Open	0
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
259		P-350	J-265	J-265A	252.43	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.09	0.06	0.00	0.01	Open	0
262		P-353	J-281	J-282	60.97	6.00	110.00	-39.96	0.45	0.02	0.26	Open	0
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
264		P-355	J-123	J50	205.02	6.00	110.00	-29.77	0.34	0.03	0.15	Open	0
265		P-356	J-297	J-270	92.80	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
266		P-357	J-285	J-306	386.52	6.00	110.00	50.74	0.58	0.16	0.40	Open	0
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
268		P-36	J-218	J-251	182.80	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
269		P-361	J-295	J-295A	196.76	6.00	110.00	164.43	1.87	0.70	3.57	Open	0
270		P-361A	J-295A	J-239	291.39	6.00	110.00	159.34	1.81	0.98	3.37	Open	0
271		P-362	J-336	J-334	237.69	6.00	110.00	10.18	0.12	0.00	0.02	Open	0
272		P-363	J-336	J-345	166.85	6.00	110.00	172.30	1.96	0.65	3.89	Open	0
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
274		P-369	J-278	J-295	165.68	6.00	110.00	169.52	1.92	0.63	3.78	Open	0
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
278		P-371	J-358	J64	110.10	8.00	110.00	-801.61	5.12	1.82	16.52	Open	0
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
280		P-374	J-350	J-153	30.43	6.00	110.00	261.32	2.97	0.26	8.42	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
284		P-378J	J-378	J-299	400.51	6.00	110.00	37.48	0.43	0.09	0.23	Open	0
285		P-379	J-119	J-359	917.88	8.00	110.00	84.17	0.54	0.23	0.25	Open	0
286		P-38	J-183	J-186	1,090.53	8.00	110.00	252.76	1.61	2.13	1.95	Open	0
287		P-380	J-119	J-359	917.88	8.00	110.00	84.17	0.54	0.23	0.25	Open	0
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
291		P-383	J-133	J-362	231.50	8.00	110.00	10.18	0.06	0.00	0.00	Open	0
292		P-384	J-362	J-140	96.16	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
293		P-384J	J-380	J-384	257.09	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
295		P-386	J-209	J-364	299.67	8.00	110.00	280.88	1.79	0.71	2.37	Open	0
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
297		P-387	J-364	J-133	108.75	8.00	110.00	275.79	1.76	0.25	2.29	Open	0
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
299		P-389	J-366	J-293	1,219.68	6.00	110.00	213.03	2.42	7.03	5.77	Open	0
300		P-39	J-186	J-103	638.49	8.00	110.00	340.07	2.17	2.16	3.38	Open	0
301		P-390	J-315	J46	657.48	6.00	110.00	123.25	1.40	1.38	2.09	Open	0
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-111.00	1.26	2.14	1.72	Open	0
308		P-397J	J-396	J-397	453.13	6.00	110.00	-116.09	1.32	0.85	1.87	Open	0
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-121.18	0.77	0.57	0.50	Open	0
310		P-40	J-246	J-184	493.82	8.00	110.00	151.94	0.97	0.38	0.76	Open	0
311		P-401	J-363	J-278	74.61	6.00	110.00	174.61	1.98	0.30	3.99	Open	0
312		P-402	J-363	J-260	380.17	6.00	110.00	-335.20	3.80	5.08	13.35	Open	0
313		P-41	J-125	J-246	2,032.66	8.00	110.00	157.03	1.00	1.64	0.81	Open	0
314		P-42	J-217	J-220	115.87	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
315		P-43	J-165	J-144	67.95	8.00	110.00	1,162.01	7.42	2.23	32.87	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
316		P-44	J-258	J-256	36.00	8.00	110.00	66.18	0.42	0.01	0.16	Open	0
317		P-45	J-165	J-217	185.69	8.00	110.00	10.18	0.06	0.00	0.01	Open	0
318		P-46	J-385	J-134	382.32	8.00	110.00	1,555.13	9.93	21.56	56.39	Open	0
319		P-47	J-224	J-247	550.17	8.00	110.00	296.15	1.89	1.44	2.61	Open	0
320		P-48	J-234	J-235	281.08	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
321		P-49	J-166	J-169	217.82	8.00	110.00	10.18	0.07	0.00	0.01	Open	0
322		P-50	J-155	J-137	552.95	8.00	110.00	-1,003.53	6.41	13.85	25.05	Open	0
323		P-51	J-193	J-216	158.25	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
325		P-57	J-180	J-223	228.41	8.00	110.00	45.82	0.29	0.02	0.08	Open	0
326		P-58	J-179	J-180	323.33	8.00	110.00	50.91	0.32	0.03	0.10	Open	0
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
328		P-60	J-256	J-179	14.41	8.00	110.00	56.00	0.36	0.00	0.12	Open	0
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
331		P-63	J-223	J-248	240.64	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
335		P-65	J-166	J-167	246.95	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
336		P-66	J-167	J-234	19.76	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
338		P-68	J-230	J-229	495.46	8.00	110.00	1,394.73	8.90	22.84	46.09	Open	0
339		P-69	J-138	J-182	296.96	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
340		P-7	J-125	J-126	564.55	10.00	110.00	5.09	0.02	0.00	0.00	Open	0
341		P-70	J-137	J-138	14.05	8.00	110.00	-1,008.62	6.44	0.36	25.29	Open	0
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
343		P-72	J-229	J-156	144.82	8.00	110.00	1,049.35	6.70	3.94	27.21	Open	0
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
345		P-74	J52	J-156	373.92	8.00	110.00	-1,044.25	6.67	10.08	26.97	Open	0
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.09	0.03	0.00	0.00	Open	0
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
349		P-78	J-208	J-230	233.19	8.00	110.00	1,399.82	8.93	10.82	46.40	Open	0
350		P-79	J-224	J-208	89.11	8.00	110.00	-301.24	1.92	0.24	2.70	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
351		P-8	J-112	J-113	234.36	10.00	110.00	-368.16	1.50	0.31	1.32	Open	0
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
353		P-81	J-134	J-139	284.76	8.00	110.00	1,810.57	11.56	21.28	74.73	Open	0
354		P-82	J-139	J-219	479.01	8.00	110.00	1,182.37	7.55	16.26	33.94	Open	0
355		P-83	J-219	J-165	142.35	8.00	110.00	1,177.28	7.51	4.79	33.67	Open	0
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
358		P-86	J-171	J-159	363.43	8.00	110.00	30.55	0.19	0.01	0.04	Open	0
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.45	0.16	0.00	0.02	Open	0
360		P-87	J-171	J-139	276.80	8.00	110.00	-623.10	3.98	2.87	10.36	Open	0
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
363		P-9	J-113	J-104	183.55	10.00	110.00	-383.43	1.57	0.26	1.42	Open	0
364		P-90	J-133	J-134	116.30	8.00	110.00	260.52	1.66	0.24	2.06	Open	0
365		P-93	J-209	J-247	44.60	8.00	110.00	-291.06	1.86	0.11	2.53	Open	0
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
367		P-95	J-221	J-162	263.63	8.00	110.00	577.28	3.68	2.37	9.00	Open	0
368		P-96	J-163	J-162	264.20	8.00	110.00	-572.20	3.65	2.34	8.85	Open	0
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
370		P-98	J-172	J-163	39.90	8.00	110.00	-567.11	3.62	0.35	8.71	Open	0
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-796.52	5.08	1.38	16.33	Open	0
373		P-J106	J-252	J-106	417.04	8.00	110.00	377.66	2.41	1.71	4.10	Open	0
374		P-J286	J-363	J-286	10.63	6.00	110.00	155.50	1.76	0.03	3.21	Open	0
375		P-J335	J-335	J-286	287.42	6.00	110.00	-150.41	1.71	0.87	3.03	Open	0
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,266.38	20.85	10.54	222.88	Open	0
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,266.38	20.85	16.45	222.87	Open	0
393		P-TANK8B	J-208	J-385	277.35	8.00	110.00	-1,706.16	10.89	18.57	66.94	Open	0
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open	0
395		P126	J-242	J-376	11.13	8.00	110.00	812.26	5.18	0.19	16.93	Open	0
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.27	0.10	0.00	0.01	Open	0
397		P128	J-344	J-393	9.32	6.00	110.00	276.59	3.14	0.09	9.35	Open	0
398		P130	J10	J14	116.51	10.00	110.00	299.25	1.22	0.10	0.90	Open	0
399		P132	J14	M8-2H	217.35	8.00	110.00	86.12	0.55	0.06	0.27	Open	0
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	86.12	0.55	0.06	0.27	Open	0
401		P136	M8-3H	J16	275.97	8.00	110.00	86.12	0.55	0.07	0.27	Open	0
402		P138	J16	J12	16.19	10.00	110.00	289.07	1.18	0.01	0.84	Open	0
403		P140	J16	M8-4H	42.30	10.00	110.00	-208.04	0.85	0.02	0.46	Open	0
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-208.04	0.85	0.12	0.46	Open	0
405		P144	M8-5H	J14	116.30	10.00	110.00	-208.04	0.85	0.05	0.46	Open	0
406		P146	J12	J-102	126.72	10.00	110.00	283.98	1.16	0.10	0.81	Open	0
407		P148	J20	J22	6.79	12.00	110.00	-73.07	0.21	0.00	0.04	Open	0
408		P150	J22	J-161	73.04	8.00	110.00	-78.16	0.50	0.02	0.22	Open	0
409		P152	J-194	J24	40.99	8.00	110.00	-5.09	0.03	0.00	0.00	Open	0
410		P154	J26	J24	12.75	8.00	110.00	10.18	0.06	0.00	0.02	Open	0
411		P156	J32	J40	349.41	12.00	110.00	-1.75	0.00	0.00	0.00	Open	0
412		P158	J30	J28	652.66	12.00	110.00	-17.07	0.05	0.00	0.00	Open	0
413		P160	J-313	J32	17.72	6.00	110.00	8.43	0.10	0.00	0.01	Open	0
414		P162	J30	J-207	49.17	12.00	110.00	-2.84	0.01	0.00	0.00	Open	0
415		P164	J30	J36	31.14	12.00	110.00	2.89	0.01	0.00	0.00	Open	0
416		P166	J36	J-207	18.03	8.00	110.00	-2.20	0.01	0.00	0.00	Open	0
417		P168	J28	J34	44.56	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
418		P170	J20	J18	292.00	12.00	110.00	5.09	0.01	0.00	0.00	Open	0
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open	0
422		P178	J44	J-236	15.32	8.00	110.00	-806.70	5.15	0.26	16.72	Open	0
423		P180	J42	J-190	51.62	8.00	110.00	-816.88	5.21	0.88	17.11	Open	0
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
425		P184	J48	J46	1,260.92	6.00	110.00	99.97	1.13	1.79	1.42	Open	0
426		P186	J46	J-366	444.59	6.00	110.00	218.12	2.48	2.68	6.02	Open	0
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
428		P190	J40	J38	318.75	12.00	110.00	-6.85	0.02	0.00	0.00	Open	0
429		P192	J38	J30	286.67	12.00	110.00	-11.94	0.03	0.00	0.00	Open	0
430		P194	J50	J-281	85.58	6.00	110.00	-34.87	0.40	0.02	0.20	Open	0
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
432		P198	J52	J54	266.38	8.00	110.00	20.36	0.13	0.00	0.02	Open	0
433		P200	J54	J58	128.71	8.00	110.00	6.39	0.04	0.00	0.00	Open	0
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open	0
436		P206	J60	J56	280.60	8.00	110.00	-3.79	0.02	0.00	0.00	Open	0
437		P208	J56	J54	23.03	8.00	110.00	-8.88	0.06	0.00	0.00	Open	0
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
440		P214	J-138	J52	34.67	8.00	110.00	-1,018.80	6.50	0.89	25.76	Open	0
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
444		P222	J64	J44	294.57	8.00	110.00	-801.61	5.12	4.87	16.53	Open	0
445		P224	J-344	J-106	395.17	12.00	110.00	-13.38	0.04	0.00	0.00	Open	0
446		P226	J-106	J-104	393.05	12.00	110.00	359.19	1.02	0.20	0.52	Open	0
447		P228	J70	J-200	50.08	8.00	110.00	35.64	0.23	0.00	0.05	Open	0
448		P230	J72	J70	21.65	8.00	110.00	8.65	0.06	0.00	0.00	Open	0
449		P232	J74	J-241	28.57	12.00	110.00	-11.89	0.03	0.00	0.00	Open	0
450		P234	J-201	J-204	2.96	6.00	110.00	5.09	0.06	0.00	0.00	Open	0
451		P236	J84	J88	84.39	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
452		P238	J82	J70	45.95	12.00	110.00	26.99	0.08	0.00	0.01	Open	0
453		P240	J82	J80	156.42	12.00	110.00	-22.09	0.06	0.00	0.00	Open	0
454		P242	J74	J80	48.39	12.00	110.00	-3.74	0.01	0.00	0.00	Open	0
455		P244	J80	J78	60.00	12.00	110.00	-25.83	0.07	0.00	0.00	Open	0

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal
456		P246	J78	J84	490.51	12.00	110.00	13.30	0.04	0.00	0.00	Open	0
457		P248	J72	J-318	236.32	6.00	110.00	1.89	0.02	0.00	0.00	Open	0
458		P250	J88	J86	49.28	12.00	110.00	4.91	0.01	0.00	0.00	Open	0
459		P252	J86	J82	141.57	12.00	110.00	4.90	0.01	0.00	0.00	Open	0
460		P254	J88	J-318	25.35	6.00	110.00	8.40	0.10	0.00	0.02	Open	0
461		P256	J78	J76	5.94	12.00	110.00	-39.13	0.11	0.00	0.00	Open	0
462		P258	J-170	J76	8.58	8.00	110.00	49.97	0.32	0.00	0.09	Open	0
463		P260	J94	J92	188.06	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
464		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
465		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
466		P266	J90	J-276	7.38	6.00	110.00	10.18	0.12	0.00	0.00	Open	0
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
468		P304A	J-378	J-347	26.13	6.00	110.00	5.09	0.06	0.00	0.01	Open	0
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open	0
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-1,034.35	6.60	4.87	26.49	Open	0

APPENDIX D:

- Item 1 – Affidavit of Publication
- Item 2 – Water Board's Water System Plan Update Approval Letter
- Item 3 – DOH Metering Plan
- Item 4 – WSU Metering Plan March 2016

APPENDIX D

Item 1 – Affidavit of Publication

NEWS REVIEW PUBLISHING COMPANY
The Moscow-Pullman Daily News
P.O.Box 374
Lewiston, Idaho 83501
(208) 743-9411

RECEIVED
JUN 19 2015
FACILITIES SERVICES
WSU PULLMAN

LEGAL ADVERTISING INVOICE

Date: 06/16/2015
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Times 2
Lines 38
Tab. lines
$ 111.15

Sold To: WSU CAPITAL PLANNING & DEVELOPMENT 110 C
PO BOX 643611
PULLMAN WA 99164

PO#

NOTICE:This is a invoice of Purchase made by you. Statement will be rendered the first of the month
Please Retain This Invoice as Your Statement Will Refer to Invoice by No. Only.

111230

Public Notice
Washington State University
2015 Water System Plan Update

Notice is hereby given that Washington State University is soliciting public input and comment on its Conservation Program draft report which is found in Chapter 4.0 of the Draft WSU 2015 Water System Plan Update. WSU will host a public comment meeting in the WSU Commons Building located on the Pullman campus on the corner of Idaho and Columbia Streets on June 22, 2015 at 1:00 – 2:00 pm. Comments will be incorporated into the draft report.

WSU's conservation program for 2015-2020 is explained in 11 measures listed below:

- Source Meters
- Service Meters
- System Leak Detection and Repair
- Technical Studies
- Landscape Management
- Agricultural Management
- Upgrades to Plumbing Fixtures
- Reduction/Elimination of Cooling Water
- Education
- Clothes Washers
- Reclaimed Water

The draft Water Conservation Chapter 4.0 of the plan is available for review at Facilities Services in the Commons Building on the WSU Pullman Campus. Comments on the plan are due in writing by July 6th at 4:00 pm. Send comments to:

Jason Baerlocher, Project Manager
WSU Facilities Services, Commons Building
P.O. Box 643611
Pullman, WA 99164-3611

CAROL L. PETERSON
NOTARY PUBLIC
STATE OF IDAHO

AFFIDAVIT OF PUBLICATION

Karen J. Lewis, Legal Clerk
being first duly sworn, on oath deposes
and says: I am the printer of
Moscow-Pullman Daily News, a newspaper
of general circulation, published daily
except Sunday at Moscow, Latah County,
Idaho, in compliance with Sections 60-106,
60-107, and 60-108 of the Idaho Code and the
amendments thereto; and an official newspaper
for Whitman County, Washington as required
by R.C.W. 36.72.071 and other provisions of
the Revised Code of Washington and the
amendments thereto: that the notice of which the
annexed is a full, true and correct printed
copy was published in the regular and entire
issues of said newspaper and not in a
supplement thereto, upon the following dates:

June 9, 16, 2015

the same being the date designated for
the publication of said notice.

Karen J. Lewis

On this 17th day of June
in the year of 2015, before me, a Notary Public,
personally appeared Karen J. Lewis,
known or identified to me to be the person
whose name subscribed to the within instrument,
and being by me first duly sworn, declared that
the statements therein are true, and acknowledged
to me that he executed the same.

Carol L. Peterson
Notary Public for Idaho,
Residing at Lewiston, Idaho
My Commission Expires 9-1-2017

APPENDIX D

Item 2 – Water Board's Water System Plan Update Approval Letter

WASHINGTON STATE UNIVERSITY
Environmental Health & Safety
Risk Management

March 29, 2016

Brian Sayrs, Regional Planner
Washington State Department of Health
Office of Drinking Water
Eastern Regional Office
16201 E. Indiana Ave., Suite 1500
Spokane, WA 99216

Re: WSU Water Board Approval of 2015 Water System Plan Update

Dear Mr. Sayrs:

The WSU Water Board has officially approved the 2015 Washington State University Pullman Campus Water System Plan Update.

Please contact the WSU Water Board at 509-335-3041 if you have any further questions.

Sincerely,

Dan Costello
WSU Water Board Co-Chair

Dwight Hagihara
WSU Water Board Co-Chair

cc: Jason Baerlocher
Gene Patterson
Steve Potratz
Jason Sampson
Angela Taylor, Taylor Engineering

PO Box 641172, Pullman, WA 99164-1172
509-335-3041 • Fax: 509-335-4442 • ehs@wsu.edu • http://www.ehs.wsu.edu

APPENDIX D

Item 3 – DOH Metering Plan

WASHINGTON STATE UNIVERSITY

Environmental Health & Safety
Risk Management

July 16, 2012

Danielle Russell
Washington State Department of Health
Eastern Drinking Water Regional Operations
16201 East Indiana Ave., Suite 1500
Spokane Valley, WA 99216-2830

Re: Washington State University PWS ID # 93200Q - Service Meter Installation

Dear Ms. Russell:

Per Andres Cervantes sanitary survey letter dated October 13, 2011, enclosed is a map showing the total number of service meters necessary with the rationale used to determine the meter locations and schedule. The schedule for completing the service meter installation (contingent on available funding) is as follows:

Year	# Meters Installed
2015	45
2016	60
2017	78
Total	183

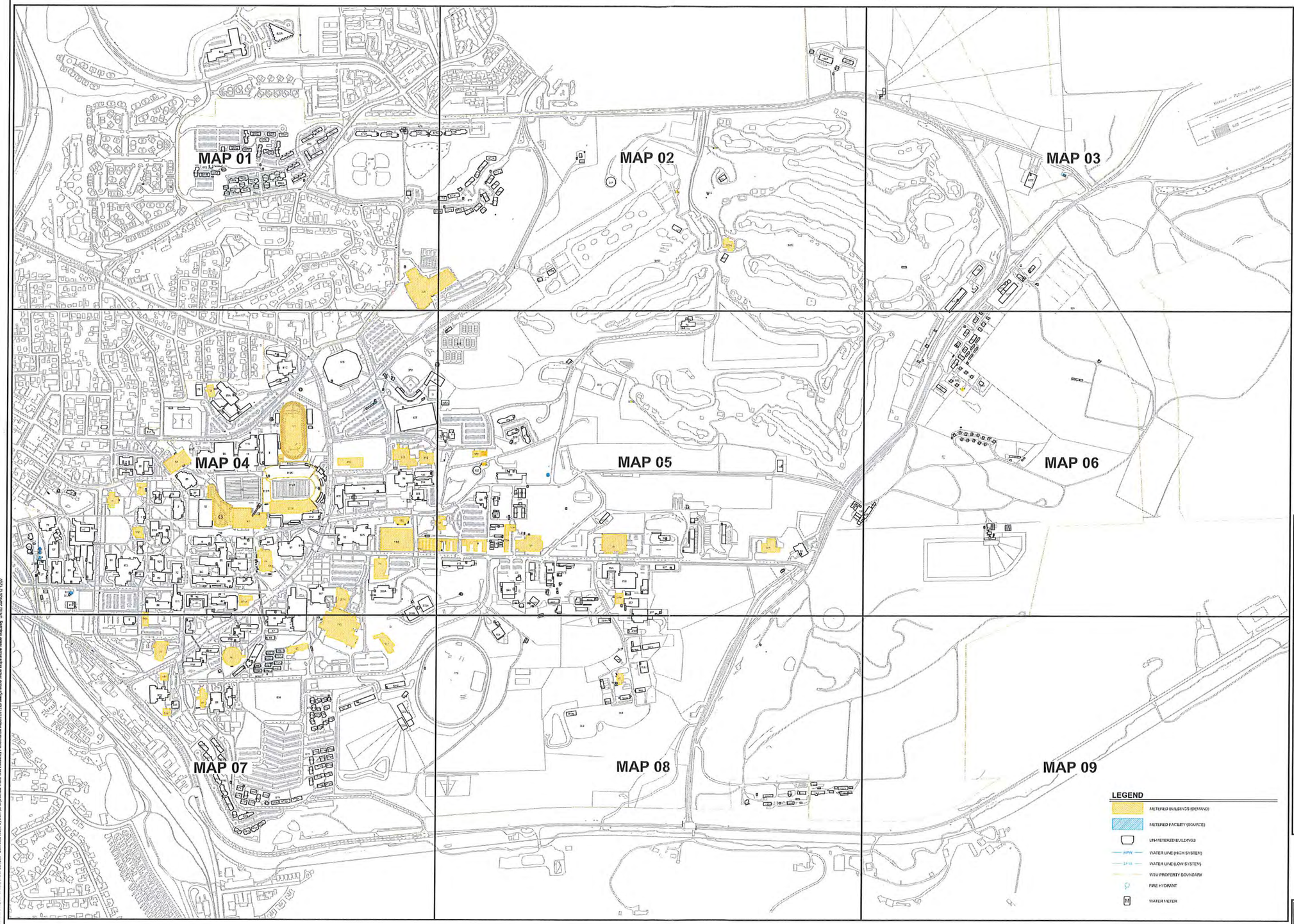
Please contact me at 509-335-5510 if you have any questions.

Sincerely

Gene Patterson
Public Health Manager

cc: Andres Cervantes, DOH
Rob Corcoran
Dwight Hagihara
Ben Kovanda
Marty O'Malley

PO Box 641172, Pullman, WA 99164-1172
509-335-3041 • Fax: 509-335-4442 • ehs@wsu.edu • http://www.ehs.wsu.edu



KEY PLAN
SCALE: N.T.S.

WASHINGTON STATE UNIVERSITY
Capital Planning and Development
PO Box 641211
Pullman, WA 99164-1211
PH 509-335-3971
FAX 509-335-8616

NO.	APPD.	DATE	REVISION DESCRIPTION

GC - DOMESTIC WATER
AREA-7/97
WATER METER LOCATION MAP
INDEX MAP

DESIGN	BTK
DRAWN	CJC
APP'D	
DATE	5-22-2012
F.F. NO.	WC14.OS
FILE NO.	797-

INDEX
SHEET 1 OF 10

FILE: N:\Projects_Bert\General Campus - 4700\General Campus - Domestic Water System (2012)\Annual Water Use Efficiency Performance Report-2012\Graphics\Water Meter Maps\Water Meter Mapping DATE: JUN/2012 12:27

SEE MAP 02

SEE MAP 04

MAP 01

SCALE: 1" = 100'

0 25 50 100 200 300

REV.	APPD.	DATE	REVISION DESCRIPTION

WASHINGTON STATE UNIVERSITY

Capital Planning and Development
Ph: 509/335-0201
Fax 509/335-8315
PO Box 641601
Pullman, WA 99164-1601

GC - DOMESTIC WATER

AREA - 767

WATER METER LOCATION MAP

MAP 01 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	5-22-2012
F.F. NO.	NONE/OS
FILE NO.	FEF-

MAP 1

SHEET 2 OF 10

FILE: N:\Projects_Brm\Gerwell Campus - 07900\Gerwell Campus - Domestic Water System (07677)\Annual Water Use Efficiency Performance Report\2012\Drawings\Winter Water Maps\Winter Meter Mitig.dwg DATE: JUN/2012 12:28

SEE MAP 01

SEE MAP 03

SEE MAP 05

MAP 02

SCALE: 1" = 100'

0 25 40 60 80 100 200 300

NO.	APPD.	DATE	REVISION DESCRIPTION

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2nd St. Maine Street
Pullman, WA 99164-3001

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FAX 509-335-8775

GC - DOMESTIC WATER

AREA - 787

WATER METER LOCATION MAP

MAP 02 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	5-22-2012
F.P. NO.	0704-04 OG
FILE NO.	787-

MAP 2

SHEET 3 OF 10

FILE: N:\Projects_Barn\Livestock Campus - 0788\General Campus - Domestic Water System (0787)\Annual Water Use Efficiency Performance Report\2012\Drawings\Water Meter Maps\Water Meter Map.dwg DATE: Jul/25/12 12:29

SEE MAP 02

Moscow – Pullman Airport

Airport Creek

SEE MAP 06

MAP 03

SCALE: 1" = 100'

0 25 40 50 100 200 400

FILE: N:\Projects_Env\General Campus - 07\00\General Campus - Domestic Water System (DTE)\Annual Water Use Efficiency Performance Report-2012\Drawings\Water Meter Map\Water Meter Map.dwg DATE: JUN/2012 12:29

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Capital Planning and Development
2245 Sam Parrish Lane
Pullman, WA 99164-3011

PH: 509-335-5577
FAX 509-335-8609

GC - DOMESTIC WATER

AREA - 707

WATER METER LOCATION MAP

MAP 03 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	5-22-2012
F.P. NO.	NONLOC0
FILE NO.	TEF.

MAP 3

SHEET 4 OF 10

SEE MAP 01

SEE MAP 05

SEE MAP 07

MAP 04

SCALE: 1" = 100'

0 25 50 75 100 200 300

REVISION DESCRIPTION	DATE	APPD.	REV.

WASHINGTON STATE UNIVERSITY

Central Plumbing and Development
Pullman, WA 99164-3011
P.O. Box 641011
PH: 509-335-0577
FAX 509-335-0578

GC - DOMESTIC WATER

AREA - 787

WATER METER LOCATION MAP

MAP 04 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	3-22-2012
F.P. NO.	NONE/OS
FILE NO.	787-

MAP 4

SHEET 5 OF 10

FILE: N:\Projects_Dept\Central Campus - 787\00\Central Campus - Domestic Water System (0787)\Annual Water Use Efficiency Performance Report\2012\Drawings\Water Meter Maps\Water Meter Map.dwg DATE: JUN/2012 12:40

SEE MAP 02

SEE MAP 04

SEE MAP 06

SEE MAP 08

MAP 05

SCALE: 1" = 100'

0 25 50 75 100 200 300

REV.	APPD.	DATE	REVISION DESCRIPTION

WASHINGTON STATE UNIVERSITY

Capital Planning and Development
P.O. Box 641211
Pullman, WA 99164-1211

PH 509-335-3291
FAX 509-335-8570

GC - DOMESTIC WATER

AREA - 707

WATER METER LOCATION MAP

MAP 05 LOCATIONS

DESIGN	BTK
DRAWN	CJO
APPD	
DATE	5-10-2012
F.P. NO.	NONLOG
FILE NO.	707-

MAP 5

SHEET 6 OF 10

FILE: N:\Networks, Bob\General Campus - 0700\General Campus - Domestic Water System (0707)\Annual Water Use Lit\Jenny Performance Report\2012\Drawings\Water Meter Maps\Water Meter Mapping DATE: JUN2012 1246

SEE MAP 03

SEE MAP 05

SEE MAP 09

MAP 06

SCALE: 1" = 100'

0 50 45 60 80 100 200 300

NO.	DATE	REVISION DESCRIPTION

WASHINGTON STATE UNIVERSITY

Capital Planning and Development
PO Box 641601
Pullman, WA 99164-1601

PH: 509-335-0371
FAX 509-335-3806

GC - DOMESTIC WATER

AREA - 197

WATER METER LOCATION MAP

MAP 06 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	5-22-2012
F.P. NO.	N0N4.00
FILE NO.	707-

MAP 6

SHEET 7 OF 10

FILE: N:\Projects_Bert\Grand Campus - 8785\Grand Campus - Domestic Water System (8787)\Annual Water Use Efficiency Performance Report\2012\Drawing\Water Meter Maps\Water Meter Mapping DATE: JUN/2012 12:42

SEE MAP 04

SEE MAP 08

REV.	APPD.	DATE	REVISION DESCRIPTION

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Capital Planning and Development
Stimson Hall, Suite 1
Pullman, WA 99164-3011

PH: 509-335-0371
FAX 509-335-8649

GC - DOMESTIC WATER

AREA - 707

WATER METER LOCATION MAP

MAP 07 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APPD	
DATE	5-22-2012
F.P. NO.	NONLOCI
FILE NO.	707-

MAP 7

SHEET 8 OF 10

MAP 07

SCALE: 1" = 100'

0 25 45 65 85 100 200 300

FILE: N:\Projects_Bew\General Campus - 9700\General Campus - Domestic Water System (0707)\Annual Water Use Efficiency Performance Report\2012\Drawings\Water Master Map\Water Meter Map.dwg DATE: JUN/07/12 12:41

SEE MAP 05

SEE MAP 07

SEE MAP 09

Paradise Creek

MAP 08

SCALE: 1" = 100'

0 25 50 75 100 200 300

NO.	REVISION DESCRIPTION	DATE	APPD.

WASHINGTON STATE UNIVERSITY

Capital Planning and Development
P.O. Box 641211
Pullman, WA 99164-1211

PH: 509.335.0237
FAX 509.335.8513

GC - DOMESTIC WATER

AREA - 707

WATER METER LOCATION MAP

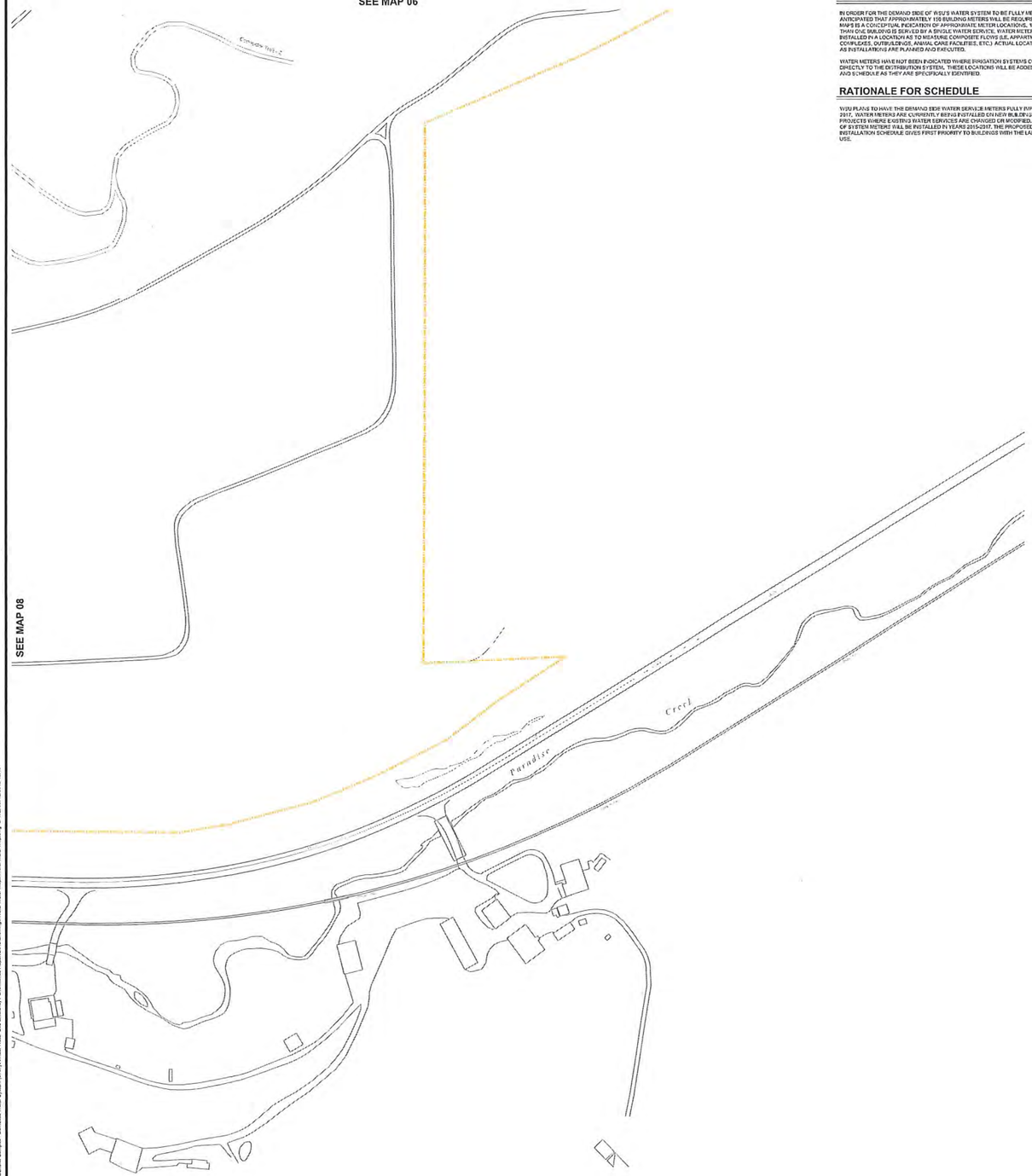
MAP 08 LOCATIONS

DESIGN	BTK
DRAWN	DJC
APPD	
DATE	5-22-2012
F.F. NO.	NON-LOG
FILE NO.	707-

MAP 8

SHEET 9 OF 10

FILE: N:\Grounds Env\General Campus - 2700\General Campus - Domestic Water System (8167)\Annual Water Use Efficiency Performance Report\2012\Drawings\Water Meter Maps\Water Meter Mapping DATE: Jul/0/2012 12:41



RATIONALE FOR METER LOCATION

IN ORDER FOR THE DEMAND SIDE OF WSU'S WATER SYSTEM TO BE FULLY METERED, IT IS ANTICIPATED THAT APPROXIMATELY 100 BUILDING METERS WILL BE REQUIRED. THIS SET OF MAPS IS A CONCEPTUAL INDICATION OF APPROXIMATE METER LOCATIONS. WHERE MORE THAN ONE BUILDING IS SERVED BY A SINGLE WATER SERVICE, WATER METERS WILL BE INSTALLED IN A LOCATION AS TO MEASURE COMPOSITE FLOWS (I.E. APPARTMENT COMPLEXES, OUTBUILDINGS, ANIMAL CARE FACILITIES, ETC.) ACTUAL LOCATIONS MAY VARY AS INSTALLATIONS ARE PLANNED AND EXECUTED.

WATER METERS HAVE NOT BEEN INDICATED WHERE IRRIGATION SYSTEMS CONNECT DIRECTLY TO THE DISTRIBUTION SYSTEM. THESE LOCATIONS WILL BE ADDED TO THE MAPS AND SCHEDULE AS THEY ARE SPECIFICALLY IDENTIFIED.

RATIONALE FOR SCHEDULE

WSU PLANS TO HAVE THE DEMAND SIDE WATER SERVICE METERS FULLY IMPLEMENTED IN 2017. WATER METERS ARE CURRENTLY BEING INSTALLED ON NEW BUILDINGS AND ON PROJECTS WHERE EXISTING WATER SERVICES ARE CHANGED OR MODIFIED. THE BALANCE OF SYSTEM METERS WILL BE INSTALLED IN YEARS 2015-2017. THE PROPOSED METER INSTALLATION SCHEDULE GIVES FIRST PRIORITY TO BUILDINGS WITH THE LARGEST WATER USE.

BUILDING NO.	BUILDING	PLANNED YEAR TO INSTALL METER (1)
32	ABELSON HALL	2015
186	AGRONOMY RESEARCH FACILITY	2017
115	AGRONOMY SEED HOUSE	2016
71	ALBROOK HYDRAULICS LABORATORY	2016
822	ALLEN CENTER FOR GLOBAL ANIMAL HEALTH	2017
0807A	ANIMAL DISEASE BIOTECHNOLOGY FACILITY	Existing
100	ANIMAL SCIENCE LABORATORY BUILDING	2016
0358E	ANTHROPOLOGY STORAGE BUILDING	2017
809	AVERY HALL	2016
372	BAILEY-BRAYTON FIELD	2017
0372B	BAILEY-BRAYTON FIELD SERVICES BUILDING	2017
806	BEASLEY COLISEUM	2015
146	BEEF CATTLE BREEDING BARN	2017
836	BIOTECHNOLOGY/LIFE SCIENCES FACILITY	Existing
11	BOHLER GYMNASIUM	2015
0011A	BOHLER GYMNASIUM ADDITION	2016
184	BOTANY FIELD STORAGE BUILDING	2017
2	BRYAN HALL	2016
807	BUSTAD HALL	2015
20	CARPENTER HALL	2015
0120F	CARVER FARM-FISH VIVARIA BUILDING	2017
0120C	CARVER FARM-STAUBER RAPTOR FACILITY	2017
0120I	CARVER FARM-STORAGE BUILDING	2017
144	CATTLE FEEDING LAB	2016
0143A	CATTLE FEEDING LAB - COMMODITY STORAGE	2017
145	CATTLE FEEDING LAB ANNEX	2017
0358A	CENTRAL RECEIVING	Existing
0360A	CENTRAL STORES - WAREHOUSE A	2016
0358C	CHEMICAL STORES BLDG	2017
0676A	CHIEF JOSEPH VILLAGE - BUILDING A	2016
0676B	CHIEF JOSEPH VILLAGE - BUILDING B	2016
0676C	CHIEF JOSEPH VILLAGE - BUILDING C	2016
0676E	CHIEF JOSEPH VILLAGE - BUILDING E	2016
0676F	CHIEF JOSEPH VILLAGE - BUILDING F	2017
813	CHILLED WATER PLANT	2017
0832A	CHILLED WATER STORAGE PUMPHOUSE	Existing
679	CHINOOK VILLAGE COMPLEX	2015
999	CITY OF PULLMAN - TRANSIT STATION	Existing
93	CLARK HALL	2015
86	CLEVELAND HALL	2015
27	COLLEGE AVENUE STEAM PLANT	2016
0027K	COLLEGE AVENUE STEAM PLANT ADDITION	2017
4	COLLEGE HALL	2016
0033A	COLLEGE OF COMMUNICATION ADDITION	2016
678	COLUMBIA VILLAGE COMPLEX	2016
5	COMMONS	2016
6	COMMUNITY HALL	2016
63	COMPTON UNION BUILDING	Existing
0358J	CONSOLIDATED STORAGE BUILDING	2017
91	COOPER PUBLICATIONS BUILDING	2016
353	CREAMERY ANNEX	2016
803	DAGGY HALL - ACADEMIC	2015
56	DANA HALL	2015
0358G	DEIONIZED WATER PRODUCTION FACILITY	2017
74	DODGEN RESEARCH FACILITY	2016
7	DUNCAN DUNN HALL	2016
850	EAST CAMPUS CHILLED WATER PLANT	Existing
0082A	EASTLICK HALL	2015
0026A	EDUCATION ADDITION	Existing
0078A	ELECTRICAL/MECHANICAL ENGINEERING BLDG	2015
46	ENGINEERING LABORATORY BUILDING	2016
58	ENGINEERING TEACHING/RESEARCH LAB BUILDING	2015
150	ENSMINGER PAVILION	Existing
111	ENTOMOLOGY GREENHOUSES	2017
0111A	ENTOMOLOGY GREENHOUSES-SHOP/STOR BLDG	2017
90	ENVIRONMENTAL HEALTH SERVICES BLDG	2017
0165E	EQUINE RESEARCH BARN	2017
814	EXPERIMENTAL ANIMAL LAB	2016
0103A	FARM SERVICES-SHOP	2016
362	FEED PREPARATION, MIXING AND STORAGE	2017
97	FINE ARTS CENTER - ACADEMIC	2015
816	FOOD SCIENCE/HUMAN NUTRITION BLDG (Phase 1)	Existing
816	FOOD SCIENCE/HUMAN NUTRITION BLDG (Phase 2)	Existing
69	FOOD SERVICE BUILDING	2015
92	FRENCH ADMINISTRATION BUILDING	2015
3	FULMER HALL	2015
79	GANNON-GOLDSWORTHY HALL	2015
700	GC - IRRIGATION	Existing
0358B	GENERAL STORAGE BLDG	2016
0358H	GLASS AND TRANSFORMER STORAGE BUILDING	2017
0079B	GOLDSWORTHY HALL	2016
0365L	GOLF COURSE-CART BARN	Existing
0365P	GOLF COURSE-NORTH RESTROOMS	Existing
0365Q	GOLF COURSE-SOUTH RESTROOMS	Existing
0141G	GOLF COURSE-TURF MAINTENANCE FACILITY	2017
840	GRAIES WAY STEAM PLANT	2016
80	HALL ROTUNDA	Existing
82	HEALD HALL	2015
173	HITCHCOCK EQUINE TRACK	2017
62	HOLLAND LIBRARY	2015
0003A	HOLLINGBERY ANNEX	2015
14	HONORS HALL	Existing
0124B	HORTICULTURE GREENHOUSE REPLACEMENT-EAST	2017
119	HORTICULTURE RESEARCH GREENHOUSE	2017
808	HULBERT HALL	2015
855	HYDROTHERAPY FACILITY	Existing
0617A	IBC GREENHOUSE	2017
817	IBC PLANT GROWTH FACILITY	2017
812	INFORMATION TECHNOLOGY BUILDING	2015
67	JEWETT OBSERVATORY	2017
76	JOHNSON HALL	2015
94	JOHNSON TOWER	2015
660	KAMIAK APARTMENT COMPLEX	2015
25	KIMBROUGH MUSIC BUILDING	2015
0039B	KRUEGEL HALL	2016
69	KRUEGEL-MCALLISTER HALL	2016
54	L.J. SMITH HALL	Existing
811	LABORATORY ANIMAL RESOURCES CENTER	Existing
138	LEWIS ALUMNI CENTRE	Existing
0092A	LIGHTY STUDENT SERVICES BUILDING	2015
356	MAINTENANCE MATERIALS STORAGE BUILDING	2017
0066N	MARKLEY SERVICES COMPLEX-GROUNDS OFFICE BLDG.	2017
0066D	MARKLEY SERVICES COMPLEX-GROUNDS SHOP	2017
0066G	MARKLEY SERVICES COMPLEX-GROUNDS STORAGE	2017
0066C	MARKLEY SERVICES COMPLEX-MOTOR POOL	2017
0066A	MARKLEY SERVICES COMPLEX-SVC GARAGE	2017
0066B	MARKLEY SERVICES COMPLEX-WAREHOUSE1	2017

BUILDING NO.	BUILDING	PLANNED YEAR TO INSTALL METER (1)
0812S	MARTIN STADIUM COMPLEX	Existing
0812B	MARTIN STADIUM-EAST STAND	2017
0812C	MARTIN STADIUM-NORTH STAND	2016
0812A	MARTIN STADIUM-SOUTH STAND	2017
16	MATH LEARNING ANNEX	2017
0085B	MCCLUSKEY SERVICES BLDG-SHOPS	2015
837	MCCLUSKEY SERVICES-SHOP ANNEX	2017
44	MCCOY HALL	2015
19	MCCROSKEY HALL	Existing
0805E	MCEACHERN RESIDENCE CENTER - EAST	2016
0805N	MCEACHERN RESIDENCE CENTER - NORTH	2016
0805S	MCEACHERN RESIDENCE CENTER - SOUTH	2017
98	MEATS LABORATORY	2017
999	MISC. CONSTRUCTION METERS	Existing
171	MOOBERRY TRACK	Existing
0171A	MOOBERRY TRACK SERVICE BUILDING	2017
24	MORRILL HALL	2016
999	MOSCOW PULLMAN AIRPORT - TERMINAL	Existing
999	MOSCOW PULLMAN AIRPORT - WATER TOWER	Existing
0033E	MURROW COMMUNICATIONS CENTER-EAST	2016
0033W	MURROW COMMUNICATIONS CENTER-WEST	2016
70	NEILL HALL	2016
0677A	NEZ PERCE VILLAGE - BUILDING A	2017
0677C	NEZ PERCE VILLAGE - BUILDING C	2016
0677E	NEZ PERCE VILLAGE - BUILDING E	2017
0677J	NEZ PERCE VILLAGE - BUILDING J	2016
0677M	NEZ PERCE VILLAGE - BUILDING M	2017
18	NORTHSIDE RESIDENCE HALL-PROPOSED	2017
42	OLYMPIA AVENUE STUDENT HOUSING	Existing
87	ORTON HALL	2015
810	OWEN SCIENCE & ENGINEERING LIBRARY	2015
0165E	PALOUSE RIDGE GOLF COURSE	Existing
0365H	PALOUSE RIDGE GOLF COURSE CLUBHOUSE	Existing
0081B	PERHAM HALL	2016
96	PHYSICAL EDUCATION BUILDING	2015
122	PLANT GROWTH CENTER	2016
114	PLANT SCIENCES GREENHOUSE	Existing
31	PRESIDENTS RESIDENCE	2017
0031A	PRESIDENTS RESIDENCE-STUDENT COTTAGE	2017
861	RECREATION CENTER RESTROOM FACILITY	2017
357	RECYCLING FACILITY	2017
0065B	REGENTS HILL-BARNARD HALL	2016
0065C	REGENTS HILL-MCGREGOR HALL	2016
0065A	REGENTS HILL-STEARNS HALL	2016
83	ROGERS HALL	Existing
84	SAFETY BUILDING	2016
72	SCOTT/COMAN	Existing
0501A	SHOCK PHYSICS BUILDING	Existing
167	SMALL ANIMAL HOLDING FACILITY	2017
95	SMITH CENTER FOR UNDERGRADUATE EDUCATION	Existing
12	SMITH GYMNASIUM	2015
833	SOUTH FAIRWAY PLAYFIELD	2017
0833A	SOUTH FAIRWAY PLAYFIELD-RESTROOM	2017
0180C	STEFFEN CENTER-BIOLOGICAL SCIENCES GREENHOUSE	2017
0180A	STEFFEN CENTER-OFFICE & SHOP	2017
0093C	STEPHENSON DINING HALL	2016
0093E	STEPHENSON EAST	2015
0093N	STEPHENSON NORTH	2015
0093S	STEPHENSON SOUTH	2015
665	STEPTOE VILLAGE COMPLEX	2015
34	STEVENS HALL	2016
35	STIMSON HALL	2016
0081A	STREIT HALL	2016
0081C	STREIT-PERHAM HALL	2016
64	STUDENT BOOKSTORE	Existing
819	STUDENT RECREATION CENTER	Existing
365	TENNIS CLUBHOUSE	2017
650	TERRACE APARTMENT COMPLEX	2015
0052A	TERRELL LIBRARY	Existing
57	THERMAL-FLUIDS RESEARCH BUILDING	2016
1	THOMPSON HALL	2016
55	TODD HALL	2015
0055A	TODD HALL ADDITION	2016
36	TROY HALL	2016
0121C	TUKEY HORT POST HARVEST HANDLING BUILDING	2017
121	TUKEY HORTICULTURE ORCHARD(SITE)	2017
0121B	TUKEY HORTICULTURE SUPPORT FACILITY	2017
0109A	USDA - PLANT INTRO. GREENHOUSE A	Existing
0114B	USDA AGRICULTURE RESEARCH CENTER BUILDING	Existing
109	USDA BUILDING	Existing
197	USDA Endo Disease Farm	2016
0198Q	USDA ISOLATION BLDG-Q	2017
136	USDA SCREENHOUSE 2	2016
0195A	USDA SOIL CONSERV SV-RESIDENCE	2017
0675A	VALLEY CREST VILLAGE - BUILDING A	2016
0675B	VALLEY CREST VILLAGE - BUILDING B	2017
0675C	VALLEY CREST VILLAGE - BUILDING C	2016
0675D	VALLEY CREST VILLAGE - BUILDING D	2017
0314A	VALLEY ROAD PLAYFIELD	2017
37	VAN DOREN HALL	2017
0165D	VET FEED LOT SHELTER	2017
169	VETERINARY ANIMAL HOLDING BARN	2017
0166A	VETERINARY FARM STORAGE	2017
0141K	VETERINARY FEEDING SHELTER 3	2017
0160A	VETERINARY LARGE ANIMAL BARN	2017
855	VETERINARY MEDICAL RESEARCH BUILDING (PROPOSED)	2017
0199B	VETERINARY QUARANTINE FACILITY-B	Existing
68	VETERINARY STORAGE BUILDING 68	2017
818	VETERINARY TEACHING HOSPITAL	Existing
39	WALKER HALL	2016
15	WASHINGTON BUILDING	Existing
0307A	WATER FLUORIDATION FACILITY 2 - S. OF COLISEUM	2017
0302A	WATER FLUORIDATION FACILITY 3 - N. CHILLER PLANT	2017
801	WEBSTER PHYSICAL SCIENCES BUILDING	2015
45	WEGNER HALL	2015
182	WILDLIFE BIOLOGY ANIMAL HOLDING FACILITY	2017
30	WILMER-DAVIS HALL	2015
40	WILSON-SHORT HALL	2015
88	WSU CHILDREN'S CENTER	2016
60	WSU INCINERATOR	Existing
680	YAKAMA VILLAGE COMPLEX	2015

(1) Installation of Planned Meters are subject to availability of funding. Actual order completed may vary, but for planned purposes, WSU's intent is to meter the largest buildings and largest water users first.

REV.	APPR.	DATE	REVISION DESCRIPTION

WASHINGTON STATE UNIVERSITY

Capital Planning and Development
P.O. Box 641237
Pullman, WA 99164-1237

PH 509-335-5671
FAX 509-335-8582

GC - DOMESTIC WATER
AREA - 787

WATER METER LOCATION MAP

MAP 09 LOCATIONS

DESIGN	BTK
DRAWN	CJC
APP'D	
DATE	5-22-2012
P.A. NO.	NONE-09
FILE NO.	787-

MAP 9

SHEET 10 OF 10

MAP 09
SCALE: 1" = 100'
0 50 100 200 300

FILE: N:\Projects\Land Grant Campus - 9789 Grant Campus - Domestic Water System (787)\Annual Water Use Efficiency Performance Report\2012\Drawings\Water Meter Maps\Water Meter Map.dwg DATE: Jul 12, 2012 12:48

APPENDIX D

Item 4 – WSU Metering Plan March 2016

WSU Pullman Water Metering Plan

FY16 $1.2 Million

1. The University determined that building 150 service meters are required to be fully metered, and comply with the Water Efficiency Rule. New additions to the facility roster since that determination was made have increased the target for compliance to 185 meters. The recent program for realigning the Pullman Airport runway, will take 25 facilities out of service permanently, reducing the total required meters to meet obligations at 160.
2. Total Facilities Services building service meters previously installed or in construction are 101.
3. Project completion: May 2016. This leaves a balance of 59 yet to be installed.
4. Cumulative meter installs for Facilities and Housing comprise 84% of the total square footage that have water services on campus.
5. Housing meter installations will be 100% complete by the end of 2016
6. Meters installed for irrigation provide 100% coverage of all irrigated acreage. This acreage totals approximately 255 acres. This includes:
   WSU Golf Course
   Eggert Organic Farm
   Tukey Orchard
   Playfields
7. General landscaping irrigation. Calsense irrigation controls comprise 137 individual zone controls with real time flow metering and monitoring. Incorporates analysis for stopping irrigation if heads are broken and monitors moisture levels. The irrigation project is considered complete.

17-19 Biennium meter projects: $1.0 Million

Facilities Services will implement two projects contingent upon available funding ($1million) to be completed in FY 18, completing the remaining 16% of meter coverage.

1. This project comprises 11 Building services. Project scope will include real time data acquisition through WSU Citect system. The buildings meters will be installed by contract.
2. 48 small vault type meter services. The smaller meters will be installed with university construction staff. They will be monitored via radio transmitter to a common collection point to determine real time flows.

At the completion of these efforts the university will have sufficient metering to meet the requirements of the metering mandate by the Washington Department of Health.

McCluskey Services Building, PO Box 641150, Pullman, WA 99164-1150
509-335-9000 • Fax: 509-335-9304

APPENDIX E:

- Item 1 – Reports of Examination
- Item 2 – Water Rights, Certificates, Permits and Claims
- Item 3 – WSU Memorandum Regarding Proposed Well No. 8
- Item 4 – Department of Ecology Water Rights Review Letter
- Item 5 – DOH Capacity Table

APPENDIX E

Item 1 – Reports of Examination

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

September 18, 2006

RECEIVED
SEP 2 0 2006
FACILITIES OPERATIONS

Washington State University
McCuskey Services Building
Pullman, WA 99164

Dear Sir or Madame:

Re: Applications for Change under Ground Water Certificate Nos. 5070-A, 5072-A, and G3-22065

Enclosed please find copies of the Department of Ecology's Reports of Examination. These reports constitute our determinations and orders regarding the above referenced applications for change.

Your applications for change have been approved and superseding certificates will be issued in accordance with the enclosed Reports of Examination. Because your project is complete and water has been put to full beneficial use, a proof examination of the project will not be required. However, you must fill out the enclosed Proof of Appropriation forms and send them to this office along with the fees requested within thirty (30) days. We can not accept cash; please send checks or money orders.

Upon receipt of the forms and statutory filing and recording fees of $50.00 payable to the Department of Ecology and $102.00 payable to the Whitman County Auditor, this office will issue final Superseding Certificates of Water Rights. Upon receipt of the fees, your Superseding Certificates of Water Rights will be prepared by Ecology, sent to the county auditor for recording, and then forwarded to you by the Auditor.

County Auditor's require a parcel number for the point of diversion/withdrawal (where your well or surface water diversion is located) and a parcel number for the property where the water is actually being used. In order to fulfill this requirement, please indicate the parcel numbers below and return to this office along with your fees. Parcel numbers can be found on your property tax statement.

You have the right to appeal this decision to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this action or decision, your notice of appeal must contain a copy of the Ecology order, action or decision you are appealing.

Your appeal must be filed with:

The Pollution Control Hearings Board
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
P.O. Box 40903
Lacey, Washington 98504-0903

Your appeal must also be served on:
The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, Washington 98504-7608

In addition, please send a copy of your appeal to:

Department of Ecology
Keith L. Stoffel, Section Manager
4601 North Monroe Street
Spokane, Washington 99205

Sincerely,

Keith L. Stoffel
Section Manager
Water Resources Program
Eastern Regional Office

KLS:ka
Enclosures

Parcel numbers:

_____ Point of diversion/withdrawal

_____ Place of use

I certify that I mailed this letter or an identical copy thereof, postage prepaid, to the above addressee(s) this 18th day of September 2006.
Water Resources Program, Secretary Lead, Kay Allhiser KA.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
May 27, 1963	6734	6373	5072-A

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	500	720

QUANTITY, TYPE OF USE, PERIOD OF USE
500 gallons per minute, 720 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Well #5

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In use

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as authorized under Water Right Certificate No. 5072-A. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Certificate 5072-A and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU (dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use was integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, but the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the university for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision: "less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year."

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Certificate

Ground Water Certificate 5072-A confirmed a right of 500 gallons per minute, 720 acre-feet per year for domestic supply and stockwater.

The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU qualifies for municipal supply under RCW 90.03.015. WSU is not using its full allocation of water. Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU. The inchoate water available is consistent with the municipal legislation (SHB 1338) passed that allows for certainty for growth into these inchoate quantities by municipal providers.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. Some of the source wells have failed and are no longer in use, but WSU has continued to exercise their right from other source wells.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Report Continued

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and the letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and Ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g)
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.htm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction: As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall be substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or

even by which people are asked. So, because WSDOE has an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to: 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200), and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right for beneficial use, nor will it impair existing rights or be detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Certificate 5070-A is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.

3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described by Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall bave access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka
W/DraftROEs/Brown2006

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 1, 1962	6405	6064	5070-A

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1500	2260

QUANTITY, TYPE OF USE, PERIOD OF USE
1500 gallons per minute, 2260 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Well #

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In use

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as authorized under Water Right Certificate No. 5070-A. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Certificate 5070-A and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU (dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use were integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, hut the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the university for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision: "less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year."

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Certificate

Ground Water Certificate 5070-A confirmed a right of 1500 gallons per minute, 2260 acre-feet per year for domestic supply.

The right is described as domestic supply. The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU qualifies for municipal supply under RCW 90.03.015. WSU is not using its full allocation of water. Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU. The inchoate water available is consistent with the municipal legislation (SHB 1338) passed that allows for certainty for growth into these inchoate quantities by municipal providers.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. Some of the source wells have failed and are no longer in use, but WSU has continued to exercise their right from other source wells.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and the letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and Ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g)
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.btm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record, not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction: As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100.

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and Preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall be substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or

even by which people are asked. So, because WSDOE has an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to: 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200), and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right for beneficial use, nor will it impair existing rights or he detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Certificate 5070-A is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.

3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described by Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka
W/DraftROEs/Brown2006

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
November 12, 1973	G3-22065	G3-22065	G3-22065C

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1500	1600

QUANTITY, TYPE OF USE, PERIOD OF USE
1500 gallons per minute, 1600 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Well #6

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In use

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as authorized under Water Right Certificate No. G3-22065C together with Report of Examination dated July 14, 1989. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Certificate G3-22065C together with Report of Examination dated July 14th, 1989 and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute

Report Continued

Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use were integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, but the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the university for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision: "less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year."

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Certificate

Ground Water Certificate G3-22065C together with Report of Examination dated July 14th, 1989 confirmed a right of 1500 gallons per minute, 1600 acre-feet per year for municipal supply.

The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU qualifies for municipal supply under RCW 90.03.015. WSU is not using its full allocation of water. Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU. The inchoate water available is consistent with the municipal legislation (SHB 1338) passed that allows for certainty for growth into these inchoate quantities by municipal providers.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. Some of the source wells have failed and are no longer in use, but WSU has continued to exercise their right from other source wells.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and the letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g)
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.htm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record, not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction: As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall he substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or

even by which people are asked. So, because WSDOE has an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200); and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right for beneficial use, nor will it impair existing rights or be detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Certificate G3-22065C together with Report of Examination dated July 14th, 1989 is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described by Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

This Report of Examination Supersedes the Report of Examination issued July 14, 1989.

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

September 18, 2006

RECEIVED
SEP 20 2006
FACILITIES OPERATIONS

Washington State University
McCuskey Services Building
Pullman, WA 99164

Dear Sir or Madame:

Re: Applications for Change under Ground Water Claim Nos. 098522 and 098523

Enclosed please find a copy of the Department of Ecology's Reports of Examination. These reports constitute our determinations and orders regarding the above referenced applications for change.

Your application for change has been approved and Certificates of Change will be issued in accordance with the enclosed Report of Examination. Because your project is complete and water has been put to full beneficial use, a proof examination of the project will not be required. However, you must fill out the enclosed Proof of Appropriation form and send it to this office within thirty (30) days.

You have the right to appeal this decision to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this action or decision, your notice of appeal must contain a copy of the Ecology order, action or decision you are appealing.

Your appeal must be filed with:
The Pollution Control Hearings Board
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
P.O. Box 40903
Lacey, Washington 98504-0903

Your appeal must also be served on:
The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, Washington 98504-7608

In addition, please send a copy of your appeal to:

Department of Ecology
Keith L. Stoffel, Section Manager
4601 North Monroe Street
Spokane, Washington 99205

Sincerely,

Keith L. Stoffel
Section Manager
Water Resources Program
Eastern Regional Office

KLS:ka
Enclosures

I certify that I mailed this letter or an identical copy thereof, postage prepaid, to the above addressee(s) this 18th day of September 2006.
Water Resources Program, Secretary Lead, Kay Allhiser KA.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
1934			Claim No. 098522

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	500	720

QUANTITY, TYPE OF USE, PERIOD OF USE
500 gallons per minute, 720 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Well #1

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In use

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as claimed under Water Right Claim No. 098522. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Claim 098522 and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU (dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU witbdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use were integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, but the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the school for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision -less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year.

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Claim

Ground Water Claim 098522 was filed by WSU during the claims registration act. The claim was submitted to Ecology describing the use of water from Well No. 1 in the amount of 500 gallons per minute, 720 acre-feet per year for municipal supply, irrigation and stockwater with the date of first use described as 1934. WSU maintains this vested right through continued water use.

The intent of the Claims Registration Act, Chapter 90.14 RCW, was to document those uses of surface water in existence prior to the adoption of the State Surface Water Code, Chapter 90.03 RCW, which was adopted in 1917, and those uses of ground water in existence prior to the adoption of the State Ground Water Code, Chapter 90.44 RCW, which was adopted in 1945. Since each code(s) adoption, the only means of acquiring a water right within the state is by filing for, and receiving, a permit from the Department of Ecology or one of its predecessors or by establishing a right under the "domestic exemption" under the ground water code (RCW 90.44.050). The Department of Ecology recognizes that the final determination of the validity and extent associated with a claim registered in accordance with RCW 90.14 ultimately lies with the Superior Court through the general adjudication process provided for by Sections 90.03.110 through 90.03.240 RCW.

WSU requests a change in point of withdrawal and to add additional points of withdrawal to reflect the current integrated system. It appears that the claim and associated quantities have been fully perfected by WSU for municipal supply purposes.

Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU.

The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU's water rights are for municipal supply purposes and are not subject to relinquishment under RCW 90.14.140 (2)(d).

WSU represents they did not abandon nor relinquish any of the municipal supply rights associated with the school. They continued to operate the municipal system from the wells that were operational and used water from these other sources. WSU has continued to express there water rights and claims in the manner described below.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and the letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and Ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g)
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.htm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction. As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall be substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or even by which people are asked. So, because WSDOE has an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200); and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized/claimed for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized/claimed to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right originally claimed for beneficial use, nor will it impair existing rights or be detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Claim 098522 is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described by Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

"Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka
W/DraftROEs/Brown2006

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
1938			Claim No.098523

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	500	720

QUANTITY, TYPE OF USE, PERIOD OF USE
500 gallons per minute, 720 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	In use

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as claimed under Water Right Claim No. 098523. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Claim 098523 and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU (dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use were integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, but the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the university for use in isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision "less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year."

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Claim

Ground Water Claim 098523 was filed by WSU during the claims registration act. The claim was submitted to Ecology describing the use of water from Well No. 2 in the amount of 500 gallons per minute, 720 acre-feet per year for municipal supply, irrigation and stockwater with the date of first use described as 1938. WSU maintains this vested right through continued water use.

The intent of the Claims Registration Act, Chapter 90.14 RCW, was to document those uses of surface water in existence prior to the adoption of the State Surface Water Code, Chapter 90.03 RCW, which was adopted in 1917, and those uses of ground water in existence prior to the adoption of the State Ground Water Code, Chapter 90.44 RCW, which was adopted in 1945. Since each code(s) adoption, the only means of acquiring a water right within the state is by filing for, and receiving, a permit from the Department of Ecology or one of its predecessors or by establishing a right under the "domestic exemption" under the ground water code (RCW 90.44.050). The Department of Ecology recognizes that the final determination of the validity and extent associated with a claim registered in accordance with RCW 90.14 ultimately lies with the Superior Court through the general adjudication process provided for by Sections 90.03.110 through 90.03.240 RCW.

WSU requests a change in point of withdrawal and to add additional points of withdrawal to reflect the current integrated system. It appears that the claim and associated quantities have been fully perfected by WSU for municipal supply purposes.

Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU.

The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU's water rights are for municipal supply purposes and are not subject to relinquishment under RCW 90.14.140 (2)(d).

WSU represents they did not abandon nor relinquish any of the municipal supply rights associated with the school. They continued to operate the municipal system from the wells that were operational and used water from these other sources. WSU has continued to express there water rights and claims in the manner described below.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the

vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and a letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g).
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual

aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.htm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record, not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction: As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100.

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall be substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or even by which people are asked. So, because WSDOE bas an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200); and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized/claimed for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized/claimed to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right originally claimed for beneficial use, nor will it impair existing rights or be detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Claim 098523 is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described by Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

Report Continued

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka
W/DraftROEs/Brown2006

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

September 18, 2006

RECEIVED
SEP 20 2006
FACILITIES OPERATIONS

Washington State University
McCuskey Services Building
Pullman, WA 99164

Dear Sir or Madam:

Re: Application for Change under Ground Water Permit No. G3-28278

Enclosed please find a copy of the Department of Ecology's Report of Examination. This report constitutes our determination and order regarding the above referenced application for change.

The examination report indicates that construction of your project has been completed. Under the development schedule contained in the Report of Examination, water is to be placed to full beneficial use by January 1, 2020.

Also enclosed is a Proof of Appropriation form which is to be sent to this office when the water has been put to full beneficial use. Please note the form requires your notarized signature.

You have the right to appeal this order to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this action or decision, your notice of appeal must contain a copy of the Ecology order, action or decision you are appealing.

Your appeal must be filed with:
The Pollution Control Hearings Board
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
P.O. Box 40903
Lacey, Washington 98504-0903

Your appeal must also be served on:
The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, Washington 98504-7608

In addition, please send a copy of your appeal to:

Department of Ecology
Keith L. Stoffel, Section Manager
4601 North Monroe Street
Spokane, Washington 99205

DATED this 18th day of September, 2006 at Spokane, Washington.

Keith L. Stoffel
Section Manager
Water Resources Program
Eastern Regional Office

KLS:KB:VL:ka
Enclosures

I certify that I mailed this letter or an identical copy thereof, postage prepaid, to the above addressee(s) this 18th day of September 2006.
Water Resources Program, Secretary Lead, Kay Allhiser KA.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
January 28, 1987	G3-28278	G3-28278	

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
7 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	2500	2260

QUANTITY, TYPE OF USE, PERIOD OF USE
2500 gallons per minute, 2260 acre-feet per year, continuously for municipal supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The place of use (POU) of this water right is the service area described in the most recent Water System Plan approved by the Washington State Department of Health, so long as the Washington State University is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Well #7

DESCRIPTION OF PROPOSED WORKS

7 wells and municipal distribution system

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	January 1, 2020

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as authorized under Water Right Permit No. G3-28278P. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.
A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Permit G3-28278P and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU (dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Three claims, three certificates, and one permit are appurtenant to the WSU campus. Seven wells have been used since 1938. One of the wells, No. 2, was decommissioned and is no longer in use. The remaining wells and water use were integrated into two systems over the years to meet the delivery, fire control and design needs of the campus. Well No. 8 was recently drilled and is ready for use. The campus water system is divided into high distribution and low distribution systems to meet pressure control and operational needs. Wells 5, 6, and 8 serve the high system and wells 1, 3, 4 and 7 serve the low system. The goal of the subject application(s) is to integrate all of the wells of the individual rights to operate as the system is currently designed. Two emergency interties are designed into the City of Pullman, but the university has not had to exercise the intertie system. The high distribution system has 2 old wells and one new well (#8). The low distribution system has 3 old wells and one new well (#7). The proposal is to have one new well on each system become the primary service well for that system. At this time if one of the old wells were out of service the system may not be able to meet the demand on the system.

Well No.	Instantaneous Capacity	System	Pump HP
1	500 GPM	Low	60
2	Decommissioned	Low	N/A
3	1000 GPM	Low	150
4	1000 GPM	Low	225
5	500 GPM	High	75
6	1500 GPM	High	250
7	2500 GPM	Low	450
8	2500 GPM	High	700

Water Use

A review of the water use data for the source wells on campus for the period of 1989 through 2004 indicated an annual use ranging between 1711 acre-feet per year to 1988 acre-feet per year. The maximum annual water use occurring in 1994. WSU provided a graph of the annual water use between 1989 and 2004 and indicated a decline in water use of 0.3 % during this period.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the school for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision: "less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year."

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Permit

Ground Water Permit G3-28278P authorized a use of 2500 gallons per minute, 2260 acre-feet per year for municipal supply. WSU has filed a Proof of Appropriation claiming the right has been put to beneficial use.

The existing water system for WSU is defined as a Group A Water System by Department of Health (DOH). The system qualifies as a "municipal water supplier" and serves water for "municipal water supply purposes" as defined under RCW 90.03.015. A new section was added to Chapter 90.03 RCW. The new section states the following: "When requested by a municipal water supplier or when processing a change or amendment to the right, the Department shall amend the water right documents and related records to ensure that water rights that are for municipal water supply purposes, as defined in Chapter 90.03.015 RCW, are correctly identified as being for municipal water supply purposes." All WSU campus water rights are for "municipal supply" and for "domestic supply" purposes which meet the criteria under RCW 90.03.015(4).

WSU qualifies for municipal supply under RCW 90.03.015. WSU is not using its full allocation of water. Water use data for WSU was provided by Gary Wells. In 1994 WSU used approximately 1988 acre-feet. WSU currently has water rights (including the claims) totaling 5300 acre-feet. Therefore, this leaves 3312 acre-feet of inchoate water available for future use by WSU. The inchoate water available is consistent with the municipal legislation (SHB 1338) passed that allows for certainty for growth into these inchoate quantities by municipal providers.

Well 7 is the authorized well for this permit. The total annual quantity under all rights authorized for WSU is 5300 acre-feet. At this time it appears a large portion of this authorization is unperfected. not put to beneficial use

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. Some of the source wells have failed and are no longer in use, but WSU has continued to exercise their right from other source wells.

This permit appears to be inchoate and will remain in good standing for municipal supply.

Existing Wells:

Well No. 1 is identified as 8" x 223' feet deep. The well was constructed in 1913. The casing is described as 40.6 feet in depth. The land surface elevation is approximately 2364 feet above mean sea level. Static was described as 70 feet below land surface in 1990.

Well No. 2 is identified as 213 feet deep. The well was constructed is 1938. The land surface elevation is approximately 2358 feet above mean sea level. The well was decommissioned and is no longer in use.

Well No. 3 is identified as 16" x 247 feet deep. The well was constructed in 1946. The casing is described as 26 feet below land surface. The static water level is shown as 30 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level.

Well No. 4 is identified as 20" x 275 feet deep. The well was constructed is 1963. The static water level is 51 feet below land surface. The land surface elevation is approximately 2366 feet above mean sea level. The well casing is described as ending 42 feet below land surface.

Well No. 5 is identified as 10" x 395 feet deep. The well was constructed is 1964. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2507 feet above mean sea level. The well casing is described as ending 300 feet below land surface.

Well No. 6 is identified as 24" x 702 feet deep. The well was constructed is 1973. The static water level was 196 feet below ground surface in 1964. The land surface elevation is approximately 2535 feet above mean sea level. The well casing is described as ending 395 feet below land surface.

Well No. 7 is identified as 24" x 2225 feet deep. The well was constructed is 1987. The static water level was 154 feet below ground surface in 1987. The land surface elevation is approximately 2415 feet above mean sea level. The well casing is described as ending 1000 feet below land surface.

Well No. 8 is identified as 20" x 812 feet deep. The well was constructed is 2003. The static water level was 333 feet below ground surface. The well casing is described as ending 280 feet below land surface. This well was constructed as an additional point of withdrawal under Certificate G3-22065C. A showing of compliance was submitted.

Hydrogeologic Analysis

Applications for change of water right permits and certificates are governed by RCW 90.44.100, which states in part that: the holder of a valid right to withdraw public ground waters may, without losing the holder's priority of right, construct wells at a new location in substitution for, or in addition to, those at the original location, or the holder may change the manner or the place of use of the water. Such amendment shall be issued by the Department only on the conditions that; (1) the additional or substitute well or wells shall tap the same body of public ground water as the original well or wells; (2) use of the original well or wells shall be discontinued upon construction of the substitute well or wells; (3) the construction of an additional well or wells shall not enlarge the right conveyed by the original permit or certificate; and (4) other existing rights shall not be impaired. The Department may specify an approved manner of construction and shall require a showing of compliance with the terms of the amendment.

The proposed project lies near a margin of the Columbia River Basalt Group. A steptoe, consisting of pre-Cenozoic granitic material lies to the southeast of Pullman, just north of Uniontown. Metasedimentary rocks are mapped on the surface to the northwest of that occurrence. Other pre-Cenozoic rocks crop out near Albion to the north of Pullman, and at Kamiak Butte. Surface geology to the west of Pullman has been mapped as Wanapum Basalt, with small outcroppings of Saddle Mountains Basalt on the highlands toward the Snake River.

In the areas underlain by the Columbia River Basalt Group (CRBG) and not otherwise administratively segregated, there are two major bodies of public ground water: the unconsolidated sediments, and the basalts of the CRBG.

- The unconsolidated zone extends from land surface down to the first solid basalt flow. It consists of unconsolidated and weakly consolidated sediments, chiefly sands and gravels in most of the Columbia Basin, but in the Pullman area consisting largely of loess.

- The basalt zone is part of a large ground water reservoir occurring in a thick series of basalt flows known as the Columbia River Basalt Group. The thickness of this group of basalt flows varies from a few hundred feet at the Spokane River to over 10,000 feet in the Pasco Basin. These flows include the Saddle Mountain, Wanapum and Grande Ronde formations. These flows are generally interconnected by fractures. Groundwater is found in a system of interconnected aquifers within the formations of the CRBG.

All wells associated with this change application produce water from basalt flows. All wells therefore tap the same body of public groundwater for their source. A survey of literature, existing well logs, and geologic mapping in the vicinity indicates most wells producing water from below approximately 2300 feet MSL produce from the Grande Ronde basalts.

Any reconstruction of wells shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC. Particularly, any reconstruction of these wells shall ensure the casing is sealed into competent basalt, any cascading water encountered shall be cased and sealed, and no interaquifer transfer of water shall be allowed. Sealing shall be accomplished by constructing a borehole that is 4 inches in diameter greater than the permanent casing. Following installation of the casing within the borehole, the annular space will be pressure grouted from bottom to top with neat cement until undiluted surface return is achieved.

Wells 7 and 8 are additional wells, not substitutes. Thus, no wells need be decommissioned as a result of this change. Any decommissioning done in this project shall be conducted in compliance with Chapter 18.104 RCW and Chapter 173-160 WAC.

Protests and Concerns

Two protests and one letter of concern were received during the protest periods and are described below.

A protest was submitted by Dianne French, from the Palouse Water Conservation Network and the letter of concern from David Hall. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined and this application is contrary to maintaining "safe, sustaining yield."
2) WSU's water useage has increased since 1997.
3) WSU does not currently utilize the full quantity authorized by its water rights yet this proposal will serve to enlarge WSU's water right.
4) Increased pumping negatively impacts local groundwater supply and may lead to conflicts with Idaho.
5) WSU's wells may withdraw water from different aquifers.

A letter of protest was submitted by Rachael Osborn on behalf of Scotty Cornelius. The concerns are summarized as follows:

1) The Grande Ronde Aquifer is being mined. WSU has never fully pumped its water rights. WSU's water usage is increasing over time. WSU intends to irrigate an expansion of its golf course.
2) WSU's application is contrary to the public interest and ecology must consider the impact on public welfare, impacts on the Snake River, interrelationships of surface and ground water.
3) Increased pumping may lead to management conflicts with Idaho.
4) WSU's application is contrary to maintain "safe sustaining yield". Approval of the application will facilitate continued and increased mining of the aquifer.
5) SEPA - "WSU has prepared a SEPA checklist for this project that fails to identify, describe or provide mitigation for aquifer mining. Ecology cannot rely on the SEPA document prepared by WSU. Ecology must prepare its own environmental analysis based on the SEPA rule that allows a permitting agency to prepare a new threshold determination when there is new information indicating the probable significant adverse environmental impacts associated with the proposal requiring a permit. New information may include the discovery of misrepresentation or lack of material disclosure in the prior environmental document. WAC 197-11-600(3)(b)(ii)."
6) WSU's application will allow expansion into unused water rights, contrary to the beneficial use requirement of state law.
7) Consolidation will enlarge its (WSU) water rights.
8) WSU has not demonstrated compliance with the requirements of RCW 90.44.100(3)(g).
9) Some of the rights have been relinquished and/or abandoned.
10) The wells may withdraw water from different aquifers.

Consideration of Protests and Concerns

Aquifer Characteristics, Mining, Conflicts: The basalt aquifers in the Palouse basin have been the subject of significant study and interest over the years due to concerns about aquifer mining. Geologic limitations on the Palouse basin are currently understood as follows:

It is postulated the Saddle Mountains Basalt (discussed above) lies in a syncline, which itself lies to the west of an anticline, a basement ridge, or other structural feature, which serves to restrict flow from the Pullman/Moscow area to the west. Consequently, the Palouse basin is isolated hydraulically from the larger Columbia Plateau Province. Additionally, the texture of loess promotes water holding capacity. Limited area of the basin, and limited vertical percolation, limits the amount of recharge able to reach the basalt within the basin.

The basalt aquifers transmit water most effectively in fracture zones at the top and bottom of individual flows, while the interiors of the flows are massive and dense. Thus, the actual volume of water bearing materials is relatively small for a given thickness of basalt. Additionally, recharge replacement of water into deep basalt flows occurs at a very small rate, unless significant post-emplacement fracturing is present. Balancing use against these geologic constraints is difficult.

In the mid 1970's community concerns about increasing demands on ground water led to several studies on ground water occurrence, and formation of a consortium of local entities (the Palouse Basin Aquifer Committee) to address water supply. In 1992, WSU adopted a ground water management plan. That plan's goal is to limit annual aquifer pumping increases to one percent (1%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy), while at no time allowing the accumulated total pumping to exceed 125 percent of the 1981 to 1985 average. To date, WSU has actually decreased their pumping in concert with other water purveyors. Recent evidence indicates rates of decline have lessened. Static water levels in well 7, for example, declined a foot per year between 1993 and 2002, and have now declined approximately 1 foot between 2002 and 2005. (See http://www.webs.uidaho.edu/pbac/Graphs/WSU%20Water%20Graphs.htm.) No evidence indicates this trend will change within the basin due to integration of these rights. Local conditions will continue to be monitored for long-term trends.

Water Usage: Diagrams and graphs submitted by the protestant(s) and WSU show a decline in water use over the period of record not an increase. The line on the graph representing a 1.3% increase in water use identifies the projected allowable increase of the Water Plan not actual water use.

Future water use and beneficial use: It is true that WSU is not using its full allocation of water. As identified above approximately 3312 acre-feet of inchoate water is available for future use for the municipality. Inchoate water availability is consistent with the municipal legislation (SHB 1338) recently passed that allows for certainty for growth into these inchoate quantities by municipal providers. It is a special position granted to municipalities under SHB 1338. It appears the legislative intent was to provide for a sufficient future water supply for growth and certainty for municipal providers, sometimes referenced as the theory of the Growing Communities Doctrine. Whether or not these applications for change to integrate these wells and rights were filed, WSU could continue to grow into these described inchoate quantities. The filing of these change applications alone does not expand the quantities of the municipal rights described above. The protestants are concerned that the inchoate water will be used for growth and expansion of a golf course. It is up to the municipal provider to determine what uses municipal rights are used for as long as the use is consistent with the definition under RCW 90.03.015.

This law allows for municipal providers to have certainty to grow into their inchoate municipal water rights without fear of relinquishment or diminishment. The legislature expressly provided this exception to those who qualify as a municipal provider.

Relinquishment and/or abandonment: WSU claims it has never abandoned nor relinquished any of its municipal rights. It is true that some of the source wells have failed and are no longer in use, but the university has continued to exercise their right from other source wells.

Aquifers and Well Construction: As described above in the Hydrogeologic Analysis, the wells are withdrawing water from the same body of public ground water and meet the requirements of RCW 90.44.100

The SEPA Checklist for this project provides inadequate environmental analysis.

Based on the information provided (Threshold Determination and Environmental Checklist), the Ecology SEPA program has come to the following conclusion:

- WAC 197-11-050 Lead Agency. (1) A lead agency shall be designated when an agency is developing or is presented with a proposal, following the rules beginning at WAC 197-11-922. The lead agency shall be the agency with the main responsibility for complying with SEPA's procedural requirements and shall be the only agency responsible for: The threshold determination; and preparation and content of environmental impact statements.

WSU is the lead agency, therefore they shall be the only agency responsible for the threshold determination.

- WAC 197-11-924 Determining the lead agency. (3) Any agency receiving a lead agency determination to which it objects shall either resolve the dispute, withdraw its objection, or petition the department for a lead agency determination within fifteen days of receiving the determination.

The WSDOE (Water Resources Program) was contacted and they did not object to the current lead agency and they did not petition the department for a lead agency determination within fifteen days of receiving the determination.

- WAC 197-11-948 Assumption of lead agency status. (1) An agency with jurisdiction over a proposal, upon review on a DNS (WAC 197-11-40) may transmit to the initial lead agency a completed "Notice of assumption of lead agency status." This notice shall be substantially similar to the form in WAC 197-11-985. Assumption of lead agency status shall occur only within the fourteen-day comment period on a DNS issued under WAC 197-11-340(2)(a), or during the comment period on a notice of application when the optional DNS process in WAC 197-11-355 is used.

The WSDOE (Water Resources Program) did not transmit to the initial lead agency a completed "Notice of assumption of lead agency status" to the initial lead agency, therefore the WSDOE does not retain any of the responsibilities of lead agency.

- WAC 197-11-600 When to use existing environmental documents (3)(b)(ii) New information indicating a proposal's probable significant adverse environmental impacts. (This includes discovery of misrepresentation or lack of material disclosure.) A new threshold determination or SEIS is not required if probable significant adverse environmental impacts are covered by the range of alternatives and impacts analyzed in the existing environmental documents.

This statement means that if WSDOE (Water Resources) program feels that new information regarding this project will cause probable significant environmental impacts, WSDOE has the ability to re-evaluate the proposal and change the threshold determination. Probable (WAC 197-11-782) is defined as "likely or reasonably likely to occur", and significant (WAC197-11-794) is defined as "a reasonable likelihood of more than a moderate adverse impact on environmental quality." The terms "probable" and "significant" are somewhat subjective though, and could have different meanings depending on which agencies, programs, or even by which people are asked. So, because WSDOE has an "action" (which is the change in water right sources), WSDOE also has the responsibility of the interpretations of the words "probable" and "significant", and therefore has the responsibility of determining if the new information will cause "probable significant environmental impacts."

When a permit, or "action" is required by another agency (other than the original lead agency), the agency issuing that permit or "action" has the ability to re-evaluate a proposal, if and only if, new information is brought forth that will cause "probable significant environmental impacts." The information provided to Ecology has not changed.

Impairment Analysis

"Impair" or "impairment" means to 1) adversely impact the physical availability of water for a beneficial use that is entitled to protection, and/or 2) to prevent the beneficial use of the water to which one is entitled, and/or 3) to adversely affect the flow of a surface water course at a time when the flows are at or below instream flow levels established by rule (POL-1200); and/or 4) degrade the quality of the source to the point that water is unsuitable for use by existing water right holders (WAC 173-150). Demonstration of impairment would require evidence of a substantial and lasting or frequent impact reflecting such conditions.

The change request is not requesting to modify the quantities of water already authorized for beneficial use. The change to integrate these wells into one dependable source to satisfy the municipal water delivery requirements is the action addressed in this finding.

Findings

When considering an application for change to a water right, Ecology must determine that the proposed change can be made without detriment or injury to existing water rights. Factors considered when determining potential impact include the following:

No Impairment to Existing Rights
The conditions of the aquifer in the Moscow Pullman area show a declining trend for many years, currently addressed by entities involved in the Palouse Basin Aquifer Committee through planning and implementation strategies. Data indicates the declining trend has slowed through their efforts. No evidence suggests this change would further adversely affect the physical availability of water for a beneficial use that is entitled to protection, nor prevent beneficial use of water. Instream flows have not been established by rule in this basin, and no water quality impacts are expected through integration of this right.

A review of Ecology records was conducted for existing water rights, permits, applications and claims in the vicinity of WSU. The search found no existing water rights in the area which would be impaired through issuance of this application for change to integrate the wells. WSU municipal wells have been continuously used for many years with no reported well interference problems. It is not anticipated that the proposed change to integrate the wells will cause impairment.

No Detriment to the Public Welfare
There has been public expression of protest or concern regarding the subject proposal, and no findings through this investigation indicate that there would be detrimental impact to the public welfare through issuance of the proposed change.

No Enhancement of the Original Right
No withdrawal of water over and above what has been authorized to beneficial use and/or originally authorized under existing rights will be allowed through approval of this change.

Same Source of Water
The ground water withdrawn at all well locations is considered to be from the same body of public water.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application to integrate the existing water system by adding six (6) existing wells and changing the place of use will not enlarge the water right for beneficial use, nor will it impair existing rights or be detrimental to the public welfare.

Recommendations

The applicant's request under Ground Water Permit G3-28278P is approved, subject to the following provisions:

This change authorizes a total of seven (7) wells located as follows:

1) 1450 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
3) 1390 feet north and 77 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
4) 1340 feet north and 75 feet west of the center of Section 5, T. 14 N., R. 45 E.W.M.
5) 1800 feet north and 2500 feet east of the SW corner of Section 34, T. 15 N., R. 45 E.W.M.
6) 400 feet south and 700 feet east of the NW corner of Section 4, T. 14 N., R. 45 E.W.M.
7) 2290 feet south and 2380 feet west of the NE corner of Section 5, T. 14 N., R. 45 E.W.M.
8) 1150 feet south and 2500 feet east of the NW corner of Section 4. T. 14 N., R. 45 E.W.M.

The place of use will be changed to:

Area served by Washington State University. The place of use of this water right shall be consistent with the service area map contained within the most recently approved water system plan (including amendments).

Provisions

"The total withdrawal under Ground Water Claims 098522, 098523, 098524, Certificate 5070-A, 5072-A, G3-22065C and G3-28278P shall not exceed 5000 gallons per minute, 5300 acre-feet per year annually for municipal supply."

"The quantities granted under this permit are issued less those amounts appropriated under Ground Water Certificate No. 5070-A, and Ground Water Claims 98522, 98524. The total combined withdrawal under this permit and Ground Water Certificate No. 5070-A shall not exceed 2500 gallons per minute 2260 acre-feet per year."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"Use of water under this authorization shall be contingent upon the water right holder's utilization of up to date water conservation practices and maintenance of efficient water delivery systems consistent with established regulation requirements and facility capabilities."

"If the criteria in RCW 90.03.386(2) are not met and a Water System Plan was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan has been approved after September 9, 2003, the place of use reverts to the last place of use described hy Ecology in a water right authorization."

"An approved measuring device shall be installed and maintained for each of the sources identified herein in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years, and shall be promptly submitted to Ecology upon request."

"The rule above describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements."

"Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions."

"This authorization to make use of public waters of the State is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

"Nothing in this authorization shall be construed as satisfying other applicable federal, state, or local statutes, ordinances, or regulations."

"All water wells constructed within the State shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

Installation and maintenance of an access port as described in chapter 173-160-291(3) WAC is required. An air line and gauge may be installed in addition to the access port."

This Change Report of Examination supersedes the Report of Examination dated October 25, 1988. A superseding permit should be issued to reflect this change authorization.

"A certificate of water right will not be issued until a final examination is made."

Signed and dated at Spokane, Washington this 18th day of September, 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

KB:VL:ka
W/DraftROEs/Brown2006

Water Use Measurement Form No. 3 - Pressurized Flow

Fill out Form No. 3 ONLY if you have pressurized flow (from either ground or surface water).

Fill out one form for each measuring device.

Name/Organization: _____ Water Right Number(s): _____

Section _____ Township _____ Range _____ ☐(E) ☐(W) _____ (¼) _____ (¼ ¼) Govt. Lot _____

Measuring Device Serial No. name or number: _____

Please check APPROPRIATE UNITS

Week	Date	Meter Reading (☐ gallons, ☐ ac-ft ☐ other)	Peak Flow (☐ gpm ☐ cfs ☐ other)
Start			
January			
February			
March			
April			
May			
June			

Week	Date	Meter Reading (☐ gallons, ☐ ac-ft ☐ other)	Peak Flow (☐ gpm ☐ cfs ☐ other)
Start			
July			
August			
September			
October			
November			
December			

Month	Monthly Volume (☐ gallons ☐ ac-ft ☐ other)	Month	Monthly Volume (☐ gallons ☐ ac-ft ☐ other)	Month	Monthly Volume (☐ gallons ☐ ac-ft ☐ other)	Month	Monthly Volume (☐ gallons ☐ ac-ft ☐ other)
January		April		July		October	
February		May		August		November	
March		June		September		December	

Total Annual Volume _____ (☐ gallons ☐ ac-ft ☐ other _____ Peak Instantaneous Flow _____ (☐ gpm ☐ cfs ☐ other_____)

Comments: _____

INSTRUCTIONS for Water Use Measurement Forms
PRESSURIZED FLOW

Fill out one **Water Use Measurement Form No. 3 – Pressurized Flow** report for each device measuring a pressurized flow. For multiple devices measuring one water right, please identify the device by either the name you use for each pressurized system or serial number of the meter. Pressurized pipe flows may be from surface diversions or groundwater withdrawals.

Data on your water use under your water right

- **Flow:** For those reading meters manually, enter the flow registered by the flow indicator on the meter. For meters that don't have an indicator (only a totalizer), measure the use over a period of several minutes to estimate the flow and use that value. For example, if 700 gallons is used over 3.3 minutes; report 212 gpm (700/3.3). Reasonable effort should be made to take the peak flow measurement when demand is close to its maximum over a period of time. If weekly readings are reported (see Reporting, above), demand over time will be more representative.

  For those with electronic data collection, fill in the highest flow rate during the shortest interval that data is collected. For example, if your equipment takes a reading once every 15 minutes, then report the highest flow for a 15 minute period during the month. **Please check the appropriate units and fill in the date.** If data is collected electronically, Ecology has an electronic spreadsheet that users can use with your computer.

- **Monthly volume:** Fill in the total volume used during the month based on the meter readings recorded. If you choose to record weekly volumes on the reporting form and submit that form for your report, the calculation of total volume can be done automatically when the data is entered into the database (see Reporting, above.) If not, then users will have to perform the calculations. **Please circle the appropriate units.**

- **Total annual volume:** Fill in the total amount of water used during the year. If you use the reporting form for recording (see Reporting, above) and submit that form for your report, the calculation can be performed automatically when the data is entered into the database. **Please circle the appropriate units.**

- **Peak instantaneous flow:** Fill in the highest peak instantaneous flow that occurred during the last year. Again, if you use the reporting form for recording also, then that calculation can be performed automatically when the data is entered into the database. **Please circle the appropriate units.**

- **Comment:** If a water source is not being used or data is not being collected please provide an explanation in the comments section.

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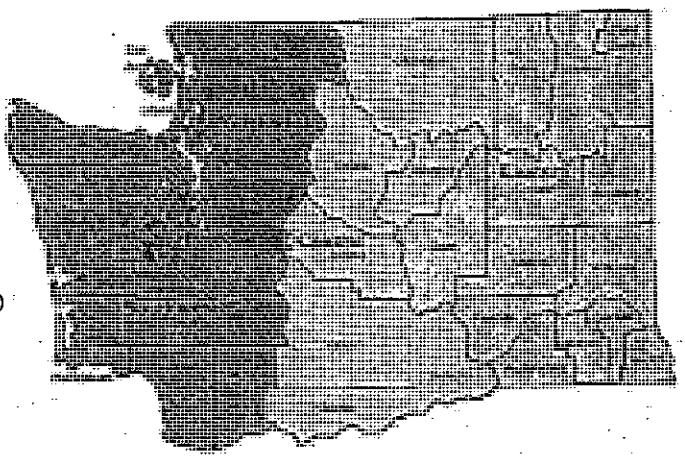

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ECY 070-172 (9/05)

State of Washington

Water Measurement Device Installation and Operation Requirements

Pipe flow measuring devices

Below is a summary of the major requirements for pipe flow meters. This sheet is intended to assist water users in understanding the most important portions of the rule, but does not include all the requirements from the rule. For additional detail and information on requirements, see "Requirements for Measuring and Reporting Water Use"; WAC 173-173.

- At any flow rate measured by the meter, the meter itself shall be rated by the manufacturer to register between 95% and 105% of the water actually passing through the meter.
- At any flow rate measured by the measuring system; i.e., meter plus any secondary equipment such as data recorders; the system shall register between 90% and 110% of the water actually passing through the system.
- Measuring devices and facilities must register and be calibrated for the full range of discharge for which they are to be used.
- The meter shall have a visual totalizer. The totalizer shall contain sufficient recording digits to ensure that "roll over" to zero does not occur before the next recording period.
- The meter shall be installed, inspected, maintained and calibrated in accordance with manufacturer specifications.
- The meter shall not be installed in a manner that creates an uneven velocity profile. Straight sections of pipe before and after the meter, straightening vanes or other flow conditioning devices shall be used to provide even flow through the meter as necessary.
- No withdrawal or diversion of water shall be made unless the measuring devices and facilities are in proper operating condition, except when a measuring device or facility is being repaired and a substitute measuring device or other method to measure the diversion or withdrawal is used.
- There shall be no turnouts or diversions between the source of water and the measuring devices and facilities, except for faucets or other small outlets that have a *de minimis* effect on the diversion or withdrawal.

State of Washington

Water Measurement Device Installation and Operation Requirements

Open channel flow measuring devices

Below is a summary of the major requirements for open channel flumes, weirs and orifices. This sheet is intended to assist users in understanding the most important portions of the rule, but does not include all the requirements from the rule. For additional detail and information on requirements, see "Requirements for Measuring and Reporting Water Use," WAC 173-173.

- At any flow rate measured by the measuring system (the measuring device plus any secondary equipment such as data recorders), the system shall register between 90% and 110% of the water actually passing through the system. Measuring facilities shall be operated and maintained to ensure that discharge can be measured accurately.
- The measuring facility shall be installed or constructed in accordance with the manufacturer's and/or designer's specifications.
- Measuring devices and facilities must register and be calibrated for the full range of discharge for which they are to be used. In determining a stage-discharge relation, the distribution of open channel flow measurements shall be sufficient to establish a full range of values for the entire stage-discharge relation.
- Rating curves shall be recalculated when there is a change in channel conditions that significantly alters flow across the control or once a year, whichever is more frequent.
- There shall be no turnouts or diversions between the source of water and the measuring devices and facilities, except for faucets or other small outlets that have a *de minimis* effect on the diversion or withdrawal. All flow diverted shall be measured as close to the point of diversion as possible.
- No withdrawal or diversion of water shall be made unless the measuring devices and facilities are in proper operating condition, except when a measuring device or facility is being repaired and a substitute measuring device or other method to measure the diversion or withdrawal is used.
- If the measuring system has no continuous stage recorder, an observer shall read the staff gage and record the reading as close in time as is practical before and after changes in regulation of flow occur.

INSTRUCTIONS for Water Use Measurement Form 1
OPEN CHANNEL and PRESSURIZED FLOW SYSTEMS

- **Source of water:** Verify that the name of the source of water is correct. If not, please correct the name.
- **User's name for point of diversion or withdrawal:** Fill in the name that you or your organization uses to describe the diversion or withdrawal measured by this measuring device.
- **Number of sources:** If there is more than one source (e.g. several creeks or wells) measured by this measuring device, check yes. If only a single source is measured, check no.
- **Number of diversions/withdrawals:** If there is more than one point of diversion or withdrawal measured by this measuring device, check yes. If only a single diversion or point of withdrawal is measured, check no.
- **Water rights:** State records indicate the water right(s) listed is associated with this measured point of diversion or withdrawal. Make corrections, if necessary.

Information on Location of your measuring device

- **WRIA:** State records show that the point of diversion or withdrawal is located in this Water Resource Inventory Area (WRIA).
- **Section, township, range, quarter, and quarter quarter, or government lot:** State records show that the point of diversion or withdrawal is located in this section, township, range, quarter, and quarter quarter, or government lot.
- **DOH WFI #:** For public drinking water systems only, fill in the Dept. of Health Water Facility Inventory number.
- **DOH Source #:** For public drinking water systems only, fill in the Department of Health Source number for this diversion/withdrawal. If there is more than one point of diversion or withdrawal measured through this measuring device, provide information on the primary diversion point.
- **Well tag number:** Provide the unique well tag number for ground water wells if the well is tagged and the number is known. If more than one well is measured through this measuring device, provide information on the primary well. If the well does not have a well tag, it is recommended that one be obtained by contacting the Well Drilling Coordinator in your regional office of Ecology.
- **Latitude and longitude of measuring device in decimal degrees or degrees, minutes, seconds:** Provide the location of the measuring device in decimal degrees such as 45.1111°N, 119.2222°W, if available, at least 4 numbers right of the decimal point. Otherwise, provide the location in degrees, minutes, and seconds, such as N50°, 30', 30.2", W100°, 50', 25.2", if known.
- **Horizontal Datum:** Horizontal Datum refers to the system used to project latitude and longitude. For example, topographic maps typically use the North American Datum plane developed in 1927 (NAD 27). Another datum plane used is NAD 83, developed in 1983. Hand-held GPS locator units can select from among a number of datum planes. Please use NAD 27 or NAD 83 when using GPS to locate your measuring device, and provide the datum or projection that was used for determining latitude and longitude. If the datum plane is unknown, fill in "unknown".
- **Is the diversion or withdrawal located at the same place as the measuring device?:** Check the appropriate answer for your situation.
- **Latitude and longitude of diversion or withdrawal in decimal degrees or degrees, minutes, seconds:** Same directions as for latitude and longitude for the measuring device.

Information about your Measuring Device

- **Type of meter:** Provide the type of measuring device for open channel flow (ramp flume, pressure transducer, weir and staff gage, etc.), or the type of measuring device for pressurized flow (propeller meter, insertion meter, etc.)
- **Brand:** Provide the name of the manufacturer for the measuring device. If the device is one that was constructed on-site (such as a flume built on-site) or there is no manufacturer, fill in "none".
- **Most recent calibration date or rating curve date (MM/DD/YYYY):** Provide the date of the most recent calibration or validation of the accuracy of the measuring device. The meter maintenance manual (pressurized systems) or the designer of open channel flow devices should be able to tell you how often calibrations should be done.
- **Does the diversion have a fish screen?:** The Department of Ecology is required by law to ask if a fish screen has been installed on surface water diversions, both gravity and pumped diversions. Check the space indicating whether or not a fish screen is installed. (This requirement does not apply to ground water withdrawal systems.
- **Changes in status of the measuring device:** Provide information and any appropriate dates related to changes in the measuring device, such as requiring repair or did not divert in order to harvest crop, to describe why readings may not be consecutive.

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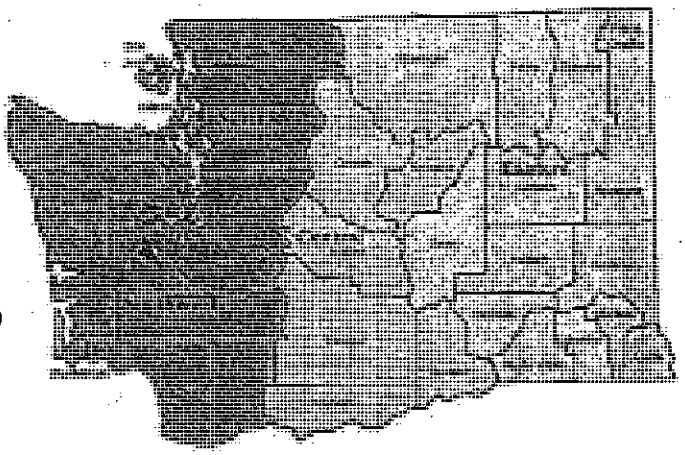

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ECY 070-170 (9/05)

Water Use Measurement Form No. 1
Open Channel and Pressurized Systems

Please review the instructions and fill out Form No. 1 for each measuring device you have.

Name of water right holder: _____

Water Right Claim/ Certificate/Permit No: _____

Source of Water: _____

User's name for diversion/ withdrawal point; (e.g. Well No. 1, Blue well house) _____

Does this measuring device measure water from more than one source of water (e.g. several springs, creeks, or wells in different aquifers)? ☐ Yes ☐ No

Does this measuring device measure water from more than point of diversion or withdrawal but still from the same source? ☐ Yes ☐ No

The following water rights are measured through this measuring device:

_____

INFORMATION ON THE LOCATION OF THE MEASURING DEVICE

WRIA _____ Section _____ Township _____ Range _____

☐ (E) ☐ (W) _____ (¼) _____ (¼¼) Govt. Lot _____

DOH WFI Number. (for public drinking water systems) _____ Well Tag Number (if available or applicable) _____

Latitude and longitude of device in decimal degrees or degrees, minutes, seconds (if available): Latitude _____ Longitude: _____

Horizontal Datum (e.g. WGS84, NAD27) _____

Is the diversion or withdrawal located at the same place as the device (within 100 feet)? ☐ Yes ☐ No

If no, provide the location of the diversion or withdrawal in decimal degrees or degrees, minutes, seconds (if available): Latitude _____ Longitude: _____

Horizontal Datum (e.g. WGS84, NAD27, NAD83, etc.) _____

INFORMATION ABOUT THE MEASURING DEVICE

Type of device: _____ Brand of device: _____

Model Number: _____ Serial Number: _____

Most recent date device was calibrated: (MM/DD/YYYY) _____

If a surface diversion, does the diversion have a fish screen? ☐ Yes ☐ No ☐ N/A

If any of the following events occurred within the last year, check the appropriate box and provide a short explanation.

☐ Device Roll-Over ☐ New device ☐ Device repair

☐ Other _____

I hereby certify that all information reported on this form is correct to the best of my knowledge.

Printed Name: _____

Position: _____

Signature: _____ Date: _____

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INSTRUCTIONS for Water Use Measurement Form 1

OPEN CHANNEL and PRESSURIZED FLOW SYSTEMS

- **Source of water:** Verify that the name of the source of water is correct. If not, please correct the name.
- **User's name for point of diversion or withdrawal:** Fill in the name that you or your organization uses to describe the diversion or withdrawal measured by this measuring device.
- **Number of sources:** If there is more than one source (e.g. several creeks or wells) measured by this measuring device, check yes. If only a single source is measured, check no.
- **Number of diversions/withdrawals:** If there is more than one point of diversion or withdrawal measured by this measuring device, check yes. If only a single diversion or point of withdrawal is measured, check no.
- **Water rights:** State records indicate the water right(s) listed is associated with this measured point of diversion or withdrawal. Make corrections, if necessary.

Information on Location of your measuring device

- **WRIA:** State records show that the point of diversion or withdrawal is located in this Water Resource Inventory Area (WRIA).
- **Section, township, range, quarter, and quarter quarter, or government lot:** State records show that the point of diversion or withdrawal is located in this section, township, range, quarter, and quarter quarter, or government lot.
- **DOH WFI #:** For public drinking water systems only, fill in the Dept. of Health Water Facility Inventory number.
- **DOH Source #:** For public drinking water systems only, fill in the Department of Health Source number for this diversion/withdrawal. If there is more than one point of diversion or withdrawal measured through this measuring device, provide information on the primary diversion point.
- **Well tag number:** Provide the unique well tag number for ground water wells if the well is tagged and the number is known. If more than one well is measured through this measuring device, provide information on the primary well. If the well does not have a well tag, it is recommended that one be obtained by contacting the Well Drilling Coordinator in your regional office of Ecology.
- **Latitude and longitude of measuring device in decimal degrees or degrees, minutes, seconds:** Provide the location of the measuring device in decimal degrees such as 45.1111°N, 119.2222°W, if available, at least 4 numbers right of the decimal point. Otherwise, provide the location in degrees, minutes, and seconds, such as N50°, 30', 30.2", W100°, 50', 25.2", if known.
- **Horizontal Datum:** Horizontal Datum refers to the system used to project latitude and longitude. For example, topographic maps typically use the North American Datum plane developed in 1927 (NAD 27). Another datum plane used is NAD 83, developed in 1983. Hand-held GPS locator units can select from among a number of datum planes. Please use NAD 27 or NAD 83 when using GPS to locate your measuring device, and provide the datum or projection that was used for determining latitude and longitude. If the datum plane is unknown, fill in "unknown".
- **Is the diversion or withdrawal located at the same place as the measuring device?:** Check the appropriate answer for your situation.
- **Latitude and longitude of diversion or withdrawal in decimal degrees or degrees, minutes, seconds:** Same directions as for latitude and longitude for the measuring device.

If you require this publication in an alternate format, please contact Water Resources at the Regional Office listed for your county of residence, or TTY (for the speech or hearing impaired) 711 or 800-833-6388.

ECY 070-170 (9/05)

Information about your Measuring Device

- **Type of meter:** Provide the type of measuring device for open channel flow (ramp flume, pressure transducer, weir and staff gage, etc.), or the type of measuring device for pressurized flow (propeller meter, insertion meter, etc.)
- **Brand:** Provide the name of the manufacturer for the measuring device. If the device is one that was constructed on-site (such as a flume built on-site) or there is no manufacturer, fill in "none".
- **Most recent calibration date or rating curve date (MM/DD/YYYY):** Provide the date of the most recent calibration or validation of the accuracy of the measuring device. The meter maintenance manual (pressurized systems) or the designer of open channel flow devices should be able to tell you how often calibrations should be done.
- **Does the diversion have a fish screen?:** The Department of Ecology is required by law to ask if a fish screen has been installed on surface water diversions, both gravity and pumped diversions. Check the space indicating whether or not a fish screen is installed. (This requirement does not apply to ground water withdrawal systems.
- **Changes in status of the measuring device:** Provide information and any appropriate dates related to changes in the measuring device, such as requiring repair or did not divert in order to harvest crop, to describe why readings may not be consecutive.

Contacts:

Vicki Cline
360-407-6300
vwin461@ecy.wa.gov

Christy Dustrude
425-649-7000
cdus461@ecy.wa.

Ken Schuster
509-575-2490
ksch461@ecy.wa.gov

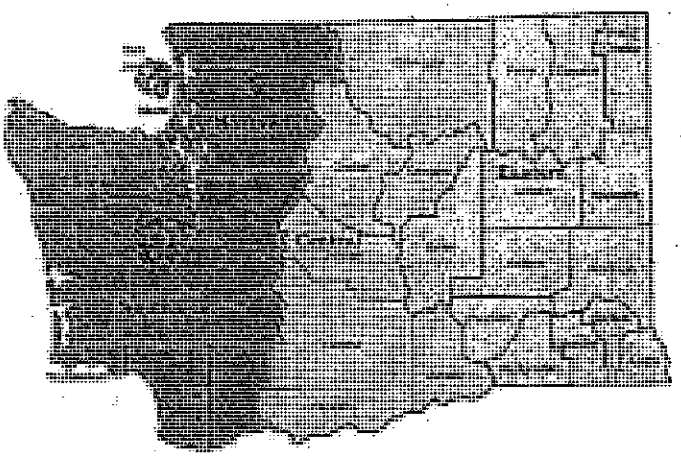
Information & Reception
509-329-3400

Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

Northwest Regional Office
3190 – 160th Ave SE
Bellevue, WA 98008-5452

Central Regional Office
15 W Yakima Ave., Suite 200
Yakima, WA 98902-3452

Eastern Regional Office
4601 N Monroe
Spokane, WA 99205-1295



If you require this publication in an alternate format, please contact Water Resources at the Regional Office listed for your county of residence, or TTY (for the speech or hearing impaired) 711 or 800-833-6388.

ECY 070-170 (9/05)

Water Use Measurement Form No. 1
Open Channel and Pressurized Systems

Please review the instructions and fill out Form No. 1 for each measuring device you have.

Name of water right holder: _____

Water Right Claim/ Certificate/Permit No: _____

Source of Water: _____

User's name for diversion/ withdrawal point; (e.g. Well No. 1, Blue well house) _____

Does this measuring device measure water from more than one source of water (e.g. several springs, creeks, or wells in different aquifers)? ☐ Yes ☐ No

Does this measuring device measure water from more than point of diversion or withdrawal but still from the same source? ☐ Yes ☐ No

The following water rights are measured through this measuring device:

_____

INFORMATION ON THE LOCATION OF THE MEASURING DEVICE

WRIA _____ Section _____ Township _____ Range _____

☐ (E) ☐ (W) _____ (¼) _____ (¼¼) Govt. Lot _____

DOH WFI Number. (for public drinking water systems) _____ Well Tag Number (if available or applicable) _____

Latitude and longitude of device in decimal degrees or degrees, minutes, seconds (if available): Latitude _____ Longitude: _____

Horizontal Datum (e.g. WGS84, NAD27) _____

Is the diversion or withdrawal located at the same place as the device (within 100 feet)? ☐ Yes ☐ No

If no, provide the location of the diversion or withdrawal in decimal degrees or degrees, minutes, seconds (if available): Latitude _____ Longitude: _____

Horizontal Datum (e.g. WGS84, NAD27, NAD83, etc.) _____

INFORMATION ABOUT THE MEASURING DEVICE

Type of device: _____ Brand of device: _____

Model Number: _____ Serial Number: _____

Most recent date device was calibrated: (MM/DD/YYYY) _____

If a surface diversion, does the diversion have a fish screen? ☐ Yes ☐ No ☐ N/A

If any of the following events occurred within the last year, check the appropriate box and provide a short explanation.

☐ Device Roll-Over ☐ New device ☐ Device repair

☐ Other _____

I hereby certify that all information reported on this form is correct to the best of my knowledge.

Printed Name: _____

Position: _____

Signature: _____ Date: _____

If you require this publication in an alternate format, please contact Water Resources at the Regional Office listed for your county of residence, or TTY (for the speech or hearing impaired) 711 or 800-833-6388.

WASHINGTON STATE POLLUTION CONTROL HEARINGS BOARD
ENVIRONMENTAL HEARINGS OFFICE
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
PO Box 40903
Lacey Washington 98504-0903
(360)459-6327 Fax: (360)438-7699
Web Address: http://www.eho.wa.gov
E-Mail: eho@eho.wa.gov

"Your Right to Be Heard"

Board Members
William H. Lynch, Chair
Bill Clarke
David W. Danner

Administrative Appeals Judges
Phyllis K. Macleod
Eric Z. Lucas
Kay Brown

Administrative Assistant
Robyn Bryant

Hearing Coordinator
Judy Greear

Secretary
Sharon Ziegler

This is your informal guide to your rights and responsibilities in an appeal. It is not exclusive and **does not have force and effect of state law or regulation.** More detailed information, in RCW 43.21B, the act creating the Pollution Control Hearings Board, and in a chapter of the Washington Administrative Code entitled, "Rules of Practice and Procedure of the Pollution Control Hearings Board, WAC 371-08," is available at your county law library or upon request from the Environmental Hearings Office and at the Environmental Hearings Office website at http://www.eho.wa.gov. For more detailed information, please open up on the web page the *Environmental Hearings Office Handbook* and the *Environmental Hearings Office Sample Formbook.* ALTERNATE FORMAT AVAILABLE UPON REQUEST

YOUR RIGHT TO BE HEARD

The Pollution Control Hearings Board (PCHB) hears appeals from orders and decisions made by:

1. Local and regional air pollution control agencies or authorities.
2. The State Department of Ecology, and
3. Other agencies as provided by law.

The Board's sole function is to give you, and all other litigants in a disputed matter, a full and complete hearing, as promptly as possible, followed by a fair and impartial written decision based on the facts and law.

The Board is not affiliated with the Department of Ecology or any other agency. To insure the Board's impartiality, the state Legislature created this independent, quasi-judicial state agency entirely separate from any other state, or regional resource or regulatory agency or local unit of government.

The Board consists of three full-time members, who are appointed by the governor and confirmed by the State Senate for staggered six-year terms. One of the three must be an attorney. All are salaried employees of the State, who also serve on the Shorelines Hearings Board.

DO YOU NEED AN ATTORNEY?

An attorney may represent you, but the law does not require one. Consider this very carefully before deciding to represent yourself. The appeal process can be complicated and significant rights may be at stake. The hearings are conducted more like court trials, instead of city council meetings.

WHEN, WHERE, AND HOW TO FILE AN APPEAL

No fee is required for filing an appeal.

The Board must RECEIVE your appeal within 30 days of the "receipt" of the order or decision. "Date of Receipt" is defined in RCW 43.21B.001(2)

The original of the appeal must be filed with the Board at:

Pollution Control Hearings Board
4226 6th Avenue SE
Bldg 2 Rowe Six
PO Box 40903
Lacey WA 98504-0903

Within 30 days of receipt of the decision, you must also serve a copy of your appeal with the Department of Ecology or Air Pollution Authority or other agency whose order or decision you are appealing.

If you are appealing a decision on a permit, you should also serve a copy of your appeal on the holder of the permit unless you are the permittee.

Failure to observe the 30 day deadline for filing with the Board and serving the Department of Ecology or Air Pollution Control Authority or other agency will result in termination and dismissal of the appeal.

Service on all parties shall be by personal service or by mail. Service by mail is effective on the date of mailing; however, filing with the Board is only effective on actual receipt by the Board.

Filing of the appeal does not stop (stay) the effectiveness of an appealed permit. For information on how to obtain a stay or temporary restraining order, please refer to RCW 43.21B.320 and Civil Rules for Superior Court 65 (CR 65).

CONTENT OF THE APPEAL

ɔur appeal should include the following
:ms:

- A copy of the order or decision you are appealing, and if the order or decision followed an application, a copy of the application.
- Your name and address (mailing and legal, if different) and, if applicable, the name and address of your representative.
- A daytime phone number.
- A brief statement why you are appealing.
- The relief you seek (what you want the Board to do).
- A statement, signed by you or your representative, attesting the content of the appeal is true.

IF YOUR PERMIT IS APPEALED

:rhaps you have been granted a permit by e Department of Ecology, air authority or ıother agency, but another party has ɔpealed. You have a right to defend the ermit and are automatically a respondent the appeal before the Board. All ıbsequent sections in this publication ɔply to you as well as to the appellant.

HEARING DATES

Then an appeal is filed, the Board will sign and notify you of a date for hearing e case.

THE PRE-HEARING CONFERENCE

ɔon after the appeal is filed, a pre-hearing ɔnference is scheduled with the Presiding fficer. The pre-hearing conference is ıually held within 4-6 weeks of the ɔpeals' filing and is generally conducted / telephone. This conference is not for e purpose of arguing your case. The ɔnference has three purposes: to discuss terest in settlement, including use of the oard's no-cost mediation program, to termine the legal issues, and to set a hedule for preparing the case for hearing settlement is not reached. Prior to the e-hearing conference each party is quired to submit a preliminary list of gal issues, proposed witnesses and chibits. After the pre-hearing conference, written pre-hearing order will be mailed the parties. It will include the hearing date, the list of legal issues, hearing preparation deadlines, and other important procedural information.

CAN THIS DISPUTE BE SETTLED?

Litigation is time and energy consuming for the parties. Each party needs to think about possible compromise. For settlement to be reached, each side needs to offer something. Parties are encouraged to begin settlement talks, without waiting for Board participation.

The Board has a no-cost mediation program to assist parties in reaching settlement. It is a voluntary program offered to the parties without charge. All parties must agree to mediate before a mediation can be scheduled. A trained Administrative Appeals Judge will work with the parties to resolve the case.

If the parties settle directly or through mediation, a written document containing the settlement terms will ultimately be signed by all, and filed with the Board, which will dismiss the appeal if the settlement conforms to the law.

BEFORE THE HEARING

Before the hearing you will want to prepare. You have the right to review the agency's file of their decision. Contact it to arrange a time and place to see the file.

You and the other parties have the right to find out in advance what witnesses and other evidence will be used at the hearing. This may be provided to you without formal procedures, such as by looking at public records. If done formally, this discovery is best accomplished with the assistance of a lawyer. Examples of formal discovery are: **Deposition**-questioning witnesses before the hearing, under oath with a court reporter present. **Interrogatory**-presenting written questions to the other side. There are formal rules that apply to discovery.

MOTIONS

Any party may file a motion. A motion is a request by one of the parties asking the Board, or the Presiding Officer to rule on a particular issue.

A motion may be dispositive or non-dispositive. A dispositive motion may be based on an issue or issues, or the whole case. A non-dispositive motion is a request for relief, which does not decide an issue or issues or the whole case. An example of a non-dispositive motion is a motion in limine. A motion in limine asks the Board, in advance of the hearing to exclude certain evidence. Dispositive motions are decided by the full Board. An example of a dispositive motion is a motion for summary judgment. A motion for summary judgment is typically based on sworn statements of fact from a person having personal knowledge of the facts alleged. A sworn statement may be either a declaration or an affidavit. An example of a declaration may be found on page 28 of the Environmental Hearings Office (EHO) Sample Formbook. This Formbook may be found by going to the EHO website at http://www.eho.wa.gov. After you have opened to the home page, click on the "Resources" button under "Research." When that page opens up, click on "The Environmental Hearings Office Sample Formbook" under "Other Resources."

A declaration or affidavit may also identify and attach documents as exhibits. This is the format of the declaration contained in the EHO Sample Formbook.

Dispositive Motions

The scheduling of dispositive motions is set forth in the pre-hearing order. Please file with the Board an original and sufficient copies of the dispositive motion for each Board member and the presiding officer, if the presiding officer is not a Board member. A copy should be served simultaneously on the date the motion is filed, on each party in the case.

Any party opposing the motion will typically have 10 days from the day it received the motion, to file an original and the requisite copies of a response with the Board, and serve a copy on each of the other parties. The moving party generally will have seven days from the date it receives the response, to file an original and the requisite copies of a reply with the Board, and serve a copy on each of the other parties. Any party may request an oral hearing from the Presiding Officer on the motion. The Presiding Officer determines whether to grant or deny the request. If the request is granted, the parties will typically personally appear and present their oral argument to the Board at its hearing room in Lacey, Washington.

Non-dispositive Motions

The deadlines for responding and replying to non-dispositive motions will generally be shorter than the above deadlines for dispositive motions. Additionally, most non-dispositive motions will be reviewed and decided solely by the Presiding Officer. In those situations, the parties need only supply an original and one copy of the pleadings to the Board.

HEARING

At the hearing, it is important to be on time. A party's failure to appear may result in default.

You will have your full opportunity to present your side of the case, but there is a judicial procedure to be followed, so that all sides can be heard in an orderly manner.

The Presiding Officer for the Board manages the proceedings. A court reporter will record what is said. The appellant usually has the obligation to present his or her case first. Then, the respondent will present its case. In a case involving a penalty or a regulatory order, the agency assessing the penalty is required to present its case first.

Each side has the right to make an opening statement, briefly outlining what its evidence will be. After the opening statements, the parties with the burden of proof will present its evidence. In a penalty or regulatory action, the agency has the burden of proof and will call witnesses first. In a permit appeal, the appealing party has the burden of proof and presents its witnesses first at the hearing.

In certain cases, the Presiding Officer may determine a site visit would be helpful to the Board's understanding of the evidence. At such a visit, the parties are requested to limit communication with the Board during the site visit. It is appropriate to point out physical landmarks, to help the Board later, at the hearing, but a court reporter is not present during the site visit, and it is not the time to present evidence or argue your case.

After the site visit, we return to the hearing. Witnesses who are sworn to tell the truth, testify from their personal knowledge in response to questions from the party calling that witness. After this direct testimony, the witness answers questions asked by the other parties during "cross-examination." The Board members may also ask questions.

Persons essential to your case need to be present at the hearing to testify as witnesses. The "hearsay" rule prevents you from testifying for them or relating what they know or what they have said.

Exhibits, such as letters, contracts, photographs, and maps, etc. may be offered as evidence. Before the hearing, number your exhibits and prepare an exhibit list. At the hearing, you will need to have the original and one copy for each member of the Board, the Presiding Officer, if not a Board member, and for the other parties. If you have multiple exhibits, please place them in a binder.

After all the evidence has been presented, litigants can summarize their arguments in closing statements. The hearing is then closed and no further evidence is taken.

THE BOARD'S DECISION

The Board will deliberate on the testimony, exhibits, and final arguments, before issuing a written decision.

The written decision called "Findings of Fact, Conclusions of Law and Order" is prepared and mailed to all litigants generally within 90 days after the hearing, or after the submission of memoranda, briefs, or proposed findings.

YOU MAY APPEAL THE FINAL ORDER

The Board's decision may be appealed to Superior Court within 30 days from the date of the **ORDER is received**, or you may file a petition with the Board for a reconsideration within 10 days of the date of the mailing of the **ORDER**

You may appeal the Board's final action on a petition for reconsideration within 20 days from the date the order is mailed. Please note, if the Board fails to act on the petition with 20 days of its filing, it is deemed denied.

FREQUENTLY USED TERMS

AIR POLLUTION CONTROL AGENCY: a local or regional agency authorized under the Washington Clean Air Act, RCW 70.94, to issue orders and assess penalties for air pollution violations, and to issue notices of construction for new air emission sources.

APPEAL: A request for review of a decision filed with the Board.

APPELLANT: A person or entity bringing the appeal.

BOARD: The Washington State Pollution Control Hearings Board.

DISMISSAL: Dismissal is an order entered by the Board terminating the appeal, canceling the hearing, and ending the Board's consideration of the case.

ECOLOGY: The Washington State Department of Ecology.

INTERVENOR: A third party asking to be heard in an appeal.

PARTY: A person who is an appellant, respondent, or intervenor.

PERSON: An individual, partnership, corporation, association, organization, governmental subdivision, agency, or entity of any character.

PRESIDING OFFICER: A member of the Board or an Administrative Appeals Judge who is assigned by the chair or vice-chair to conduct a conference or hearing

RESPONDENT: A person or entity on the other side of the dispute from the appellant.

STIPULATION: An agreement between the parties.

The Environmental Hearings Office does not discriminate in employment or any of its services against persons with disabilities, and will make reasonable accommodations for any citizen who needs assistance to participate in our hearings or other activities. If a party or a witness requires an interprter, or qualifies for reasonable accommodations, that person shall notify the presiding officer at least three weeks before the hearing or situation for which assistance is needed.

Judy/Office/PCHBPAMP 10/04

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

September 18, 2006

CERTIFIED MAIL (7003 1680 0007 1553 7948)

Washington State University
McCuskey Services Building
Pullman, WA 99164

Dear Sir or Madam:

Re: Application for Change of Water Right Claim No. 098524

Enclosed please find a copy of the Department of Ecology's Report of Examination. This report constitutes our determination and order regarding the above-referenced application. A copy of this Report of Examination has been sent to the protestants.

Your application has been denied.

You have the right to appeal this order to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this action or decision, your notice of appeal must contain a copy of the Ecology order, action or decision you are appealing.

Your appeal must be filed with:
The Pollution Control Hearings Board
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
P.O. Box 40903
Lacey, Washington 98504-0903

Your appeal must also be served on:
The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, Washington 98504-7608

RECEIVED
SEP 19 2006
FACILITIES OPERATIONS

In addition, please send a copy of your appeal to:

Department of Ecology
Keith L. Stoffel, Section Manager
4601 North Monroe Street
Spokane, Washington 99205

DATED this 18th day of September, 2006, at Spokane, Washington.

Keith L. Stoffel
Section Manager
Water Resources Program
Eastern Regional Office

KLS:ka
Enclosures

I certify that I mailed this letter or an identical copy thereof, postage prepaid, to the above addressee(s) this 18th day of September, 2006.
Water Resources Program, Secretary Lead, Kay Allhiser KA

cc: Dianne French
Rachael Osborn for Scotty Cornelius

RECEIVED
SEP 19 2006
FACILITIES

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Application for Change
REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
1946			Claim No. 098524

NAME
Washington State University

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
McCuskey Services Bldg.	Pullman	WA	99164

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
1 well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	1000	1440

QUANTITY, TYPE OF USE, PERIOD OF USE
1000 gallons per minute, 1440 acre-feet per year continuously for municipal supply, irrigation, stockwater

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
DENIED

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
		14/15	45	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

DENIED

RECEIVED
SEP 19 2006
FACILITIES OPERATIONS

DESCRIPTION OF PROPOSED WORKS

1 well

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:

REPORT

Background

An application for change/transfer was submitted by Washington State University (WSU) of Pullman, Washington to the Department of Ecology on October 28, 2004. WSU proposes to integrate its existing wells, by adding seven (7) existing points of withdrawal as claimed under Water Right Claim No. 098524. WSU also proposes to change the place of use to the area served by Washington State University to be consistent with the approved water service area. WSU has proposed changes to all of its existing ground water right documents in this area.

A notice of application was duly published in accordance with RCW 90.03.280 in the Pullman Daily News on January 14 and 21, 2005 and contained errors. An amended notice was duly published May 5 and 12, 2005. Two protests were received during the protest periods and will be discussed later in the report.

This application is not exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, due to the fact that the cumulative quantities of water for this project under all water rights, including those proposed for change herein, constitute a withdrawal of more than 2,250 gallons per minute. After review of a completed environmental checklist and other information, this proposal was determined to not have a significant adverse impact on the environment. A final Declaration of Non-Significance was issued by WSU on June 7, 2004.

Investigation

In considering the proposed change, the investigation included, but was not limited to, research and review of: (1) appropriate rules and statutes, (2) Ground Water Claim 098524 and other water rights/claims/applications in the vicinity, (3) water well reports for the applicant's wells, (4) USGS topographic maps, (5) Comprehensive Water System Plan for WSU dated 2001), (6) discussions with Gary Wells, and (7) review by Department of Ecology regional program staff hydrogeologists.

A field investigation was conducted by Kevin Brown on October 20, 2005 with Gary Wells. WSU withdraws water under the following seven (7) water right documents:

Ground Water Claim 098522

Priority Date:	year 1934
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #1

Ground Water Claim 098523

Priority Date:	year 1938
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #2

Ground Water Claim 098524

Priority Date:	year 1946
Instantaneous Quantity (Qi):	1000 gallons per minute
Annual Quantity (Qa):	1440 acre-feet per year
Purpose:	municipal supply, irrigation and stock
Source:	A well - #3

Certificate 5070-A

Priority Date:	August 1, 1962
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	domestic supply for WSU
Source:	A well - #4

Certificate 5072-A

Priority Date:	May 27, 1963
Instantaneous Quantity (Qi):	500 gallons per minute
Annual Quantity (Qa):	720 acre-feet per year
Purpose:	community domestic supply and stock water
Source:	A well - #5

Certificate G3-22065C

Priority Date:	November 12, 1973
Instantaneous Quantity (Qi):	1500 gallons per minute
Annual Quantity (Qa):	1600 acre-feet per year
Purpose:	municipal supply
Source:	A well - #6

Permit G3-28278P

Priority Date:	January 28, 1987
Instantaneous Quantity (Qi):	2500 gallons per minute
Annual Quantity (Qa):	2260 acre-feet per year
Purpose:	municipal supply
Source:	A well - #7

An application for change has been filed on each of the above described water right documents. Each right will have its own determination.

Water Rights

Seven water right documents are appurtenant to the campus. There are additional rights held by the school for isolated locations that are not addressed in this review. The campus rights are as follows:

Water Right	Qi	Qa	Priority Date	Type	Source
Claim 098522	500	720	1934	Primary*	1
Claim 098523	500	720	1938	Primary	2
Claim 098524	(1000)	(1440)	1946 (not valid)	Not valid*	3
Cert 5070-A	1500	2260	1962	Primary*	4
Cert 5072-A	500	720	1963	Primary	5
G3-22065C	1500	1600	1973	Primary	6, 8
G3-28278P	2500*	2260*	1987	Supplemental*	7
Totals	**5000 GPM**	**5300 AFY**			

*Permit issued with a provision -less those amounts appropriated underground Water Cert. 5070-A, and Ground Water Claims 98522 and 98524. Total combined quantity shall not exceed 2500 gallons per minute, 2260 acre-feet per year.

The above water analysis totals are consistent with the 2001 comprehensive water plan.

Evaluation of the Water Right Claim

Ground Water Claim 098524 was filed by WSU during the claims registration act. The claim was submitted to Ecology describing the use of water from Well No. 3 in the amount of 1000 gallons per minute, 1440 acre-feet per year for municipal supply, irrigation and stockwater with the date of first use described as 1946.

The intent of the Claims Registration Act, Chapter 90.14 RCW, was to document those uses of surface water in existence prior to the adoption of the State Surface Water Code, Chapter 90.03 RCW, which was adopted in 1917, and those uses of ground water in existence prior to the adoption of the State Ground Water Code, Chapter 90.44 RCW, which was adopted in 1945. Since each code(s) adoption, the only means of acquiring a water right within the state is by filing for, and receiving, a permit from the Department of Ecology or one of its predecessors or by establishing a right under the "domestic exemption" under the ground water code (RCW 90.44.050). The Department of Ecology recognizes that the final determination of the validity and extent associated with a claim registered in accordance with RCW 90.14 ultimately lies with the Superior Court through the general adjudication process provided for by Sections 90.03.110 through 90.03.240 RCW.

Well No. 3 was constructed in 1946. The claimed use was not prior to 1945. Lacking evidence of a beneficial use prior to 1945, no further evaluation of the requested change is being conducted.

Conclusion

It is the conclusion of this examiner that, in accordance with Chapters 90.03 and 90.44 RCW, this application for change to integrate the existing water system by adding six (6) existing wells and changing the place of use of Water Right Claim No, 98524 be and is DENIED. It does not appear the claim 98524 represents a valid water right.

Recommendations

The applicant's application for change request under Ground Water Claim 098524 is **DENIED.**

The Department of Ecology recognizes that the final determination of the validity and extent associated with a claim registered in accordance with RCW 90.14 ultimately lies with the Superior Court through the general adjudication process provided for by Sections 90.03.110 through 90.03.240 RCW. The claim will remain on record.

Signed and dated at Spokane, Washington this 18th day of September. 2006

By Kevin Brown

Kevin Brown
Water Resources Program
Eastern Regional Office

FEB 1 8 2008

KB:VL:ka
W/DraftROEs/Brown2006

WASHINGTON STATE POLLUTION CONTROL HEARINGS BOARD
ENVIRONMENTAL HEARINGS OFFICE
4224 - 6th Avenue SE, Rowe Six, Bldg. 2
PO Box 40903
Lacey Washington 98504-0903
(360)459-6327 Fax: (360)438-7699
Web Address: http://www.eho.wa.gov
E-Mail: eho@eho.wa.gov

"Your Right to Be Heard"

Board Members
William H. Lynch, Chair
Bill Clarke
David W. Danner

Administrative Appeals Judges
Phyllis K. Macleod
Eric Z. Lucas
Kay Brown

Administrative Assistant
Robyn Bryant

Hearing Coordinator
Judy Greear

Secretary
Sharon Ziegler

This is your informal guide to your rights and responsibilities in an appeal. It is not exclusive and **does not have force and effect of state law or regulation.** More detailed information, in RCW 43.21B, the act creating the Pollution Control Hearings Board, and in a chapter of the Washington Administrative Code entitled, "Rules of Practice and Procedure of the Pollution Control Hearings Board, WAC 371-08," is available at your county law library or upon request from the Environmental Hearings Office and at the Environmental Hearings Office website at http://www.eho.wa.gov. For more detailed information, please open up on the web page the *Environmental Hearings Office Handbook* and the *Environmental Hearings Office Sample Formbook.* ALTERNATE FORMAT AVAILABLE UPON REQUEST

YOUR RIGHT TO BE HEARD

The Pollution Control Hearings Board (PCHB) hears appeals from orders and decisions made by:

1. Local and regional air pollution control agencies or authorities.
2. The State Department of Ecology, and
3. Other agencies as provided by law.

The Board's sole function is to give you, and all other litigants in a disputed matter, a full and complete hearing, as promptly as possible, followed by a fair and impartial written decision based on the facts and law.

The Board is not affiliated with the Department of Ecology or any other agency. To insure the Board's impartiality, the state Legislature created this independent, quasi-judicial state agency entirely separate from any other state, or regional resource or regulatory agency or local unit of government.

The Board consists of three full-time members, who are appointed by the governor and confirmed by the State Senate for staggered six-year terms. One of the three must be an attorney. All are salaried employees of the State, who also serve on the Shorelines Hearings Board.

DO YOU NEED AN ATTORNEY?

An attorney may represent you, but the law does not require one. Consider this very carefully before deciding to represent yourself. The appeal process can be complicated and significant rights may be at stake. The hearings are conducted more like court trials, instead of city council meetings.

WHEN, WHERE, AND HOW TO FILE AN APPEAL

No fee is required for filing an appeal.

The Board must RECEIVE your appeal within 30 days of the "receipt" of the order or decision. "Date of Receipt" is defined in RCW 43.21B.001(2)

The original of the appeal must be filed with the Board at:

Pollution Control Hearings Board
4226 6th Avenue SE
Bldg 2 Rowe Six
PO Box 40903
Lacey WA 98504-0903

Within 30 days of receipt of the decision, you must also serve a copy of your appeal with the Department of Ecology or Air Pollution Authority or other agency whose order or decision you are appealing.

If you are appealing a decision on a permit, you should also serve a copy of your appeal on the holder of the permit unless you are the permittee.

Failure to observe the 30 day deadline for filing with the Board and serving the Department of Ecology or Air Pollution Control Authority or other agency will result in termination and dismissal of the appeal.

Service on all parties shall be by personal service or by mail. Service by mail is effective on the date of mailing; however, filing with the Board is only effective on actual receipt by the Board.

Filing of the appeal does not stop (stay) the effectiveness of an appealed permit. For information on how to obtain a stay or temporary restraining order, please refer to RCW 43.21B.320 and Civil Rules for Superior Court 65 (CR 65).

SEP 19 2006

CONTENT OF THE APPEAL

our appeal should include the following ems:

A copy of the order or decision you are appealing, and if the order or decision followed an application, a copy of the application.
Your name and address (mailing and legal, if different) and, if applicable, the name and address of your representative.
A daytime phone number.
A brief statement why you are appealing.
The relief you seek (what you want the Board to do).
A statement, signed by you or your representative, attesting the content of the appeal is true.

IF YOUR PERMIT IS APPEALED

erhaps you have been granted a permit by e Department of Ecology, air authority or nother agency, but another party has ppealed. You have a right to defend the ermit and are automatically a respondent the appeal before the Board. All ubsequent sections in this publication pply to you as well as to the appellant.

HEARING DATES

Then an appeal is filed, the Board will ssign and notify you of a date for hearing e case.

THE PRE-HEARING CONFERENCE

oon after the appeal is filed, a pre-hearing nference is scheduled with the Presiding fficer. The pre-hearing conference is ually held within 4-6 weeks of the ppeals' filing and is generally conducted telephone. This conference is not for e purpose of arguing your case. The nference has three purposes: to discuss terest in settlement, including use of the oard's no-cost mediation program, to etermine the legal issues, and to set a hedule for preparing the case for hearing settlement is not reached. Prior to the e-hearing conference each party is quired to submit a preliminary list of gal issues, proposed witnesses and chibits. After the pre-hearing conference, written pre-hearing order will be mailed the parties. It will include the hearing date, the list of legal issues, hearing preparation deadlines, and other important procedural information.

CAN THIS DISPUTE BE SETTLED?

Litigation is time and energy consuming for the parties. Each party needs to think about possible compromise. For settlement to be reached, each side needs to offer something. Parties are encouraged to begin settlement talks, without waiting for Board participation.

The Board has a no-cost mediation program to assist parties in reaching settlement. It is a voluntary program offered to the parties without charge. All parties must agree to mediate before a mediation can be scheduled. A trained Administrative Appeals Judge will work with the parties to resolve the case.

If the parties settle directly or through mediation, a written document containing the settlement terms will ultimately be signed by all, and filed with the Board, which will dismiss the appeal if the settlement conforms to the law.

BEFORE THE HEARING

Before the hearing you will want to prepare. You have the right to review the agency's file of their decision. Contact it to arrange a time and place to see the file.

You and the other parties have the right to find out in advance what witnesses and other evidence will be used at the hearing. This may be provided to you without formal procedures, such as by looking at public records. If done formally, this discovery is best accomplished with the assistance of a lawyer. Examples of formal discovery are: **Deposition**-questioning witnesses before the hearing, under oath with a court reporter present. **Interrogatory**-presenting written questions to the other side. There are formal rules that apply to discovery.

MOTIONS

Any party may file a motion. A motion is a request by one of the parties asking the Board, or the Presiding Officer to rule on a particular issue.

A motion may be dispositive or non-dispositive. A dispositive motion may be based on an issue or issues, or the whole case. A non-dispositive motion is a request for relief, which does not decide an issue or issues or the whole case. An example of a non-dispositive motion is a motion in limine. A motion in limine asks the Board, in advance of the hearing to exclude certain evidence. Dispositive motions are decided by the full Board. An example of a dispositive motion is a motion for summary judgment. A motion for summary judgment is typically based on sworn statements of fact from a person having personal knowledge of the facts alleged. A sworn statement may be either a declaration or an affidavit. An example of a declaration may be found on page 28 of the Environmental Hearings Office (EHO) Sample Formbook. This Formbook may be found by going to the EHO website at http://www.eho.wa.gov. After you have opened to the home page, click on the "Resources" button under "Research." When that page opens up, click on "The Environmental Hearings Office Sample Formbook" under "Other Resources."

A declaration or affidavit may also identify and attach documents as exhibits. This is the format of the declaration contained in the EHO Sample Formbook.

Dispositive Motions

The scheduling of dispositive motions is set forth in the pre-hearing order. Please file with the Board an original and sufficient copies of the dispositive motion for each Board member and the presiding officer, if the presiding officer is not a Board member. A copy should be served simultaneously on the date the motion is filed, on each party in the case.

Any party opposing the motion will typically have 10 days from the day it received the motion, to file an original and the requisite copies of a response with the Board, and serve a copy on each of the other parties. The moving party generally will have seven days from the date it receives the response, to file an original and the requisite copies of a reply with the Board, and serve a copy on each of the other parties. Any party may request an oral hearing from the Presiding Officer on the motion. The Presiding Officer determines whether to grant or deny the request. If the request is granted, the parties will typically personally appear and present their oral argument to the Board at its hearing room in Lacey, Washington.

Non-dispositive Motions

The deadlines for responding and replying to non-dispositive motions will generally be shorter than the above deadlines for dispositive motions. Additionally, most non-dispositive motions will be reviewed and decided solely by the Presiding Officer. In those situations, the parties need only supply an original and one copy of the pleadings to the Board.

HEARING

At the hearing, it is important to be on time. A party's failure to appear may result in default.

You will have your full opportunity to present your side of the case, but there is a judicial procedure to be followed, so that all sides can be heard in an orderly manner.

The Presiding Officer for the Board manages the proceedings. A court reporter will record what is said. The appellant usually has the obligation to present his or her case first. Then, the respondent will present its case. In a case involving a penalty or a regulatory order, the agency assessing the penalty is required to present its case first.

Each side has the right to make an **opening statement**, briefly outlining what its evidence will be. After the opening statements, the parties with the burden of proof will present its evidence. In a penalty or regulatory action, the agency has the burden of proof and will call witnesses first. In a permit appeal, the appealing party has the burden of proof and presents its witnesses first at the hearing.

In certain cases, the Presiding Officer may determine a **site visit** would be helpful to the Board's understanding of the evidence. At such a visit, the parties are requested to limit communication with the Board during the site visit. It is appropriate to point out physical landmarks, to help the Board later, at the hearing, but a court reporter is not present during the site visit, and it is not the time to present evidence or argue your case.

After the site visit, we return to the hearing. Witnesses who are sworn to tell the truth, testify from their personal knowledge in response to questions from the party calling that witness. After this **direct testimony**, the witness answers questions asked by the other parties during "**cross-examination.**" The Board members may also ask questions.

Persons essential to your case need to be present at the hearing to testify as witnesses. The "hearsay" rule prevents you from testifying for them or relating what they know or what they have said.

Exhibits, such as letters, contracts, photographs, and maps, etc. may be offered as evidence. Before the hearing, number your exhibits and prepare an exhibit list. At the hearing, you will need to have the original and one copy for each member of the Board, the Presiding Officer, if not a Board member, and for the other parties. If you have multiple exhibits, please place them in a binder.

After all the evidence has been presented, litigants can summarize their arguments in closing statements. The hearing is then closed and no further evidence is taken.

THE BOARD'S DECISION

The Board will deliberate on the testimony, exhibits, and final arguments, before issuing a written decision.

The written decision called "Findings of Fact, Conclusions of Law and Order" is prepared and mailed to all litigants generally within 90 days after the hearing, or after the submission of memoranda, briefs, or proposed findings.

YOU MAY APPEAL THE FINAL ORDER

The Board's decision may be appealed to Superior Court within 30 days from the date of the **ORDER is received**, or you may file a petition with the Board for a reconsideration within 10 days of the date of the mailing of the **ORDER**

You may appeal the Board's final action on a petition for reconsideration within 20 days from the date the order is mailed. Please note, if the Board fails to act on the petition with 20 days of its filing, it is deemed denied.

FREQUENTLY USED TERMS

AIR POLLUTION CONTROL AGENCY: a local or regional agency authorized under the Washington Clean Air Act, RCW 70.94, to issue orders and assess penalties for air pollution violations, and to issue notices of construction for new air emission sources.

APPEAL: A request for review of a decision filed with the Board.

APPELLANT: A person or entity bringing the appeal.

BOARD: The Washington State Pollution Control Hearings Board.

DISMISSAL: Dismissal is an order entered by the Board terminating the appeal, canceling the hearing, and ending the Board's consideration of the case.

ECOLOGY: The Washington State Department of Ecology.

INTERVENOR: A third party asking to be heard in an appeal.

PARTY: A person who is an appellant, respondent, or intervenor.

PERSON: An individual, partnership, corporation, association, organization, governmental subdivision, agency, or entity of any character.

PRESIDING OFFICER: A member of the Board or an Administrative Appeals Judge who is assigned by the chair or vice-chair to conduct a conference or hearing

RESPONDENT: A person or entity on the other side of the dispute from the appellant.

STIPULATION: An agreement between the parties.

The Environmental Hearings Office does not discriminate in employment or any of its services against persons with disabilities, and will make reasonable accommodations for any citizen who needs assistance to participate in our hearings or other activities. If a party or a witness requires an interprter, or qualifies for reasonable accommodations, that person shall notify the presiding officer at least three weeks before the hearing or situation for which assistance is needed.

Judy/Office/PCHBPAMP 10/04

SEP 19 2006

APPENDIX E

Item 2 – Water Rights, Certificates, Permits and Claims

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JAN 25 1974 177233
CASH ___ OTHER ___ NONE ___

1. NAME ~~[illegible]~~ WASHINGTON STATE UNIVERSITY

ADDRESS ~~[illegible]~~

Pullman, Washington ZIP CODE 99163

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water (SURFACE OR GROUND WATER)

W.R.I.A. 34 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Well No. 1

B. IF SURFACE WATER, THE SOURCE IS N.A.

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 500 gpm PRESENTLY USED 450 (GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 720 PRESENTLY USED 161 (ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED part of 1678 PRESENTLY IRRIGATED part of 530

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: continuously

4. DATE OF FIRST PUTTING WATER TO USE: MONTH ___ YEAR 1934

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 1450 FEET North AND 75 FEET West FROM THE Center CORNER OF SECTION 5

BEING WITHIN Lot 3 OF SECTION 5 T. 14 N., R. 45 (E. ~~OR W.~~) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT 2 BLOCK 8 OF Reaney's Addition to Pullman, Washington (GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Washington State University campus and contiguous University owned land located in Sections 3, 4 and 5, T.14N., R.45 E.W.M. and Sections 32, 33 and 34, T.15N., R.45 E.W.M. containing 1678 acres more or less in the

COUNTY of Whitman

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal Supply, Irrigation and stock water

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Appropriation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

JAN 675098522

DIRECTOR - DEPARTMENT OF ECOLOGY

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X V L Shelton

DATE March 12, 1974

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

V. L. Shelton, Vice President—Finance
436 French Administration Building
Washington State University
Pullman, Washington 99163

☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $200 MUST ACCOMPANY EVERY WATER RIGHT CLAIM

RETURN ALL THREE COPIES WITH CARBONS INTACT ALONG WITH YOUR FEE TO
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION
OLYMPIA, WASHINGTON 98504

ORIGINAL DWR

Well #2

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JAN 25 1974 77234
CASH ___ OTHER ___ NONE ___

1. NAME ~~XXXXXXXXXXXXXXX~~ WASHINGTON STATE UNIVERSITY

ADDRESS ~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~

Pullman, Washington ZIP CODE 99163

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water (SURFACE OR GROUND WATER)

W.R.I.A. 34 (LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Well No. 2

B. IF SURFACE WATER, THE SOURCE IS N. A.

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 500 gpm PRESENTLY USED 350
(~~CUBIC FEET PER SECOND~~ GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 720 PRESENTLY USED 130
(ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED part of 1678 PRESENTLY IRRIGATED part of 530

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: continuously

4. DATE OF FIRST PUTTING WATER TO USE: MONTH ___ YEAR 1938

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 1223 FEET North AND 34 FEET West FROM THE Center CORNER OF SECTION 5

BEING WITHIN SE 1/4 NW 1/4 OF SECTION 5 T. 14 N., R. 45 (E~~XXX~~.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT ___ BLOCK ___ OF ___
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Washington State University campus and contiguous University owned land located in Section 3, 4 and 5, T. 14N., R. 45 E.W.M. and Sections 32, 33 and 34, T. 15N., R. 45 E.W.M. containing 1678 acres more or less in the

COUNTY of Whitman

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal Supply, Irrigation and stock water

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Appropriation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED ___ THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

Jan 75098523

DIRECTOR - DEPARTMENT OF ECOLOGY

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X V. L. Shelton

DATE March 12, 1974

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

V. L. Shelton, Vice President--Finance
436 French Administration Building
Washington State University
Pullman, Washington 99163

☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

~~A FEE OF $2.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM~~

RETURN ALL THREE COPIES WITH CARBONS INTACT, ALONG WITH YOUR FEE TO:
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION
OLYMPIA, WASHINGTON 98504

ORIGINAL DWR

Well #3

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

WATER RIGHT CLAIM

RECEIVED
DEPARTMENT OF ECOLOGY
JAN 25 74 177235
CASH ___ OTHER ___ NONE ___

1. NAME ~~Xxxxxx Xxxxxx~~ WASHINGTON STATE UNIVERSITY

ADDRESS ~~Xxxxxxxxx Xxxxx~~

Pullman, Washington ZIP CODE 99163

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED: Ground Water
(SURFACE OR GROUND WATER)

W.R.I.A. 34
(LEAVE BLANK)

A. IF GROUND WATER, THE SOURCE IS Well No. 3

B. IF SURFACE WATER, THE SOURCE IS N.A.

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:

A. QUANTITY OF WATER CLAIMED 1,000 gpm PRESENTLY USED 1,000
(~~Xxxxxxxxxxxxxxx~~ GALLONS PER MINUTE)

B. ANNUAL QUANTITY CLAIMED 1440 PRESENTLY USED 628
(ACRE FEET PER YEAR)

C. IF FOR IRRIGATION, ACRES CLAIMED part of 1678 PRESENTLY IRRIGATED part of 530

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED: continuously

4. DATE OF FIRST PUTTING WATER TO USE: MONTH ___ YEAR 1946

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL: 1390 FEET North AND 77
FEET West FROM THE Center CORNER OF SECTION 5

BEING WITHIN Lot 3 OF SECTION 5 T. 14 N., R. 45 (E~~xxx~~.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT 1 BLOCK 8 OF
Reaney's Addition to Pullman, Washington
(GIVE NAME OF PLAT OR ADDITION)

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED: Washington State University campus and contiguous University owned land located in Sections 3, 4 and 5, T.14N., R.45 E.W.M. and Sections 32, 33 and 34, T.15N., R.45 E.W.M. containing 1678 acres more or less in the

COUNTY of Whitman

7. PURPOSE(S) FOR WHICH WATER IS USED: Municipal Supply, Irrigation and stock water

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Appropriation

DO NOT USE THIS SPACE

THE FILING OF A STATEMENT OF CLAIM DOES NOT CONSTITUTE AN ADJUDICATION OF ANY CLAIM TO THE RIGHT TO USE OF WATERS AS BETWEEN THE WATER USE CLAIMANT AND THE STATE OR AS BETWEEN ONE OR MORE WATER USE CLAIMANTS AND ANOTHER OR OTHERS. THIS ACKNOWLEDGEMENT CONSTITUTES RECEIPT FOR THE FILING FEE.

DATE RETURNED THIS HAS BEEN ASSIGNED WATER RIGHT CLAIM REGISTRY NO.

Jan 675098524

DIRECTOR, DEPARTMENT OF ECOLOGY John Biggs

I HEREBY SWEAR THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X V L Shelton

DATE March 12, 1974

IF CLAIM FILED BY DESIGNATED REPRESENTATIVE, PRINT OR TYPE FULL NAME AND MAILING ADDRESS OF AGENT BELOW.

V. L. Shelton, VLice President--Finance
436 French Administration Building
Washington State University
Pullman, Washington 99163

☐ ADDITIONAL INFORMATION RELATING TO WATER QUALITY AND/OR WELL CONSTRUCTION IS AVAILABLE

A FEE OF $20.00 MUST ACCOMPANY THIS WATER RIGHT CLAIM

RETURN ALL THREE COPIES WITH CARBONS INTACT, ALONG WITH YOUR FEE TO:
DEPARTMENT OF ECOLOGY
WATER RIGHT CLAIMS REGISTRATION

ORIGINAL - DNR

STATE OF WASHINGTON, COUNTY OF Whitman

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That WASHINGTON STATE UNIVERSITY

of Pullman, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well (No.4)

located within NE SE NW; and Lot 1, Block 8 of Reaney's Addition to Pullman

Sec. 5, Twp. 14 N., R. 45 E.W.M.,

for the purpose of domestic supply (for Washington State University)

under and subject to provisions contained in Ground Water Permit No. 6064 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 11 at page 5070-A;

that the right hereby confirmed dates from August 1, 1962; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1,500 gallons per minute; 2,260 acre-feet per year for domestic supply for Washington State University.

Special provisions required by the Supervisor of Water Resources:

A description of the lands to which such ground water right is appurtenant:

Washington State University campus, Pullman, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 26th day of February, 19 65.

M. O. Walker

State Supervisor of Water Resources

CERTIFICATE RECORD No. 11 PAGE No. 5072-A

STATE OF WASHINGTON, COUNTY OF Whitman

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That WASHINGTON STATE UNIVERSITY

of Pullman, Washington, has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a W.S.U. Well No. 5

located within NE¼SW¼

Sec. 34, Twp. 15 N., R. 45 E. W.M.,

for the purpose of community domestic supply and stock water

under and subject to provisions contained in Ground Water Permit No. 6373 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 11 at page 5072-A, that the right hereby confirmed dates from May 27, 1963; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 500 gallons per minute; 720 acre-feet per year for community domestic supply and stock water.

Special provisions required by the Supervisor of Water Resources:

A description of the lands to which such ground water right is appurtenant:

Washington State University Campus, Pullman, Washington.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 24th day of February, 19 65.

M. B. Walker

State Supervisor of Water Resources

DEPARTMENT OF ECOLOGY

#6

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

RIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
November 12, 1973	G3-22065	G3-22065P	G3-22065C

NAME
WASHINGTON STATE UNIVERSITY

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
Dept. of Physical Plant	Pullman	Washington	99163

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
a well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	1500	1600

QUANTITY, TYPE OF USE, PERIOD OF USE
1500 gallons per minute, 1600 acre feet per year, continuously, for municipal supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
400 feet south and 700 feet east of the northwest corner of Sec. 4

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼	4	14	45 E.	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Washington State University campus and contiguous University owned land located in Secs. 3, 4, and 5, T. 14 N., R. 45 E.W.M. and Secs. 32, 33, and 34, T. 15 N., R. 45 E.W.M.

authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

Certificate holder shall maintain an access port as described in Ground Water Bulletin No. 1.

A suitable measuring device approved by the Department of Ecology shall be maintained in accordance with WAC 508-64-020 through WAC 508-64-040.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Spokane, *Washington, this* 22nd *day of* June, *19* 78

WILBUR G. HALLAUER, Director
Department of Ecology

ENGINEERING DATA

OK.....

by JOHN L. ARNQUIST, Regional Manager

FILED FOR RECORD

REQUEST OF Dept of Ecology *FOR COUNTY USE ONLY*

JUN 23 1978
8:00 AM.
JAMES REPP, COUNTY AUDITOR
WHITMAN COUNTY, WASH.
DEPUTY Jeanne M. Long

INDEXED
DIRECT ✓
REVERSE ✓

DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
January 28, 1987	G3-28278	G3-28278P	

NAME
WASHINGTON STATE UNIVERSITY

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
Physical Plant	Pullman	WA	99164

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
a well (No. 7)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	2500	2260

QUANTITY, TYPE OF USE, PERIOD OF USE
2500 gallons per minute, 2260 acre feet per year, continuously, for municipal supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL
2290 feet south and 2380 feet west from the NE corner of Sec. 5

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
WSU Campus - SW¼SW¼NE¼	5	14	45 E	34	Whitman

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

WSU Campus and contiguous University owned land located in Secs. 3, 4, & 5, T. 15 N., R. 45 E.W.M., and Secs. 32, 33, & 34, T. 15 N., R. 45 E.W.M., Whitman County, Washington.

DESCRIPTION OF PROPOSED WORKS

. Vertical Turbine pump; integrated into existing distribution system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	April 1, 1990	April 1, 1991

6064 098523-2

4 #4 #3

PROVISIONS

The quantities granted under this permit are issued less those amounts appropriated under Ground Water Certificate No. 5070-A and Ground Water Claims No. 098522 and No. 098524. The total combined withdrawal under this permit and Ground Water Certificate No. 5070-A shall not exceed 2500 gallons per minute, 2260 acre feet per year. 6064

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 and/or WAC 508-64-020 through WAC 508-64-040.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required for the actual crop grown on the number of acres and the place of use specified.

This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

A certificate of water right will not be issued until a final examination is made.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

A well log of the completed well shall be submitted by the driller to the Department of Ecology within thirty (30) days of completion of this well. This well log shall be complete and all information concerning the static water level in the completed well in addition to any pump test data shall be submitted as it is obtained.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Spokane *Washington, this* 7th *day of* February, *19*89

CHRISTINE O. GREGOIRE, Director
Department of Ecology

by ..... THEODORE M. OLSON, P.E., Section Supervisor
Water Resource Program

ENGINEERING DATA
OK ..... DEF

APPENDIX E

Item 3 – WSU Memorandum Regarding Proposed Well No. 8

WASHINGTON STATE UNIVERSITY

Facilities Operations

MEMORANDUM

TO: Ev Davis

FROM: Gary Wells

DATE: August 30, 2001

SUBJECT: Water Right for New Well #8

To drill a replacement well on an existing water right, a minimal amount of time will be required. The following steps will be necessary:

1. File a notice of intent with DOE to drill a replacement well on existing water right.
2. Drill and construct the well.
3. File a DOE notice showing compliance with RCW 99.44.100(3).

To change water right for new well from 1,500 gpm to 2,500 gpm will require a change of water right source. The total water right for our old wells is:

Well #1	500 gpm
Well #2	500 gpm
Well #3	1,000 gpm
Well #4	1,500 gpm
Well #5	500 gpm
Well #6	1,500 gpm
Total	5,500 gpm

The permit for Well #7 assigns 2,500 gpm of the 3,000 gpm for Wells 1, 3, and 4, to Well #7. A change of water right source will essentially assign 2,500 gpm of the remaining water right to the new well. We will still be able to operate any well or wells that we want as long as we do not withdraw at a total rate that exceeds 5,000 gpm.

To change the water right source for Well #6 will require the following steps:

1. Meet with DOE to determine which existing permits will be involved.
2. File an application for change of water right source with DOE.
   - Publication of notice – 2 weeks
   - Protest period – 30 days
3. DOE will prepare report of examination and give decision – years.

As this process may take years, we should go ahead and submit our application. DOE processes the applications in the order that they are received.

I have attached other water system data that you requested.

McCluskey Services Building, PO Box 641150, Pullman, WA 99164-1150
509-335-9000 • Fax: 509-335-9304

APPENDIX E

Item 4 – Department of Ecology Water Rights Review Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

August 14, 2015

RECEIVED
AUG 17 2015
DEPARTMENT OF HEALTH
EASTERN REGIONAL OFFICE

Mr. Gene Patterson
Washington State University
P.O. Box 641150
Pullman, WA 99164-1150

Dear Mr. Patterson:

Re: Washington State University; PWS ID # 93200; Whitman County
Comprehensive Water System Plan: DOH Project #15-0714

I have reviewed the above referenced document in accordance with the *2007 Memorandum of Understanding* between Department of Health (DOH) and Department of Ecology (DOE), and in accordance with RCW 90.03.386. Ecology's review is focused only on the subject water system's water rights legitimacy, adequacy and related issues affecting the submitted report.

Washington State University (WSU) has three water right certificates, one permit and 2 valid claims. The water system is designated as municipal water supplier according to RCW 90.03.015. The Water Right Status Tables 5-2 to 5-4 appear to be current and correct. In 2006, WSU was approved by Ecology to consolidate all of its source wells, so each well can pump up to 5000 gpm, the total instantaneous quantity (Qi). The annual total quantity (Qa) is authorized as 5300 acre-feet per year. WSU water system has adequate water right to support its current operation, 6 year forecast and 20 year growth.

These are my comments at this time. Please don't hesitate to contact me should you have any questions regarding this letter. I can be reached at (509) 329-3451 or by email at yifu461@ecy.wa.gov.

Sincerely,

Ying Fu
Water Resources Program
Eastern Regional Office

COPY

YF:md

cc: Brian Sayrs, DOH/Spokane Office
Victoria, DOE/ERO

APPENDIX E

Item 5 – DOH Capacity Table

Table 5-2
Existing Water Rights Status

Permit, Certificate or Claim #	Name of Right-holder or Claimant	Priority Date	Source Name/ Number	Primary or Supplemental	Existing Water Rights		Existing Consumption		Current Water Right Status (Excess/Deficiency)	
					Maximum Instantaneous Flow Rate(Qi) gpm/cfs	Maximum Annual Volume(Qa) AF/yr	Maximum Instantaneous Flow Rate (Qi) gpm/cfs	Maximum Annual Volume (Qa) Af/yr	Maximum Instantaneous Flow Rate (Qi) gpm/cfs	Maximum Annual Volume (Qa) AF/yr
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 AF/yr	3,250 gpm[1]	1,454 AF/yr[1]	1,750 gpm	3,846 AF/yr

Intertie Name/Identifier		Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Existing Consumption through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
			Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
1. WSU		Emergency Use Only	N/A	N/A	N/A	N/A	N/A	N/A
Total								

Pending Water Right Applications	Name on Application	Date Submitted	Primary or Supplemental	Maximum Instantaneous Flow Rate (Qi) Requested	Maximum Annual Volume (Qa) Requested
None	N/A	N/A	N/A	N/A	N/A

1. Existing consumption based on projected Average Day Demand of 1,296,515 gpd and a Maximum Day Demand of 4,680,418 gpd in 2014. See Chapter 2 for the water demand forecast.

Table 5-3 Forecasted Water Rights Status (2020)										
					Existing Water Rights		**Forecasted Water Use From Sources (6 Year Demand)**		**Forecasted Water Rights Status (Excess/Deficiency – 6 Year Demand in Water Right)**	
Permit, Certificate or Claim #	**Name of Right-holder or Claimant**	**Priority Date**	**Source Name/ Number**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate(Qi) gpm/cfs**	**Maximum Annual Volume(Qa) AF/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) Af/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) AF/yr**
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 Af/yr	3,268 gpm	1,462 AF/yr	1,732 gpm	3,838 AF/yr

			Existing Limits on Intertie Water Use		**Existing Consumption through Intertie**		**Current Intertie Supply Status (Excess/Deficiency)**	
Intertie Name/Identifier		**Name of Purveyor Providing Water**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**
1. WSU		Emergency Use Only	N/A	N/A	N/A	N/A	N/A	N/A
Total								

Pending Water Right Applications	**Name on Application**	**Date Submitted**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate (Qi) Requested**	**Maximum Annual Volume (Qa) Requested**
None	N/A	N/A	N/A	N/A	N/A

Table 5-4 Forecasted Water Rights Status (2034)										
					Existing Water Rights		**Forecasted Water Use from Sources (20 Year Demand)**		**Forecasted Water Rights Status (Excess/Deficiency – 20 Year Demand in Water Right)**	
Permit, Certificate or Claim #	**Name of Right-holder or Claimant**	**Priority Date**	**Source Name/ Number**	**Primary or Supplemental**	**Maximum Instantaneous Flow Rate(Qi) gpm/cfs**	**Maximum Annual Volume(Qa) AF/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) Af/yr**	**Maximum Instantaneous Flow Rate (Qi) gpm/cfs**	**Maximum Annual Volume (Qa) AF/yr**
Permit/Certificate										
1. Permit G3-28278P	WSU	01/28/87	Well No. 7	Supplemental (Qa)	2,500 gpm	2,260 AF/yr				
2. Cert. 5070-A	WSU	08/01/62	Well No. 4	Primary	1,500 gpm	2,260 AF/yr				
3. Cert. 5072-A	WSU	05/27/63	Well No. 5	Primary	500 gpm	720 AF/yr				
4. Cert. G3-22065C	WSU	11/12/73	Well Nos. 6 and 8	Primary	1,500 gpm	1,600 AF/yr				
Claims										
1. Claim 098522	WSU	1934	Well No. 1	Primary	500 gpm	720 AF/yr				
2. Claim 098523	WSU	1938	Well No. 2	Primary	500 gpm	720 AF/yr				
3. Claim 098524	WSU	1946	Well No. 3	Not Valid	(1,000 gpm)	(1,440 AF/yr)				
Total					5,000 gpm	5,300 Af/yr	3,569 gpm	1,596 AF/yr	1,431 gpm	3,704 AF/yr
					Existing Limits on Intertie Water Use		**Existing Consumption through Intertie**		**Current Intertie Supply Status (Excess/Deficiency)**	
Intertie Name/Identifier		**Name of Purveyor Providing Water**			**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**	**Maximum Instantaneous Flow Rate (Qi)**	**Maximum Annual Volume (Qa)**
1. WSU		Emergency Use Only			N/A	N/A	N/A	N/A	N/A	N/A
Total										
Pending Water Right Applications	**Name on Application**	**Date Submitted**		**Primary or Supplemental**	**Maximum Instantaneous Flow Rate (Qi) Requested**		**Maximum Annual Volume (Qa) Requested**			
None	N/A	N/A		N/A	N/A		N/A			

2015
Water System Plan Update
Washington State University
Pullman, Washington

final Report

VOLUME 3 of 3 APPENDIX II

Washington State University
World Class. Face to Face.

Prepared By

Taylor Engineering, Inc.
245 E. Main Street
Pullman, Washington 99163

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WASHINGTON STATE UNIVERSITY
April 1, 2016

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Wellhead Protection Program
December 2013

Washington State University
Pullman Campus

Gene Patterson
Public Health Manager
Environmental Health and Safety

Daniel J. Cappellini
Wellhead Protection Specialists
Evergreen Rural Water of Washington

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1. I. Introduction

This is the Wellhead Protection Program component of the WSU Water System Plan. This document outlines the Wellhead Protection Program WSU will use to identify, minimize, and manage the risks associated with the supply and quality of their groundwater resource.

II. Water Resources

WSU withdraws water from four wells (Well #4 [S04], Well #6 [S06], Well #7 [S08], and Well #8 [S09]). The following table describes individual well construction.

Well Number	Well Depth	First Open Interval	Static Water Level*
#4	275 ft	165 ft	120 ft
#6	702 ft	393 ft	295 ft
#7	1814 ft	512 ft	175 ft
#8	812 ft	542 ft	343 ft

*From Master Water File Test Well tables.

The aquifer is the Grande Ronde unit, the deepest and most productive unit of the Columbia Basin Basalt Group. Groundwater movement in the aquifer is estimated to be west through the well site. Details on well construction and aquifer material can be found in the well logs that are on file at WSU. Details on local geology can be found in USGS Water Resource Investigation Report 89-4103.

III. Susceptibility Assessment

Susceptibility is determined by conditions that affect the movement of groundwater, and thus contaminants, from the land surface into an aquifer. Susceptibility is a qualitative measure of how quickly and how far water originating at land surface must travel to enter the aquifer and reach a water source (well or spring). Confining units, well depth, construction and aquifer material are critical to susceptibility determinations.

In general, a confining unit is any earthen material that does not readily transmit water. Typically layers of clay or shale may act as confining units, depending on their thickness and lateral extent. Likewise, wells constructed with good surface seals which penetrate deep bedrock aquifers also have low susceptibility. Wells are less susceptible to contamination when confining units are present because they impede the movement of contaminants from the land surface into underlying aquifers.

The original drilling records for the WSU source wells indicate some confining layers present above the aquifer. All wells indicate an aquifer guarded from surface infiltration by several significant sequences of hard basalt interbeded with clay. Subsequently, this confinement maintains artesian pressure in the aquifer, which is a clear indication that the production zone is hydraulically confined and resistant to direct gravitational recharge from the geology immediately above. Based on the information provided by the utility in the Ground Water Contamination Susceptibility Assessment Survey Form, the WA State Department of Health (DOH) has rated Well #6 [S06], Well #7 [S08], and Well #8 [S09] with low susceptibility and Well #4 [S04] with moderate susceptibility.

The Susceptibility Assessment is also used to classify the vulnerability of a water source. Vulnerability is composed of two factors: the physical susceptibility (as noted above) and the sources risk of exposure to contaminants. The risk of exposure to contaminants is determined by whether or not contaminants are used in the area, or detected in the water supply. DOH has issued a low vulnerability rating for all WSU source wells; likewise there is no evidence of impact to water quality within the aquifer from local land use.

IV. Delineation

Aquifer recharge occurs through infiltration of precipitation in areas where the aquifer lies at or near the surface, or where confining units are thin or absent, permitting further infiltration into the aquifer. Ideally, all land areas that contribute recharge to the aquifer would be targeted for the Wellhead Protection Program. Unfortunately, the identification of precise recharge areas for wells is a technical and time consuming process. Further, they can include vast areas, making them difficult to manage. This is particularly important when confronted with artesian

conditions, local surface confinement, and high rates of horizontal groundwater movement: precisely the case confronting this water system. To address these problems, WSU focuses its protection efforts near the wellheads.

Several different methods may be used to determine the Wellhead Protection Area. The most straightforward method accepted by the state is a calculated fixed radius (CFR). This method is also used within the Susceptibility Assessment, which is used to grant source water monitoring waivers.

The Wellhead Protection areas were delineated using this simple volumetric flow equation: $r = \sqrt{(Q) \times (t) / (\Pi) \times (n) \times (H)}$ based on November 2012 to October 2013 pumping data.

Parameter	WPP Zone	Well #4 (S04)	Well #6 (S06)	Well #7 (S08)	Well #8 (S09)
r = calculated radius of protection zone (ft)	6 month	220	511	515	478
	1 year	312	722	729	675
	5 year	697	1615	1630	1510
	10 year	986	2285	2305	2136
Q = pumping rate of well per year (cu. ft. / yr) *		671,611	3,607,495	25,698,882	31,535,241
t = time of travel (years)		0.5, 1, 5, 10	0.5, 1, 5, 10	0.5, 1, 5, 10	0.5, 1, 5, 10
Π = Pi		3.14	3.14	3.14	3.14
n = estimated porosity (if unknown 0.22)		.22	.22	.22	.22
H = Open interval or length of well screen (ft) (use 10 ft if open borehole or spring)		10 Well does not have screens/ louvers	10 Well does not have screens/ louvers	70	100

* gallons x 0.1337 = cubic feet

Using the information above, the six month, one, five, and ten-year groundwater time of travel zones were delineated and the corresponding Wellhead Protection Areas are shown on the accompanying Map, included as Figure 1. Once again, it is important to emphasize that

Wellhead Protection Areas are useful planning tools, but do not represent precise groundwater capture zones for the wells. A more accurate Wellhead Protection Area depiction would require more information and resources than are currently available. Furthermore, developing an awareness of the systems contamination potential is a higher priority at this time. Managing regional groundwater quality issues and land use oversight within multijurisdictional recharge areas is the responsibility of the WA State Department of Ecology (DOE). DOE will be notified of WSU's Wellhead Protection Areas and reminded of the role the agencies play in protecting the WSU groundwater resource.

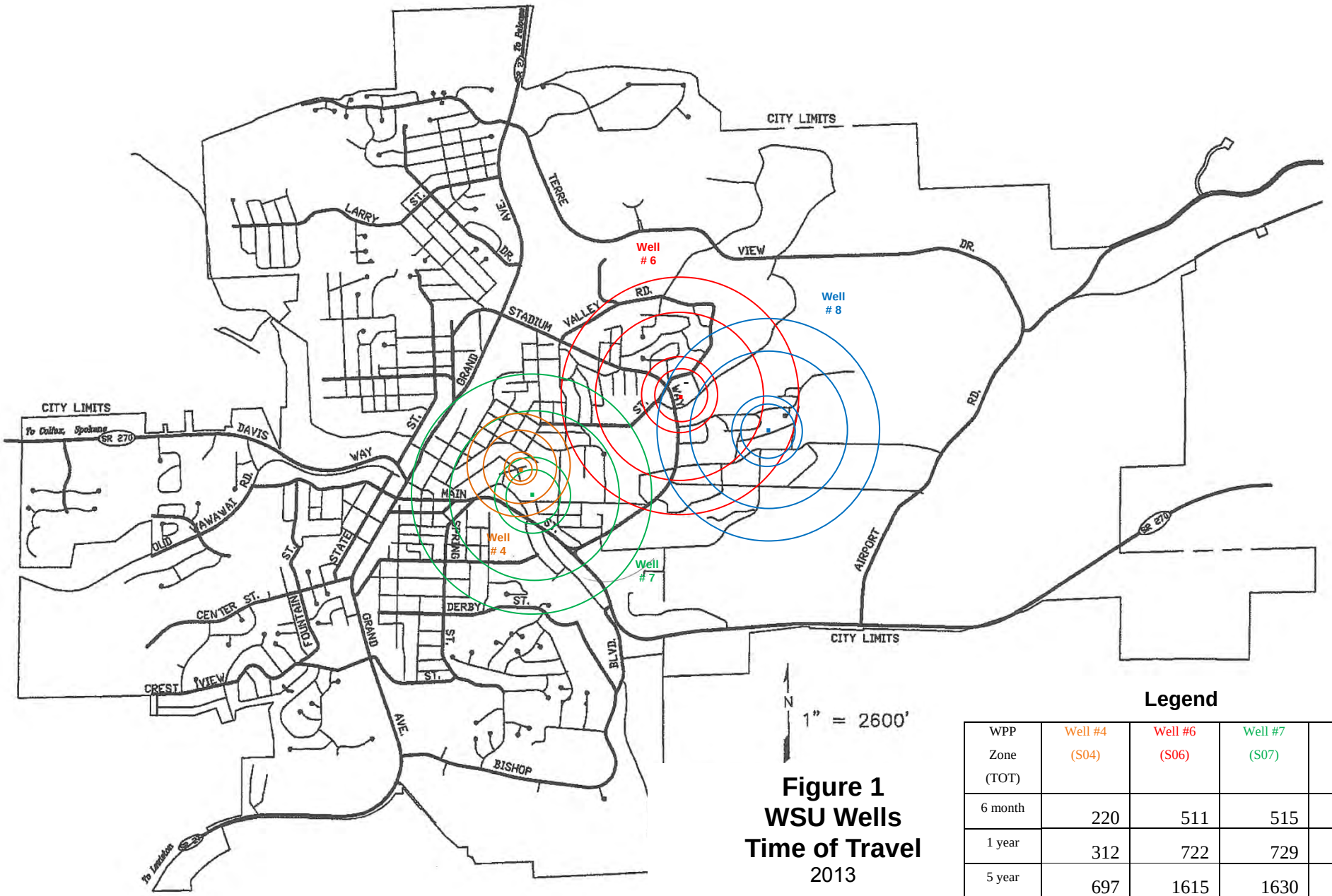

Figure 1
WSU Wells
Time of Travel
2013

Legend

WPP Zone (TOT)	Well #4 (S04)	Well #6 (S06)	Well #7 (S07)	Well #8 (S09)
6 month	220	511	515	478
1 year	312	722	729	675
5 year	697	1615	1630	1510
10 year	986	2285	2305	2136

V. Potential Contaminant Source Inventory

A field survey was conducted within the Wellhead Protection Areas in 2007 to inventory potential sources of contamination and identified land use activities hazardous to groundwater quality. A water system volunteer and an Evergreen Rural Water groundwater specialist performed a visual inspection of these Wellhead Protection Areas to examine the extent of the potential hazards within the Areas. No significant changes in land use have occurred since 2007.

Sanitary Control Areas: The wells are located on land owned by WSU within the campus compound. WSU Facilities Services and Environmental Health & Safety maintain a close watch over activities in and around the wells to ensure there is no immediate threat of direct aquifer contamination via a well's casing. Well construction and aquifer characteristics provide ample protection to minimize potential threat immediately surrounding the wells.

The following Potential Contaminant Sources have been identified by WSU Environmental Health & Safety however none of them are in 100 foot Sanitary Control Areas of the wells. For playfields and landscaping, the WSU Grounds Shop and Housing grounds crews use Best Management Practices to maintain irrigation, fertilizer, and pesticide application rates in order to minimize leaching into the local groundwater system. Therefore even though the playfields and landscaping are included as potential contaminant sources where they appear within the Wellhead Protection Areas, their risk to the WSU water sources has been minimized. As part of WSU's Wellhead Protection Program management efforts the ground crews have been notified with a reminder of the importance in their diligence with regard to this issue.

WSU Potential Contaminant Sources (none are in Sanitary Control Areas)
ADBF- above ground fuel tank for generator
Animal Sciences Lab 100 - above ground fuel tank for generator
Beasley Coliseum - above ground fuel tank for generator
Biosciences Lab - above ground fuel tank for generator
Farm Services Shop (#103) - above ground used oil tank and underground fuel tank
Golf Course Maintenance Shop – above ground fuel tank
Grimes Way Steam Plant - above ground fuel tank and underground fuel tanks
Motor Pool - petroleum contamination from previously removed underground storage tank- used oil tank
Murrow - underground storage tank and above ground fuel tank for generator
Natural Grass Playfields and Landscaping
Olympia Ave Residence Hall – above ground fuel tank for generator
Plant Growth Center #122 - above ground fuel tank for generator
Public Safety - above ground fuel tank for generator
Rogers – above ground fuel tank for generator
Smith CUE - above ground fuel tank for generator
Vet Isolation Barn - above ground fuel tank for generator
Washington Building - underground fuel tank for generator
Webster - above ground fuel tank for generator

Notification: Local off-campus businesses received letters, and WSU departments and businesses on campus also received a memo regarding their potential impacts to groundwater quality. Overall, this education campaign provides the departments and businesses with information describing the risks and assistance available to them to assist with the Wellhead Protection Program. Copies of the memorandum and letters are included in Appendix 1.

Local Businesses Off-Campus			
Potential Contaminant Source	**Address**	**Phone Number**	**Type of Activity**
Cenex Convenience Store	975 E. Main St.	334-1864	Gas Station
Deda Auto Repair	511 SE Riverview Dr.	334-3309	Auto Repair
Grange Supply Co.	355 NW State St.	332-2511	Gas Station
Imported Car Service	1315 SE Bishop Blvd.	332-2314	Auto Repair
Pro Tech Auto Repair	1200 SE Latah St.	332-5730	Auto Repair
Rennie Keasel Chevron	485 E Main St.	334-2813	Gas Station
Spot Shop Cleaners	240 NE Kamiaken St.	332-5111	Dry Cleaners
Sun Rental	1105 SE Latah St.	332-2444	Fueling Tank
Sunset Mart	1455 SE Bishop Blvd.	332-6863	Gas Station
Tesoro2Go	770 N. Grand Ave.	332-6414	Gas Station
US Bank	301 E. Main St.	334-1313	Old UST

WSU Departments and On-Campus Businesses (none are in Sanitary Control Areas)
Animal Sciences
Facilities Services
Housing
Palouse Ridge Golf Club
Plant Introduction
Steffen Center
USDA-ARS
Vet Medicine ARU

VI. Contingency and Emergency Response Planning

A contingency plan is needed in the event of a prolonged power outage, contamination event, or natural disaster resulting in the partial or complete loss of source capacity. The contingency plan identifies the amount of water required to sustain the campus during an emergency, alternative sources of supply, and future sources of drinking water.

Short Term: WSU maintains 6,100,000 gallons of storage which could buffer against interruptions in supply for 2-5 days, depending on the season, without rationing. The campus would be limited to strict rationing if necessary. If a power outage were to occur, emergency power would be provided immediately by WSU in order to maintain key components of the water system. In the event of well pump failure, WSU currently has other wells equipped to maintain reservoir levels independently while repairs are being made. In addition, WSU has an intertie agreement with the City of Pullman.

Long Term: For long term disruptions in supply, such as complete well failure, WSU is in a good position. If a well were to fail, the system would rely on one or two of the other wells until repairs are completed or a new source well is developed. At least two of the wells are capable of individually providing an adequate supply of water independently. The system would be able to operate at full capacity until a replacement well could be brought on line. If one of the wells were contaminated, it is possible that the other wells would also become contaminated. WSU is prepared to develop new wells as needed to alleviate well contamination issues.

Emergency Preparedness*:* During an emergency, WSU will contact WHITCOM at 911 and the Emergency Management Coordinator for Whitman County at (509) 397-5606. If assistance cannot be provided locally, WSU will seek assistance for potable water on an emergency basis.

A hazardous spill response notice was sent to the following regulatory agencies. This notice informed them of the WSU wells and Wellhead Protection Areas and the potential for contamination to WSU's water supply. These agencies can use this information to evaluate whether changes in hazardous spill response measures, zoning, and planning are needed to protect the WSU water supply. Copies of the letters are included in Appendix 1.

Regulatory Agency	**Address**
City of Pullman Public Works	325 SE Paradise St. Pullman, WA 99163
Pullman Fire Department	620 S. Grand Ave. Pullman, WA 99163
WA Dept. of Ecology Eastern Regional Office	4601 North Monroe Spokane, WA 99205-1295
Whitman County Emergency Management	310 N. Main St., Suite 101 Colfax, WA 99111
Whitman County Public Works	P.O. Box 430 Colfax, WA 99111

Concluding Remarks: WSU is in a good position to continue providing safe and reliable drinking water to faculty, staff, students and visitors. In turn WSU is helping to ensure a reliable drinking water resource which they share with the local community and region. The WSU Pullman campus is fortunate to have Potential Contaminant Sources limited to facilities and infrastructure under its direct control and a handful of responsible local businesses. Training has been provided to WSU staff responsible for their respective campus assets. This plan serves the public interest as well as the community by protecting the drinking water supply at minimal cost while maintaining compliance with existing drinking water regulations.

VII. Appendix 1

Notification Memorandum and Letters

MEMORANDUM

To: Margaret Benson, Animal Sciences
John Fluegel, Steffen Center
Travis Frost, USDA-ARS
Todd Lupkes, Palouse Ridge Golf Club
Fred Loaiza, Vet Medicine ARU
Wayne Olson, Plant Introduction
Bob Tattershall, Housing
Bill Vertrees, Facilities Services

From: Gene Patterson, WSU Environmental Health & Safety

Subject: WSU and Tula Young Hastings Farm Wellhead Protection Program

Date: December 10, 2013

WSU Environmental Health & Safety has developed a Wellhead Protection Program required by the Washington Department of Health for the Pullman campus and Tula Young Hastings Farm. The program helps public water systems protect local drinking water supplies. Wellhead protection requires a community effort to keep potential contaminants from being released near WSU drinking water wells.

The biggest threat to local water supplies is hazardous materials put onto the ground or into septic systems. All drinking water wells provide a direct pathway for contaminants to enter the groundwater, and therefore all hazardous materials should be used and disposed of responsibly.

Some examples of hazardous materials are:

- Household chemicals including all cleaners
- Paints, thinners, and other solvents
- Automotive fluids including motor oil, gasoline, antifreeze or similar products
- Fuel tanks
- Lawn and garden supplies including fertilizers and pesticides
- Animal and pet waste

Tips to avoid septic system trouble:

- DO NOT allow anyone to drive or park over any part of the system. Areas should be left undisturbed with only a mowed grass cover. In addition roots from nearby trees or shrubs may clog and damage drain lines.
- DO NOT use commercial septic tank additives. These products usually do not help and some may hurt septic systems in the long run.
- DO NOT contaminate septic systems by pouring chemicals down the drain. They can kill the beneficial bacteria that treat wastewater and ultimately contaminate drinking water.

Please forward this information to applicable personnel in your areas, and thank you for following these guidelines to help protect WSU's water supplies. If you have any questions please contact me at 509-335-3041.

December 6, 2013

Deda Auto Repair
511 SE Riverview Dr.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Deda Auto Repair:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

The Program also requires an inventory of potential sources of groundwater contamination within these WPAs. The primary purpose of this letter is to notify you that your facility is located within WSU's WPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, etc.), and the potential exists that a chemical spill from your facility may adversely impact the campus drinking water supply, please notify Washington State University immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Pullman Fire Department and WSU Environmental Health and Safety Department be contacted.

Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Pro Tech Auto Repair
1200 SE Latah St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Pro Tech Auto Repair:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

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Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Rennie Keasel Chevron
485 E. Main St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Rennie Keasel Chevron:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

The Program also requires an inventory of potential sources of groundwater contamination within these WPAs. The primary purpose of this letter is to notify you that your facility is located within WSU's WPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, etc.), and the potential exists that a chemical spill from your facility may adversely impact the campus drinking water supply, please notify Washington State University immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Pullman Fire Department and WSU Environmental Health and Safety Department be contacted.

Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Spot Shop Cleaners
240 NE Kamiaken St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Spot Shop Cleaners:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

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Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Sun Rental
1105 SE Latah St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Sun Rental:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

The Program also requires an inventory of potential sources of groundwater contamination within these WPAs. The primary purpose of this letter is to notify you that your facility is located within WSU's WPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, etc.), and the potential exists that a chemical spill from your facility may adversely impact the campus drinking water supply, please notify Washington State University immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Pullman Fire Department and WSU Environmental Health and Safety Department be contacted.

Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Tesoro 2Go
770 N. Grand Ave.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Tesoro 2Go:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

The Program also requires an inventory of potential sources of groundwater contamination within these WPAs. The primary purpose of this letter is to notify you that your facility is located within WSU's WPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, etc.), and the potential exists that a chemical spill from your facility may adversely impact the campus drinking water supply, please notify Washington State University immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Pullman Fire Department and WSU Environmental Health and Safety Department be contacted.

Please note that the groundwater aquifer that supplies WSU's wells also supply the City of Pullman's wells. Therefore, immediate notification of WSU in the event of a spill also assists the City of Pullman by protecting the water supply for the entire community. Thank you for assisting us in protecting WSU's water supply and groundwater at WSU. If you have any questions, please contact me at 509-335-3041.

Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

US Bank
301 E. Main St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear US Bank:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

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Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Cenex Convenience Store
975 E. Main St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Cenex Convenience Store:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

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Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Grange Supply Co.
355 NW State St.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Grange Supply Co.:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

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Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Sunset Mart
1455 SE Bishop Blvd.
Pullman, WA 99163

Re: WSU Wellhead Protection Program

Dear Sunset Mart:

Washington State University has a Wellhead Protection Program for the Pullman campus per Washington Department of Health WAC 246-290-135(3) regulations. The purpose of this Program is to protect the quality of the campus drinking water supply. As part of the Program, maps were prepared that show the areas around each campus drinking water well where a chemical spill on the ground may cause contamination of the well/aquifer. These areas are Wellhead Protection Areas (WPA).

The Program also requires an inventory of potential sources of groundwater contamination within these WPAs. The primary purpose of this letter is to notify you that your facility is located within WSU's WPA. Since your business or the activities conducted at your facility may involve the use of chemicals (e.g., gasoline, underground storage tanks, etc.), and the potential exists that a chemical spill from your facility may adversely impact the campus drinking water supply, please notify Washington State University immediately if a chemical spill occurs at your facility. All spills should be reported by dialing 911 and requesting that the Pullman Fire Department and WSU Environmental Health and Safety Department be contacted.

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Sincerely,

Gene Patterson
Public Health / Air and Water Quality Manager

December 6, 2013

Mike Heston, Fire Chief
Pullman Fire Department
620 S. Grand Ave.
Pullman, WA 99163

Re: WSU Wellhead Protection Area

Dear Fire Chief Heston:

WSU has developed a Wellhead Protection Program (WPP) as required by the Washington Department of Health (DOH). As part of this program, WSU must provide wellhead protection information to agencies responsible for incident/spill response procedures. Using the results of the susceptibility assessment and the findings of the wellhead protection area inventory, local emergency responders are asked to evaluate whether changes in incident/spill response procedures are needed to better protect groundwater within WPAs. As stated in the DOH Wellhead Protection Program Guidance Document, "If a public water system's source water is determined to be vulnerable to surface activities, special procedures may need to be incorporated into local emergency response Programs."

DOH has given the WSU drinking water wells the following ratings:

Sources S06 (Well #6), S08 (Well #7), S09 (Well #8) Susceptibility Rating: Low
Source S04 (Well #4) Susceptibility Rating: Moderate

Thank you for your attention in this matter. If you have any questions or would like a copy of the WPP, please feel free to contact me at 335-3041.

Sincerely,

Gene Patterson
WSU Public Health/Air and Water Quality Manager

December 6, 2013

Bill Tensfeld
Director, Emergency Management
310 N. Main St., Suite 101
Colfax, WA 99111

Re: WSU Wellhead Protection Area

Dear Mr. Tensfeld:

WSU has developed a Wellhead Protection Program (WPP) as required by the Washington Department of Health (DOH) for WSU. As part of this program, WSU must provide wellhead protection information to agencies responsible for incident/spill response procedures. Using the results of the susceptibility assessment and the findings of the wellhead protection area inventory, local emergency responders are asked to evaluate whether changes in incident/spill response procedures are needed to better protect groundwater within wellhead protection areas. As stated in the DOH Wellhead Protection Program Guidance Document, "If a public water system's source water is determined to be vulnerable to surface activities, special procedures may need to be incorporated into local emergency response Programs."

DOH has given the WSU drinking water wells the following ratings:

Sources S06 (Well #6), S08 (Well #7), S09 (Well #8) Susceptibility Rating: Low
Source S04 (Well #4) Susceptibility Rating: Moderate

Thank you for your attention in this matter. If you have any questions or would like a copy of the WPP, please feel free to contact me at 335-3041.

Sincerely,

Gene Patterson
WSU Public Health/Air and Water Quality Manager

December 6, 2013

Washington Department of Ecology
Eastern Regional Office
4601 North Monroe
Spokane, WA 99205-1295

Re: WSU Pullman Wellhead Protection Area

Dear Department of Ecology:

As part of the Washington State University Wellhead Protection Program, WSU is required to provide notification of Wellhead Protection Areas (WPAs). Please keep in mind WSU's WPAs when inspecting and permitting the storage, use, and disposal of hazardous materials. It is worth mentioning that local geology (i.e. clay, deep bedrock) restricts surface contaminants from entering the aquifer near the well sites.

Sincerely,

Gene Patterson
WSU Public Health/Air and Water Quality Manager

December 6, 2013

Art Garro
City of Pullman Public Works
325 SE Paradise St.
Pullman, WA 99163

Re: WSU Wellhead Protection Area

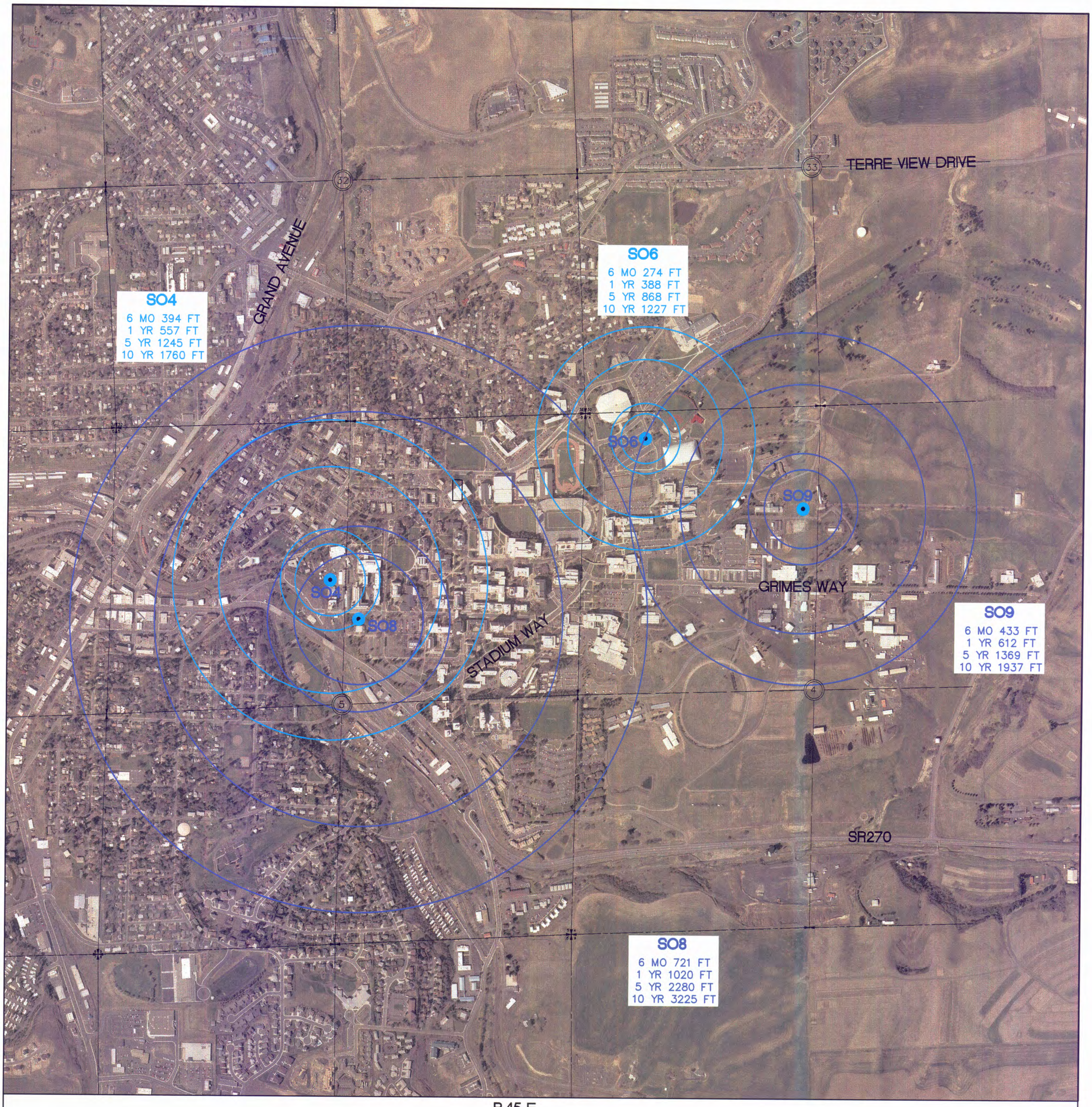
Dear Mr. Garro:

As part of the Washington State University Wellhead Protection Program, WSU is required to provide notification of Wellhead Protection Areas (WPAs) to local entities.

Please keep in mind WSU's WPAs when inspecting and permitting areas in the City that may impact groundwater in the area, and contact WSU if anything is found that may impact WSU's wells.

Sincerely,

Gene Patterson
WSU Public Health/Air and Water Quality Manager



R.45 E.

LEGEND

- SOURCE WELLS
- SOURCE 08 CFR GROUNDWATER TOT ZONES
- SOURCE 09 CFR GROUNDWATER TOT ZONES
- SOURCE 04 CFR GROUNDWATER TOT ZONES
- SOURCE 06 CFR GROUNDWATER TOT ZONES
- RAILROAD

NORTH

SCALE:
1" ≅ 535'

FIGURE 1. FIGURE DEPICTS THE WSU PULLMAN CAMPUS WELLHEAD PROTECTION AREA (WHPA) MAP. MAP INCLUDES WELLS SO 4,6,8 AND 9, THEIR ASSOCIATED CALCULATED FIXED RADII (CFR) GROUNDWATER TIME OF TRAVEL (TOT) ZONES, AND ANY POTENTIAL CONTAMINANT SOURCES (PCS) IDENTIFIED WITHIN THE WHPA.

APPENDIX G:

- Item 1 – Water Quality Analysis Reports
- Item 2 – Coliform Sampling Plan
- Item 3 – WSU Chlorine Safety Procedures
- Item 4 – WSU Cross Connection Control Program & Water Board Approval Letter
- Item 5 –Backflow Assembly Testing 2014 Annual Summary Report
- Item 6 - Cross Connection Hazard Locations List
- Item 7 – Backflow Assembly List
- Item 8 – Drinking Water Complaint Form
- Item 9 - Recorded Water System Complaints
- Item 10 – 2014 Consumer Confidence Report
- Item 11 – Facility Operations Organization Charts
- Item 12 – MSDS – Chlorine Gas
- Item 13 – WSU – Safety Policies and Procedures Manual
- Item 14 – Lead and Copper Monitoring Plan,

APPENDIX G

Item 1 - Water Quality Analysis Reports

DBP

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 01141	Collect Date:	8/1/2014	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2014	Date Reported:	8/13/2014	Supervisor: JWC
Date Analyzed:	8/5/2014			
County:	WHITMAN	Sample Location: GENERAL STORAGE 358B		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coil **Date:** 8/13/2014

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 01142	Collect Date:	8/1/2014	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2014	Date Reported:	8/13/2014	Supervisor:	JWC
Date Analyzed:	8/8/2014				
County:	WHITMAN	Sample Location:	GENERAL STORAGE 358B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cobb **Date:** 8/13/2014

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 01143	Collect Date:	8/1/2014	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2014	Date Reported:	8/13/2014	Supervisor: JWC
Date Analyzed:	8/5/2014			
County:	WHITMAN	Sample Location: STREIT/PERHAM 81C		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coil **Date:** 8/13/2014

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 01144	Collect Date:	8/1/2014	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2014	Date Reported:	8/13/2014	Supervisor:	JWC
Date Analyzed:	8/9/2014				
County:	WHITMAN	Sample Location:	STREIT/PERHAM 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coll **Date:** 8/13/2014

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

DBP Stage 1

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 86510	Collect Date:	8/1/2013	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor: JWC
Date Analyzed:	8/1/2013			
County:	WHITMAN	Sample Location: CHINOOK APTS. 679BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cuth **Date:** 8/14/2013

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 86511	Collect Date:	8/1/2013	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor: JWC
Date Analyzed:	8/9/2013			
County:	WHITMAN	Sample Location: CHINOOK APTS. 679BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Lab Supervisor: John Coll **Date:** 8/14/2013

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 86512	Collect Date:	8/1/2013	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor:	JWC
Date Analyzed:	8/2/2013				
County:	WHITMAN	Sample Location:	STREIT/PERHAM 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Catt **Date:** 8/14/2013

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 86513	Collect Date:	8/1/2013	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor:	JWC
Date Analyzed:	8/9/2013				
County:	WHITMAN	Sample Location:	STREIT/PERHAM 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cahill **Date:** 8/14/2013

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 86514	Collect Date:	8/1/2013	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor: JWC
Date Analyzed:	8/2/2013			
County:	WHITMAN	Sample Location: GENERAL STORAGE 358B		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cook **Date:** 8/14/2013

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 86515	Collect Date:	8/1/2013	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor:	JWC
Date Analyzed:	8/10/2013				
County:	WHITMAN	Sample Location:	GENERAL STORAGE 358B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coil **Date:** 8/14/2013

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 86516	Collect Date:	8/1/2013	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor: JWC
Date Analyzed:	8/2/2013			
County:	WHITMAN	Sample Location: FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	ND	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cook **Date:** 8/14/2013

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 86517	Collect Date:	8/1/2013	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2013	Date Reported:	8/14/2013	Supervisor:	JWC
Date Analyzed:	8/10/2013				
County:	WHITMAN	Sample Location:	FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coutt **Date:** 8/14/2013

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73739	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/8/2012			
County:	WHITMAN	Sample Location: GENERAL STORAGE BUILDING 358B		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	0.84	µg/L	0.5			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	0.84	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Catt **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73740	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/6/2012			
County:	WHITMAN	Sample Location: GENERAL STORAGE BUILDING 358B		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cook **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-002

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73745	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/8/2012			
County:	WHITMAN	Sample Location: FARM SERVICES BUILDING 103A		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	0.59	µg/L	0.5			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	0.59	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 73746	Collect Date:	8/1/2012	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor:	JWC
Date Analyzed:	8/6/2012				
County:	WHITMAN	Sample Location:	FARM SERVICES BUILDING 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coll **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-008

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73743	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/8/2012			
County:	WHITMAN	Sample Location: CHINOOK APTS BUILDING 679BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	0.67	µg/L	0.5			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	0.67	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-005

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73744	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/6/2012			
County:	WHITMAN	Sample Location: CHINOOK APTS BUILDING 679BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cook **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-006

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73741	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/8/2012			
County:	WHITMAN	Sample Location: STREIT / PERHAM BUILDING 81C		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	1.12	µg/L	0.5			EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5			EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5			EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5			EPA 524.2	SAT	
	Total Trihalomethane	1.12	µg/L		60	80	EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-003

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 73742	Collect Date:	8/1/2012	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/1/2012	Date Reported:	8/15/2012	Supervisor: JWC
Date Analyzed:	8/6/2012			
County:	WHITMAN	Sample Location: STREIT / PERHAM BUILDING 81C		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	MAH	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	MAH	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	MAH	
0416	Total HAA(5)	ND	ug/L	6	45	60	SM6251B	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	MAH	

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/15/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120802006-004

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DBP - Stn. 1

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 59963	Collect Date:	8/1/2011	DOH Source #: S09
Multiple Source Nos:		Sample Type:	D	Sample Purpose: C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor: JWC
Date Analyzed:	8/4/2011			
County:	WHITMAN	Sample Location:	GENERAL STORAGE BUILDING 358B	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	Method	Analyst	Qualifier
27	Chloroform	ND	ug/L	EPA 524.2	CAS	
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS	
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS	
30	Bromoform	ND	ug/L	EPA 524.2	CAS	
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cook **Date:** 8/8/2011

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59964	Collect Date:	8/1/2011	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	GENERAL STORAGE BUILDING 358B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Coutt **Date:** 8/8/2011

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59965	Collect Date:	8/1/2011	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	FARM SERVICES BUILDING 103A SHOP TAP		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	Method	Analyst	Qualifier
27	Chloroform	ND	ug/L	EPA 524.2	CAS	
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS	
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS	
30	Bromoform	ND	ug/L	EPA 524.2	CAS	
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cook **Date:** 8/8/2011

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59966	Collect Date:	8/1/2011	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	FARM SERVICES BUILDING 103A SHOP TAP		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coll **Date:** 8/8/2011

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59967	Collect Date:	8/1/2011	DOH Source #:	S07
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	CHINOOK APTS BUILDING 679BB LAUNDRY SINK		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	Method	Analyst	Qualifier
27	Chloroform	ND	ug/L	EPA 524.2	CAS	
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS	
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS	
30	Bromoform	ND	ug/L	EPA 524.2	CAS	
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coltt **Date:** 8/8/2011

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 59968	Collect Date:	8/1/2011	DOH Source #: S07
Multiple Source Nos:		Sample Type:	D	Sample Purpose: C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor: JWC
Date Analyzed:	8/4/2011			
County:	WHITMAN	Sample Location:	CHINOOK APTS BUILDING 679BB LAUNDRY SINK	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/8/2011

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59969	Collect Date:	8/1/2011	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	STREIT/PERHAM BUILDING 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	Method	Analyst	Qualifier
27	Chloroform	ND	ug/L	EPA 524.2	CAS	
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS	
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS	
30	Bromoform	ND	ug/L	EPA 524.2	CAS	
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coil **Date:** 8/8/2011

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 59970	Collect Date:	8/1/2011	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	D	Sample Purpose:	C
Date Received:	8/1/2011	Date Reported:	8/8/2011	Supervisor:	JWC
Date Analyzed:	8/4/2011				
County:	WHITMAN	Sample Location:	STREIT/PERHAM BUILDING 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT	
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT	
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT	
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT	

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Coltt **Date:** 8/8/2011

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU	
Lab/Sample Number:	125 44844	Collect Date:	8/2/2010	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor: JWC
Date Analyzed:	8/3/2010			
County:	WHITMAN	Sample Location: FARM SERVICES BLDG 103A SHOP TAP		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	509-335-3041		

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 44845	Collect Date:	8/2/2010	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor:	JWC
Date Analyzed:	8/8/2010				
County:	WHITMAN	Sample Location:	FARM SERVICES BLDG 103A SHOP TAP		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU	
Lab/Sample Number:	125 44852	Collect Date:	8/2/2010	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor: JWC
Date Analyzed:	8/9/2010			
County:	WHITMAN	Sample Location: CHINOOK APTS BLDG 679BB LAUNDRY SINK		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	509-335-3041		

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Coth **Date:** 8/16/2010

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU	
Lab/Sample Number:	125 44853	Collect Date:	8/2/2010	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor: JWC
Date Analyzed:	8/8/2010			
County:	WHITMAN	Sample Location: CHINOOK APTS BLDG 679BB LAUNDRY SINK		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	509-335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 44850	Collect Date:	8/2/2010	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor:	JWC
Date Analyzed:	8/3/2010				
County:	WHITMAN	Sample Location:	STREIT / PERHAM BLDG 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 44851	Collect Date:	8/2/2010	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor:	JWC
Date Analyzed:	8/8/2010				
County:	WHITMAN	Sample Location:	STREIT / PERHAM BLDG 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 44846	Collect Date:	8/2/2010	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor:	JWC
Date Analyzed:	8/3/2010				
County:	WHITMAN	Sample Location:	GENERAL STORAGE BLDG 358B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 44847	Collect Date:	8/2/2010	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/2/2010	Date Reported:	8/16/2010	Supervisor:	JWC
Date Analyzed:	8/8/2010				
County:	WHITMAN	Sample Location:	GENERAL STORAGE BLDG 358B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/16/2010

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31136	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/6/2009				
County:	WHITMAN	Sample Location:	STREIT - PERHAM 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31137	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/8/2009				
County:	WHITMAN	Sample Location:	STREIT - PERHAM 81C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cahill **Date:** 8/13/2009

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31138	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/6/2009				
County:	WHITMAN	Sample Location:	CHINOOK APTS 679 BB		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31139	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/8/2009				
County:	WHITMAN	Sample Location:	CHINOOK APTS 679 BB		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU	
Lab/Sample Number:	125 31141	Collect Date:	8/3/2009	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor: JWC
Date Analyzed:	8/6/2009			
County:	WHITMAN	Sample Location: GENERAL STORAGE 679 BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	509-335-3041		

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31142	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/8/2009				
County:	WHITMAN	Sample Location:	GENERAL STORAGE 679 BB		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31143	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/6/2009				
County:	WHITMAN	Sample Location:	FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 31144	Collect Date:	8/3/2009	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/3/2009	Date Reported:	8/13/2009	Supervisor:	JWC
Date Analyzed:	8/8/2009				
County:	WHITMAN	Sample Location:	FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/13/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090804039-008

Printed on: 13 August 2009 14:37:50

DBP Samples

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18977	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/13/2008				
County:	WHITMAN	Sample Location:	FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cahill **Date:** 8/14/2008

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18978	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/9/2008				
County:	WHITMAN	Sample Location:	FARM SERVICES 103A		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18979	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/13/2008				
County:	WHITMAN	Sample Location:	STREIT / PERHAM 81 C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18980	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/9/2008				
County:	WHITMAN	Sample Location:	STREIT / PERHAM 81 C		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 18981	Collect Date:	8/4/2008	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor: JWC
Date Analyzed:	8/13/2008			
County:	WHITMAN	Sample Location: CHINOOK APTS 679 BB		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18982	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/9/2008				
County:	WHITMAN	Sample Location:	CHINOOK APTS 679 BB		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 18983	Collect Date:	8/4/2008	DOH Source #: S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor: JWC
Date Analyzed:	8/13/2008			
County:	WHITMAN	Sample Location: GENERAL STORAGE 358 B		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

DOH #	Analyte	Result	Units	Method	Analyst
27	Chloroform	ND	ug/L	EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	EPA 524.2	CAS
30	Bromoform	ND	ug/L	EPA 524.2	CAS
	Total Trihalomethane	ND	ug/L	EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
MDL = 0.5 ug/L for each analyte
EPA MCL TOTAL= 80.0 ug/L

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - SM6251B

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 18984	Collect Date:	8/4/2008	DOH Source #:	S92
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/5/2008	Date Reported:	8/14/2008	Supervisor:	JWC
Date Analyzed:	8/9/2008				
County:	WHITMAN	Sample Location:	GENERAL STORAGE 358 B		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0411	Monochloroacetic acid	ND	ug/L	2			SM6251B	SAT
0412	Dichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0413	Trichloroacetic acid	ND	ug/L	1			SM6251B	SAT
0414	Monobromoacetic acid	ND	ug/L	1			SM6251B	SAT
0415	Dibromoacetic acid	ND	ug/L	1			SM6251B	SAT
0418	Total HAA(5)	ND	ug/L	1	48	60	SM6251B	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
0417	Bromochloroacetic acid	ND	ug/L	1			SM6251B	SAT

Notes:
ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/14/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 54400	Collect Date:	10/31/2014	DOH Source #: SO4
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	10/31/2014	Date Reported:	11/10/2014	Supervisor: JWC
Date Analyzed:	10/31/2014 6:23:00 PM			
County:	WHITMAN	Sample Location:	WELL 4	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	CRW

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cahill **Date:** 11/10/2014

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 54401	Collect Date:	10/31/2014	DOH Source #:	SO6
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	10/31/2014	Date Reported:	11/10/2014	Supervisor:	JWC
Date Analyzed:	10/31/2014 6:46:00 PM				
County:	WHITMAN	Sample Location:	WELL 6		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	CRW

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 11/10/2014

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 54402	Collect Date:	10/31/2014	DOH Source #: SO8
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	10/31/2014	Date Reported:	11/10/2014	Supervisor: JWC
Date Analyzed:	10/31/2014 7:09:00 PM			
County:	WHITMAN	Sample Location:	WELL 7	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	CRW

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cobb **Date:** 11/10/2014

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 54403	Collect Date:	10/31/2014	DOH Source #:	SO9
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	10/31/2014	Date Reported:	11/10/2014	Supervisor:	JWC
Date Analyzed:	10/31/2014 7:32:00 PM				
County:	WHITMAN	Sample Location:	WELL 8		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	CRW

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Call **Date:** 11/10/2014

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 83658	Collect Date:	5/23/2013	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/23/2013	Date Reported:	5/29/2013	Supervisor:	JWC
Date Analyzed:	5/23/2013				
County:	WHITMAN	Sample Location:	WELL #4		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	ETL

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cuff **Date:** 5/29/2013

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 130523073-001

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 83659	Collect Date:	5/23/2013	DOH Source #: S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/23/2013	Date Reported:	5/29/2013	Supervisor: JWC
Date Analyzed:	5/23/2013			
County:	WHITMAN	Sample Location:	WELL #6	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	ETL

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Colt **Date:** 5/29/2013

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 83660	Collect Date:	5/23/2013	DOH Source #: S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/23/2013	Date Reported:	5/29/2013	Supervisor: JWC
Date Analyzed:	5/23/2013			
County:	WHITMAN	Sample Location:	WELL #7	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	ETL

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 5/29/2013

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 83661	Collect Date:	5/23/2013	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/23/2013	Date Reported:	5/29/2013	Supervisor:	JWC
Date Analyzed:	5/23/2013				
County:	WHITMAN	Sample Location:	WELL #8		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
0020	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	ETL

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
ND (Not Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 5/29/2013

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 70908	Collect Date:	5/24/2012	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	C	Sample Purpose:	B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor:	JWC
Date Analyzed:	6/1/2012				
County:	WHITMAN	Sample Location:	WELL 7		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0004	Arsenic	ND	mg/L	0.0014	0.01	0.01	EPA 200.8	JTT	
0005	Barium	0.0641	mg/L	0.1	2	2	EPA 200.8	JTT	
0006	Cadmium	ND	mg/L	0.001	0.005	0.005	EPA 200.8	JTT	
0007	Chromium	ND	mg/L	0.007	0.1	0.1	EPA 200.8	JTT	
0011	Mercury	ND	mg/L	0.0002	0.002	0.002	EPA 200.8	JTT	
0012	Selenium	ND	mg/L	0.002	0.05	0.05	EPA 200.8	JTT	
0110	Beryllium	ND	mg/L	0.0003	0.004	0.004	EPA 200.8	JTT	
0111	Nickel	ND	mg/L	0.005			EPA 200.8	JTT	
0112	Antimony	ND	mg/L	0.003	0.006	0.006	EPA 200.8	JTT	
0113	Thallium	ND	mg/L	0.001	0.002	0.002	EPA 200.8	JTT	
0116	Cyanide	ND	mg/L	0.01	0.2	0.2	EPA 335.4	CRW	
0019	Fluoride	0.442	mg/L	0.5	2	4	EPA 300.0	JTT	
0114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	JTT	
0020	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	
0161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0008	Iron	0.381	mg/L	0.1		0.3	EPA 200.7	ETL	
0010	Manganese	0.0497	mg/L	0.01		0.05	EPA 200.8	JTT	
0013	Silver	ND	mg/L	0.1		0.1	EPA 200.8	JTT	
0021	Chloride	2.25	mg/L	20		250	EPA 300.0	JTT	
0022	Sulfate	12.7	mg/L	50		250	EPA 300.0	JTT	
0024	Zinc	ND	mg/L	0.2		5	EPA 200.8	JTT	

State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0014	Sodium	20.4	mg/L	5			EPA 200.7	ETL	
0015	Hardness(CaCO3)	111	mg/L	10			EPA 200.7	ETL	
0016	Conductivity	352	µmhos/cm	70		700	EPA 120.1	ETL	
0017	Turbidity	0.30	NTU	0.1			EPA 180.1	ETL	
0018	Color	ND	color units	15		15	EPA 110.2	ETL	
0026	Total Dissolved Solids	285	mg/L	100		500	EPA 160.1	JTT	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-005

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State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0009	Lead	ND	mg/L	0.001		0.015	EPA 200.8	JTT	
0023	Copper	ND	mg/L	0.02	--	1.3	EPA 200.8	JTT	
0015	Calcium	20.6	mg/L				EPA 200.7	ETL	
0015	Magnesium	14.4	mg/L				EPA 200.7	ETL	

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

IOC - Well #8

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 70908	Collect Date:	5/24/2012	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	C	Sample Purpose:	B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor:	JWC
Date Analyzed:	6/1/2012				
County:	WHITMAN	Sample Location:	WELL 7		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0004	Arsenic	ND	mg/L	0.0014	0.01	0.01	EPA 200.8	JTT	
0005	Barium	0.0641	mg/L	0.1	2	2	EPA 200.8	JTT	
0006	Cadmium	ND	mg/L	0.001	0.005	0.005	EPA 200.8	JTT	
0007	Chromium	ND	mg/L	0.007	0.1	0.1	EPA 200.8	JTT	
0011	Mercury	ND	mg/L	0.0002	0.002	0.002	EPA 200.8	JTT	
0012	Selenium	ND	mg/L	0.002	0.05	0.05	EPA 200.8	JTT	
0110	Beryllium	ND	mg/L	0.0003	0.004	0.004	EPA 200.8	JTT	
0111	Nickel	ND	mg/L	0.005			EPA 200.8	JTT	
0112	Antimony	ND	mg/L	0.003	0.006	0.006	EPA 200.8	JTT	
0113	Thallium	ND	mg/L	0.001	0.002	0.002	EPA 200.8	JTT	
0116	Cyanide	ND	mg/L	0.01	0.2	0.2	EPA 335.4	CRW	
0019	Fluoride	0.442	mg/L	0.5	2	4	EPA 300.0	JTT	
0114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	JTT	
0020	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	
0161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0008	Iron	0.381	mg/L	0.1		0.3	EPA 200.7	ETL	
0010	Manganese	0.0497	mg/L	0.01		0.05	EPA 200.8	JTT	
0013	Silver	ND	mg/L	0.1		0.1	EPA 200.8	JTT	
0021	Chloride	2.25	mg/L	20		250	EPA 300.0	JTT	
0022	Sulfate	12.7	mg/L	50		250	EPA 300.0	JTT	
0024	Zinc	ND	mg/L	0.2		5	EPA 200.8	JTT	

State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0014	Sodium	20.4	mg/L	5			EPA 200.7	ETL	
0015	Hardness(CaCO3)	111	mg/L	10			EPA 200.7	ETL	
0016	Conductivity	352	µmhos/cm	70		700	EPA 120.1	ETL	
0017	Turbidity	0.30	NTU	0.1			EPA 180.1	ETL	
0018	Color	ND	color units	15		15	EPA 110.2	ETL	
0026	Total Dissolved Solids	285	mg/L	100		500	EPA 160.1	JTT	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-005

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State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0009	Lead	ND	mg/L	0.001		0.015	EPA 200.8	JTT	
0023	Copper	ND	mg/L	0.02	--	1.3	EPA 200.8	JTT	
0015	Calcium	20.6	mg/L				EPA 200.7	ETL	
0015	Magnesium	14.4	mg/L				EPA 200.7	ETL	

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cobb **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Anatek File # 120525002-005

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 70904	Collect Date:	5/24/2012	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	C	Sample Purpose:	B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor:	JWC
Date Analyzed:	5/25/2012				
County:	WHITMAN	Sample Location:	WELL 4		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0020	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	

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ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Catt **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 70905	Collect Date:	5/24/2012	DOH Source #: S06
Multiple Source Nos:		Sample Type:	C	Sample Purpose: B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor: JWC
Date Analyzed:	5/25/2012			
County:	WHITMAN	Sample Location:	WELL 6	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0020	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 70910	Collect Date:	5/24/2012	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	C	Sample Purpose:	B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor:	JWC
Date Analyzed:	5/25/2012				
County:	WHITMAN	Sample Location:	WELL 8		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0020	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT	

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Anatek File # 120525002-007

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 65228	Collect Date:	11/15/2011	DOH Source #: S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	11/15/2011	Date Reported:	11/22/2011	Supervisor: JWC
Date Analyzed:	11/16/2011			
County:	WHITMAN	Sample Location: S04	well 4	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate - N	ND	mg/L	2	5	10	EPA 300.0	JTT

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
NDN(ot Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Colt **Date:** 11/22/2011

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 111116007-001

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 65229	Collect Date:	11/15/2011	DOH Source #: S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	11/15/2011	Date Reported:	11/22/2011	Supervisor: JWC
Date Analyzed:	11/16/2011			
County:	WHITMAN	Sample Location: S08 - WELL 7		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate - N	ND	mg/L	2	5	10	EPA 300.0	JTT

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
NDN(ot Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cook **Date:** 11/22/2011

Well #1 well report - no Sample in 2011

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 111116007-002

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 65230	Collect Date:	11/15/2011	DOH Source #: S09
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	11/15/2011	Date Reported:	11/22/2011	Supervisor: JWC
Date Analyzed:	11/16/2011			
County:	WHITMAN	Sample Location: S09 - WELL 8		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate - N	ND	mg/L	2	5	10	EPA 300.0	JTT

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
NDN(ot Detected): Indicates that the analysis was performed but the contaminant concentration Is less than the SRL.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Cook **Date:** 11/22/2011

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Anatek File # 111116007-003

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42564	Collect Date:	6/3/2010	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/11/2010	Supervisor:	JWC
Date Analyzed:	6/4/2010				
County:	WHITMAN	Sample Location:	S04		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	MAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/11/2010

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42565	Collect Date:	6/3/2010	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/11/2010	Supervisor:	JWC
Date Analyzed:	6/4/2010				
County:	WHITMAN	Sample Location:	S06		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	MAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/11/2010

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42570	Collect Date:	6/3/2010	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/21/2010	Supervisor:	JWC
Date Analyzed:	6/4/2010				
County:	WHITMAN	Sample Location:	S08		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

Well #7

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	MAS

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
NDN(ot Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/21/2010

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Inorganic Chemicals (IOC's) Analysis Report

Will #8

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42567	Collect Date:	6/3/2010	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/11/2010	Supervisor:	JWC
Date Analyzed:	6/4/2010				
County:	WHITMAN	Sample Location:	S09		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	MAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/11/2010

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Anatek File # 100603069-004

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42566	Collect Date:	6/3/2010	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/11/2010	Supervisor:	JWC
Date Analyzed:	6/10/2010				
County:	WHITMAN	Sample Location:	S06		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	0.907	mg/L	0.1	0.3	0.3	EPA 200.7	ETL

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/11/2010

Nitrate - well #6

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 27255	Collect Date:	5/12/2009	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor:	JWC
Date Analyzed:	5/13/2009				
County:	WHITMAN	Sample Location:	S06 - WELL 6		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	0.164	mg/L	0.5	5	10	EPA 300.0	JTT

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Well #6

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s (IOC's) Analysis Report

e: WSU EH&S
: 5/12/2009
pe: B
rted: 6/4/2009

DOH Source #: S06
Sample Purpose: C
Supervisor: JWC

ple Location: S06 - WELL 6
OX 641172
MAN, WA 99164
) 335-3041

Result	Units	SRL	Trigger	MCL	Method	Analyst
0.164	mg/L	0.5	5	10	EPA 300.0	JTT

s exceed this level, contact the DOH

Date: 6/4/2009

John W. Cobb

NM: ID00013; OR:ID200001-002; WA:C1320

00513019-003

Nitrate - Well #7

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 27258	Collect Date:	5/12/2009	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor:	JWC
Date Analyzed:	5/13/2009				
County:	WHITMAN	Sample Location: S08 - WELL 7			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 6/4/2009

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-006

IOC - well #F

M

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		well #F
Lab/Sample Number:	125 27927	Collect Date:	6/2/2009	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	6/2/2009	Date Reported:	6/17/2009	Supervisor:	JWC
Date Analyzed:	6/8/2009				
County:	WHITMAN	Sample Location:	S09		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
4	Arsenic	ND	mg/L	0.002	0.01	0.01	EPA 200.8	ETL
5	Barium	0.0758	mg/L	0.1	2	2	EPA 200.8	ETL
6	Cadmium	ND	mg/L	0.002	0.005	0.005	EPA 200.8	ETL
7	Chromium	ND	mg/L	0.01	0.1	0.1	EPA 200.8	ETL
11	Mercury	ND	mg/L	0.0005	0.002	0.002	EPA 200.8	ETL
12	Selenium	ND	mg/L	0.005	0.05	0.05	EPA 200.8	ETL
110	Beryllium	ND	mg/L	0.003	0.004	0.004	EPA 200.8	ETL
111	Nickel	ND	mg/L	0.04	0.1		EPA 200.8	ETL
112	Antimony	ND	mg/L	0.005	0.006	0.006	EPA 200.8	ETL
113	Thallium	ND	mg/L	0.002	0.002	0.002	EPA 200.8	ETL
116	Cyanide	ND	mg/L	0.05	0.2	0.2	EPA 335.4	JTT
19	Fluoride	0.706	mg/L	0.5	2	4	EPA 300.0	JTT
114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	JTT
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT
161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	0.274	mg/L	0.1	0.3		EPA 200.7	ETL
10	Manganese	0.0588	mg/L	0.01	0.05	0.05	EPA 200.8	ETL
13	Silver	ND	mg/L	0.01	0.05	0.1	EPA 200.8	ETL
21	Chloride	2.37	mg/L	20	250	250	EPA 300.0	JTT
22	Sulfate	1.54	mg/L	10	250	250	EPA 300.0	JTT
24	Zinc	0.00316	mg/L	0.02	5	5	EPA 200.8	ETL

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090603036-001

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State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
14	Sodium	23.1	mg/L	5			EPA 200.7	ETL
15	Hardness(CaCO3)	107	mg/L	10			EPA 200.7	ETL
16	Conductivity	312	µmhos/cm	10	700		EPA 120.1	JAK
17	Turbidity	0.17	NTU	0.1	1		EPA 180.1	JAK
18	Color	5	color units	5	15	15	EPA 110.2	JAK
26	Total Dissolved Solids	209	mg/L	150	500	500	EPA 160.1	JAK

State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
9	Lead	ND	mg/L	0.002	0.015	0.015	EPA 200.8	ETL
23	Copper	ND	mg/L	0.2	1.3	1.3	EPA 200.8	ETL

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John. Cobb **Date:** 6/17/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
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IVC - Well #4

Environmental Health & Safety
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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 27253	Collect Date:	5/12/2009	DOH Source #: S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor: JWC
Date Analyzed:	5/26/2009			
County:	WHITMAN	Sample Location: S04 - WELL 4		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
4	Arsenic	ND	mg/L	0.002	0.01	0.01	EPA 200.8	ETL
5	Barium	0.0965	mg/L	0.1	2	2	EPA 200.8	ETL
6	Cadmium	ND	mg/L	0.002	0.005	0.005	EPA 200.8	ETL
7	Chromium	0.00111	mg/L	0.01	0.1	0.1	EPA 200.8	ETL
11	Mercury	ND	mg/L	0.0005	0.002	0.002	EPA 200.8	ETL
12	Selenium	ND	mg/L	0.005	0.05	0.05	EPA 200.8	ETL
110	Beryllium	ND	mg/L	0.003	0.004	0.004	EPA 200.8	ETL
111	Nickel	ND	mg/L	0.04	0.1		EPA 200.8	ETL
112	Antimony	ND	mg/L	0.005	0.006	0.006	EPA 200.8	ETL
113	Thallium	ND	mg/L	0.002	0.002	0.002	EPA 200.8	ETL
116	Cyanide	ND	mg/L	0.05	0.2	0.2	EPA 335.4	JTT
19	Fluoride	0.692	mg/L	0.5	2	4	EPA 300.0	JTT
114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	JTT
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT
161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	0.213	mg/L	0.1	0.3		EPA 200.7	ETL
10	Manganese	0.187	mg/L	0.01	0.05	0.05	EPA 200.8	ETL
13	Silver	ND	mg/L	0.01	0.05	0.1	EPA 200.8	ETL
21	Chloride	2.51	mg/L	20	250	250	EPA 300.0	JTT
22	Sulfate	45.4	mg/L	10	250	250	EPA 300.0	JTT
24	Zinc	ND	mg/L	0.02	5	5	EPA 200.8	ETL

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
14	Sodium	22.8	mg/L	5			EPA 200.7	ETL
15	Hardness(CaCO3)	140	mg/L	10			EPA 200.7	ETL
16	Conductivity	403	µmhos/cm	10	700		EPA 120.1	JAK
17	Turbidity	0.24	NTU	0.1	1		EPA 180.1	JAK
18	Color	5	color units	5	15	15	EPA 110.2	JAK
26	Total Dissolved Solids	272	mg/L	150	500	500	EPA 160.1	JAK

State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
9	Lead	ND	mg/L	0.002	0.015	0.015	EPA 200.8	ETL
23	Copper	0.00482	mg/L	0.2	1.3	1.3	EPA 200.8	ETL

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Conk **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-001

Nitrate, etc.

Well 7

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 16185	Collect Date:	5/23/2008	DOH Source #: S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/23/2008	Date Reported:	5/29/2008	Supervisor: JWC
Date Analyzed:	5/23/2008			
County:	WHITMAN	Sample Location: S08, WELL #7		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	0.484	mg/L	0.1	0.3	0.3	EPA 200.8	DMB
10	Manganese	0.0568	mg/L	0.01	0.05	0.05	EPA 200.8	DMB

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/29/2008

Anatek File # 080527003-002

Nitrate, Well 8

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 16184	Collect Date:	5/23/2008	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/23/2008	Date Reported:	5/29/2008	Supervisor:	JWC
Date Analyzed:	5/23/2008				
County:	WHITMAN	Sample Location: S09, WELL #8			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/29/2008

Anatek File # 080527003-001

Well 6

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 16186	Collect Date:	5/23/2008	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/23/2008	Date Reported:	5/29/2008	Supervisor:	JWC
Date Analyzed:	5/23/2008				
County:	WHITMAN	Sample Location: S06, WELL #6			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/29/2008

Anatek File # 080527003-003

Well 4

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 16187	Collect Date:	5/23/2008	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/23/2008	Date Reported:	5/29/2008	Supervisor:	JWC
Date Analyzed:	5/23/2008				
County:	WHITMAN	Sample Location: S04, WELL #4			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
17	Turbidity	0.95	NTU	0.1	1		EPA 180.1	DMB

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/29/2008

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 03012	Collect Date:	5/3/2007	DOH Source #:	S08 Well #7
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/3/2007	Date Reported:	5/23/2007	Supervisor:	JWC
Date Analyzed:	5/4/2007				
County:	WHITMAN	Sample Location: S08 - WELL #7			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	RAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/23/2007

Well #7

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Inorganic Chemicals (IOC's) Analysis Report

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 09759	Collect Date:	10/8/2007	DOH Source #: S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	10/9/2007	Date Reported:	10/26/2007	Supervisor: JWC
Date Analyzed:	10/17/2007			
County:	WHITMAN	Sample Location:	WELL #7	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-6152		

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
4	Arsenic	0.00112	mg/L	0.002	0.01	0.01	EPA 200.8	ETL

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 10/26/2007

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Inorganic Chemicals (IOC's) Analysis Report

Well #6

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 03010	Collect Date:	5/3/2007	DOH Source #:	S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/3/2007	Date Reported:	5/23/2007	Supervisor:	JWC
Date Analyzed:	5/8/2007				
County:	WHITMAN	Sample Location: S06 - WELL #6			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
4	Arsenic	ND	mg/L	0.002	0.01	0.01	EPA 200.8	RAS
5	Barium	0.102	mg/L	0.1	2	2	EPA 200.8	RAS
6	Cadmium	ND	mg/L	0.002	0.005	0.005	EPA 200.8	RAS
7	Chromium	ND	mg/L	0.01	0.1	0.1	EPA 200.8	RAS
11	Mercury	ND	mg/L	0.0005	0.002	0.002	EPA 200.8	RAS
12	Selenium	ND	mg/L	0.005	0.05	0.05	EPA 200.8	RAS
110	Beryllium	ND	mg/L	0.003	0.004	0.004	EPA 200.8	RAS
111	Nickel	ND	mg/L	0.04	0.1		EPA 200.8	RAS
112	Antimony	ND	mg/L	0.005	0.006	0.006	EPA 200.8	RAS
113	Thallium	ND	mg/L	0.002	0.002	0.002	EPA 200.8	RAS
116	Cyanide	ND	mg/L	0.05	0.2	0.2	EPA 335.4	ETL
19	Fluoride	ND	mg/L	0.5	2	4	EPA 300.0	RAS
114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	RAS
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	RAS
161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	RAS

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	2.40	mg/L	0.1	0.3	0.3	EPA 200.8	RAS
10	Manganese	0.0881	mg/L	0.01	0.05	0.05	EPA 200.8	RAS
13	Silver	ND	mg/L	0.01	0.05	0.1	EPA 200.8	RAS
21	Chloride	ND	mg/L	20	250	250	EPA 300.0	RAS
22	Sulfate	ND	mg/L	10	250	250	EPA 300.0	RAS
24	Zinc	ND	mg/L	0.02	5	5	EPA 200.8	RAS

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State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
14	Sodium	21.8	mg/L	5			SM3111B	RAS
15	Hardness(CaCO3)	117	mg/L	10			EPA 200.8	RAS
16	Conductivity	323	µmhos/cm	10	700		EPA 120.1	JTT
17	Turbidity	16.4	NTU	0.1	1		EPA 180.1	JTT
18	Color	10	color units	5	15	15	EPA 110.2	JTT
26	Total Dissolved Solids	211	mg/L	150	500	500	EPA 160.1	JTT

State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
9	Lead	ND	mg/L	0.002	0.015	0.015	EPA 200.8	RAS
23	Copper	ND	mg/L	0.2	1.3		EPA 200.8	RAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Coltt **Date:** 5/23/2007

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Inorganic Chemicals (IOC's) Analysis Report

Well #8

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 03014	Collect Date:	5/3/2007	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	5/3/2007	Date Reported:	5/23/2007	Supervisor:	JWC
Date Analyzed:	5/8/2007				
County:	WHITMAN	Sample Location: S09 - WELL #8			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
4	Arsenic	ND	mg/L	0.002	0.01	0.01	EPA 200.8	RAS
5	Barium	ND	mg/L	0.1	2	2	EPA 200.8	RAS
6	Cadmium	ND	mg/L	0.002	0.005	0.005	EPA 200.8	RAS
7	Chromium	ND	mg/L	0.01	0.1	0.1	EPA 200.8	RAS
11	Mercury	ND	mg/L	0.0005	0.002	0.002	EPA 200.8	RAS
12	Selenium	ND	mg/L	0.005	0.05	0.05	EPA 200.8	RAS
110	Beryllium	ND	mg/L	0.003	0.004	0.004	EPA 200.8	RAS
111	Nickel	ND	mg/L	0.04	0.1		EPA 200.8	RAS
112	Antimony	ND	mg/L	0.005	0.006	0.006	EPA 200.8	RAS
113	Thallium	ND	mg/L	0.002	0.002	0.002	EPA 200.8	RAS
116	Cyanide	ND	mg/L	0.05	0.2	0.2	EPA 335.4	ETL
19	Fluoride	0.526	mg/L	0.5	2	4	EPA 300.0	RAS
114	Nitrite-N	ND	mg/L	0.1	0.5	1	EPA 300.0	RAS
20	Nitrate-N	ND	mg/L	0.5	5	10	EPA 300.0	RAS
161	Total Nitrate/Nitrite-N	ND	mg/L	0.5	5	10	EPA 300.0	RAS

EPA Regulated (Secondary)

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
8	Iron	0.361	mg/L	0.1	0.3	0.3	EPA 200.8	RAS
10	Manganese	0.0575	mg/L	0.01	0.05	0.05	EPA 200.8	RAS
13	Silver	ND	mg/L	0.01	0.05	0.1	EPA 200.8	RAS
21	Chloride	ND	mg/L	20	250	250	EPA 300.0	RAS
22	Sulfate	ND	mg/L	10	250	250	EPA 300.0	RAS
24	Zinc	ND	mg/L	0.02	5	5	EPA 200.8	RAS

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State Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
14	Sodium	21.1	mg/L	5			SM3111B	RAS
15	Hardness(CaCO3)	110	mg/L	10			EPA 200.8	RAS
16	Conductivity	300	µmhos/cm	10	700		EPA 120.1	JTT
17	Turbidity	0.38	NTU	0.1	1		EPA 180.1	JTT
18	Color	ND	color units	5	15	15	EPA 110.2	JTT
26	Total Dissolved Solids	213	mg/L	150	500	500	EPA 160.1	JTT

State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
9	Lead	ND	mg/L	0.002	0.015	0.015	EPA 200.8	RAS
23	Copper	ND	mg/L	0.2	1.3		EPA 200.8	RAS

ND = Not Detected at levels above the SRL
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Coltt **Date:** 5/23/2007

Anatek File # 070504001-005

Well #4

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Inorganic Chemicals (IOC's) Analysis Report For Nitrates

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 07654	Collect Date:	8/29/2007	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	8/29/2007	Date Reported:	8/30/2007	Supervisor:	JWC
Date Analyzed:	8/30/2007				
County:	WHITMAN	Sample Location:	S04		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

EPA Regulated Chemical

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analyst
20	Nitrate - N	ND	mg/L	0.5	5	10	EPA 300.0	JTT

NOTES:

SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Trigger Level: DOH drinking water response level. Systems exceeding this level are required to take additional samples. Contact the DOH immediately.
MCL (Maximum Contaminant Level): SDWA maximum contaminant level. If exceeded, contact the DOH immediately.
NDN(ot Detected): Indicates that the analysis was performed but the contaminant concentration is less than the SRL.

Lab Supervisor: John W. Cobb **Date:** 8/30/2007

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#: WA5393200 System Name: WSU EH&S

DOH Source #: S93
Multiple Source Nos: Sample Type: Sample Purpose: C
Date Received: 7/18/2012 Date Reported: 8/1/2012 Supervisor: JWC
Date Analyzed: 7/30/2012
County: WHITMAN
Report To: Address: P.O. BOX 641172
City, State, ZIP PULLMAN, WA 99164
Phone Number: (509) 335-3041

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 73084	7/18/2012	CHINOOK J47	Lead	0.00502	mg/L	EPA 200.8	ETL	
125 73084	7/18/2012	CHINOOK J47	Copper	0.0527	mg/L	EPA 200.8	ETL	
125 73085	7/18/2012	CHINOOK N63	Lead	0.00203	mg/L	EPA 200.8	ETL	
125 73085	7/18/2012	CHINOOK N63	Copper	0.0460	mg/L	EPA 200.8	ETL	
125 73086	7/18/2012	CHINOOK P67	Lead	0.00243	mg/L	EPA 200.8	ETL	
125 73086	7/18/2012	CHINOOK P67	Copper	0.0600	mg/L	EPA 200.8	ETL	
125 73087	7/18/2012	CHINOOK Y116	Lead	0.00572	mg/L	EPA 200.8	ETL	
125 73087	7/18/2012	CHINOOK Y116	Copper	0.101	mg/L	EPA 200.8	ETL	
125 73088	7/18/2012	COLUMBIA D12	Lead	0.00547	mg/L	EPA 200.8	ETL	
125 73088	7/18/2012	COLUMBIA D12	Copper	0.0933	mg/L	EPA 200.8	ETL	
125 73089	7/18/2012	COLUMBIA G22	Lead	0.00930	mg/L	EPA 200.8	ETL	
125 73089	7/18/2012	COLUMBIA G22	Copper	0.167	mg/L	EPA 200.8	ETL	
125 73090	7/18/2012	COLUMBIA L36	Lead	0.00538	mg/L	EPA 200.8	ETL	
125 73090	7/18/2012	COLUMBIA L36	Copper	0.0823	mg/L	EPA 200.8	ETL	
125 73091	7/18/2012	COLUMBIA Q52	Lead	0.0116	mg/L	EPA 200.8	ETL	
125 73091	7/18/2012	COLUMBIA Q52	Copper	0.168	mg/L	EPA 200.8	ETL	
125 73092	7/18/2012	NEZ PERCE A2	Lead	0.00732	mg/L	EPA 200.8	ETL	
125 73092	7/18/2012	NEZ PERCE A2	Copper	0.00786	mg/L	EPA 200.8	ETL	
125 73093	7/18/2012	NEZ PERCE B8	Lead	0.00650	mg/L	EPA 200.8	ETL	
125 73093	7/18/2012	NEZ PERCE B8	Copper	0.00604	mg/L	EPA 200.8	ETL	
125 73094	7/18/2012	NEZ PERCE G21	Lead	0.00731	mg/L	EPA 200.8	ETL	
125 73094	7/18/2012	NEZ PERCE G21	Copper	0.00502	mg/L	EPA 200.8	ETL	
125 73095	7/18/2012	NEZ PERCE L46	Lead	0.00547	mg/L	EPA 200.8	ETL	
125 73095	7/18/2012	NEZ PERCE L46	Copper	0.00897	mg/L	EPA 200.8	ETL	
125 73096	7/18/2012	NEZ PERCE Q68	Lead	0.0149	mg/L	EPA 200.8	ETL	
125 73096	7/18/2012	NEZ PERCE Q68	Copper	0.0147	mg/L	EPA 200.8	ETL	
125 73097	7/18/2012	NEZ PERCE S81	Lead	0.0141	mg/L	EPA 200.8	ETL	
125 73097	7/18/2012	NEZ PERCE S81	Copper	0.0154	mg/L	EPA 200.8	ETL	
125 73098	7/18/2012	YAKIMA 609	Lead	0.00420	mg/L	EPA 200.8	ETL	
125 73098	7/18/2012	YAKIMA 609	Copper	0.223	mg/L	EPA 200.8	ETL	
125 73099	7/18/2012	YAKIMA 615	Lead	0.00380	mg/L	EPA 200.8	ETL	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120718050-016

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type:	Sample Purpose: C
Date Received:	7/18/2012	Date Reported: 8/1/2012	Supervisor: JWC
Date Analyzed:	7/30/2012		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 73099	7/18/2012	YAKIMA 615	Copper	0.209	mg/L	EPA 200.8	ETL	
125 73100	7/18/2012	YAKIMA 635	Lead	0.00127	mg/L	EPA 200.8	ETL	
125 73100	7/18/2012	YAKIMA 635	Copper	0.134	mg/L	EPA 200.8	ETL	
125 73101	7/18/2012	YAKIMA G47	Lead	0.00204	mg/L	EPA 200.8	ETL	
125 73101	7/18/2012	YAKIMA G47	Copper	0.194	mg/L	EPA 200.8	ETL	
125 73102	7/18/2012	YAKIMA 713	Lead	0.00313	mg/L	EPA 200.8	ETL	
125 73102	7/18/2012	YAKIMA 713	Copper	0.206	mg/L	EPA 200.8	ETL	
125 73103	7/18/2012	YAKIMA 745	Lead	0.00473	mg/L	EPA 200.8	ETL	
125 73103	7/18/2012	YAKIMA 745	Copper	0.244	mg/L	EPA 200.8	ETL	
125 73104	7/18/2012	YAKIMA 755	Lead	0.00336	mg/L	EPA 200.8	ETL	
125 73104	7/18/2012	YAKIMA 755	Copper	0.199	mg/L	EPA 200.8	ETL	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 8/1/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120718050-021

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name: WSU	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/25/2012	Date Reported: 8/3/2012	Supervisor: JWC
Date Analyzed:	8/2/2012		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	509-335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 73357	7/25/2012	CHINOOK A-2	Lead	0.00187	mg/L	EPA 200.8	ETL	
125 73357	7/25/2012	CHINOOK A-2	Copper	0.0229	mg/L	EPA 200.8	ETL	
125 73358	7/25/2012	CHINOOK K51	Lead	0.00147	mg/L	EPA 200.8	ETL	
125 73358	7/25/2012	CHINOOK K51	Copper	0.0261	mg/L	EPA 200.8	ETL	
125 73359	7/25/2012	CHINOOK L55	Lead	0.00272	mg/L	EPA 200.8	ETL	
125 73359	7/25/2012	CHINOOK L55	Copper	0.0598	mg/L	EPA 200.8	ETL	
125 73360	7/25/2012	CHINOOK W 105	Lead	0.00205	mg/L	EPA 200.8	ETL	
125 73360	7/25/2012	CHINOOK W 105	Copper	0.0403	mg/L	EPA 200.8	ETL	
125 73361	7/25/2012	YAKIMA 654	Lead	0.00381	mg/L	EPA 200.8	ETL	
125 73361	7/25/2012	YAKIMA 654	Copper	0.243	mg/L	EPA 200.8	ETL	
125 73362	7/25/2012	YAKIMA 708	Lead	0.00175	mg/L	EPA 200.8	ETL	
125 73362	7/25/2012	YAKIMA 708	Copper	0.161	mg/L	EPA 200.8	ETL	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John Coll **Date:** 8/3/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120725047-006

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	8/8/2012	Date Reported: 8/23/2012	Supervisor: JWC
Date Analyzed:	8/21/2012		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 74308	8/1/2012	FOOD SERVICES BUILDING	Lead	0.0140	mg/L	EPA 200.8	ETL	
125 74308	8/1/2012	FOOD SERVICES BUILDING	Copper	0.104	mg/L	EPA 200.8	ETL	
125 74309	8/3/2012	STIMSON HALL	Lead	0.00712	mg/L	EPA 200.8	ETL	
125 74309	8/3/2012	STIMSON HALL	Copper	0.158	mg/L	EPA 200.8	ETL	
125 74310	8/8/2012	EE/ME BUILDING	Lead	0.00735	mg/L	EPA 200.8	ETL	
125 74310	8/8/2012	EE/ME BUILDING	Copper	0.127	mg/L	EPA 200.8	ETL	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cook **Date:** 8/23/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120809048-003

Lead + Copper 09

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	6/4/2009	Date Reported: 6/18/2009	Supervisor: JWC
Date Analyzed:	6/8/2009		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

90% = 0.9 x 30 Sample = 27 Sample (4 highest value)

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 27985	6/4/2009	FOOD SERVICES	Lead	0.0120	mg/L	EPA 200.8	ETL
125 27985	6/4/2009	FOOD SERVICES	Copper	0.149	mg/L	EPA 200.8	ETL
125 27986	6/3/2009	EE/ME BUILDING	Lead	0.0187	mg/L	EPA 200.8	ETL
125 27986	6/3/2009	EE/ME BUILDING	Copper	0.202	mg/L	EPA 200.8	ETL
125 27987	6/4/2009	NEZ PERCE B8	Lead	0.00465	mg/L	EPA 200.8	ETL
125 27987	6/4/2009	NEZ PERCE B8	Copper	0.0199	mg/L	EPA 200.8	ETL
125 27988	6/4/2009	NEZ PERCE D14	Lead	0.00874	mg/L	EPA 200.8	ETL
125 27988	6/4/2009	NEZ PERCE D14	Copper	0.0203	mg/L	EPA 200.8	ETL
125 27989	6/4/2009	NEZ PERCE E	Lead	0.00924	mg/L	EPA 200.8	ETL
125 27989	6/4/2009	NEZ PERCE E	Copper	0.0275	mg/L	EPA 200.8	ETL
125 27990	6/4/2009	NEZ PERCE G22	Lead	0.00161	mg/L	EPA 200.8	ETL
125 27990	6/4/2009	NEZ PERCE G22	Copper	0.153	mg/L	EPA 200.8	ETL
125 27991	6/4/2009	NEZ PERCE J34	Lead	0.0200	mg/L	EPA 200.8	ETL
125 27991	6/4/2009	NEZ PERCE J34	Copper	0.0296	mg/L	EPA 200.8	ETL
125 27992	6/4/2009	NEZ PERCE L46	Lead	0.00922	mg/L	EPA 200.8	ETL
125 27992	6/4/2009	NEZ PERCE L46	Copper	0.0110	mg/L	EPA 200.8	ETL
125 27993	6/4/2009	NEZ PERCE N58	Lead	0.00891	mg/L	EPA 200.8	ETL
125 27993	6/4/2009	NEZ PERCE N58	Copper	0.0183	mg/L	EPA 200.8	ETL
125 27994	6/4/2009	NEZ PERCE Q70	Lead	0.00805	mg/L	EPA 200.8	ETL
125 27994	6/4/2009	NEZ PERCE Q70	Copper	0.0210	mg/L	EPA 200.8	ETL
125 27995	6/4/2009	CHINOOK A3	Lead	0.00256	mg/L	EPA 200.8	ETL
125 27995	6/4/2009	CHINOOK A3	Copper	0.0319	mg/L	EPA 200.8	ETL
125 27996	6/4/2009	CHINOOK J47	Lead	0.00234	mg/L	EPA 200.8	ETL
125 27996	6/4/2009	CHINOOK J47	Copper	0.0231	mg/L	EPA 200.8	ETL
125 27997	6/4/2009	CHINOOK K51	Lead	0.00117	mg/L	EPA 200.8	ETL
125 27997	6/4/2009	CHINOOK K51	Copper	0.0246	mg/L	EPA 200.8	ETL
125 27998	6/4/2009	CHINOOK L55	Lead	0.00196	mg/L	EPA 200.8	ETL
125 27998	6/4/2009	CHINOOK L55	Copper	0.0448	mg/L	EPA 200.8	ETL
125 27999	6/4/2009	CHINOOK M60	Lead	0.00186	mg/L	EPA 200.8	ETL
125 27999	6/4/2009	CHINOOK M60	Copper	0.0486	mg/L	EPA 200.8	ETL
125 28000	6/4/2009	CHINOOK N65	Lead	ND	mg/L	EPA 200.8	ETL

90% - OK

not highest → Copper 0.202

value just past

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090605002-016

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name:	WSU EH&S		
				DOH Source #:	S93
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	6/4/2009	Date Reported:	6/18/2009	Supervisor:	JWC
Date Analyzed:	6/8/2009				
County:	WHITMAN				
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 28000	6/4/2009	CHINOOK N65	Copper	0.0405	mg/L	EPA 200.8	ETL
125 28001	6/4/2009	CHINOOK P68	Lead	0.00261	mg/L	EPA 200.8	ETL
125 28001	6/4/2009	CHINOOK P68	Copper	0.0491	mg/L	EPA 200.8	ETL
125 28002	6/4/2009	CHINOOK W106	Lead	0.00187	mg/L	EPA 200.8	ETL
125 28002	6/4/2009	CHINOOK W106	Copper	0.158	mg/L	EPA 200.8	ETL
125 28003	6/4/2009	CHINOOK Y116	Lead	0.00168	mg/L	EPA 200.8	ETL
125 28003	6/4/2009	CHINOOK Y116	Copper	0.122	mg/L	EPA 200.8	ETL
125 28004	6/4/2009	COLUMBIA D12	Lead	0.00352	mg/L	EPA 200.8	ETL
125 28004	6/4/2009	COLUMBIA D12	Copper	0.0562	mg/L	EPA 200.8	ETL
125 28005	6/4/2009	COLUMBIA G22	Lead	0.0167	mg/L	EPA 200.8	ETL
125 28005	6/4/2009	COLUMBIA G22	Copper	0.199	mg/L	EPA 200.8	ETL
125 28006	6/4/2009	COLUMBIA J27	Lead	0.00278	mg/L	EPA 200.8	ETL
125 28006	6/4/2009	COLUMBIA J27	Copper	0.0559	mg/L	EPA 200.8	ETL
125 28007	6/4/2009	COLUMBIA L36	Lead	0.00534	mg/L	EPA 200.8	ETL
125 28007	6/4/2009	COLUMBIA L36	Copper	0.0680	mg/L	EPA 200.8	ETL
125 28008	6/4/2009	COLUMBIA Q52	Lead	ND	mg/L	EPA 200.8	ETL
125 28008	6/4/2009	COLUMBIA Q52	Copper	0.00622	mg/L	EPA 200.8	ETL

Hwy Value

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John. Cobb **Date:** 6/18/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090605002-024

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	6/12/2009	Date Reported: 7/1/2009	Supervisor: JWC
Date Analyzed:	6/17/2009		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 28379	6/12/2009	COLUMBIA N-44	Lead	ND	mg/L	EPA 200.8	ETL
125 28379	6/12/2009	COLUMBIA N-44	Copper	0.0116	mg/L	EPA 200.8	ETL
125 28380	6/12/2009	NEZ PERCE S81	Lead	ND	mg/L	EPA 200.8	ETL
125 28380	6/12/2009	NEZ PERCE S81	Copper	0.0136	mg/L	EPA 200.8	ETL
125 28381	6/12/2009	STIMSON HALL - ROOM 44	Lead	ND	mg/L	EPA 200.8	ETL
125 28381	6/12/2009	STIMSON HALL - ROOM 44	Copper	0.0113	mg/L	EPA 200.8	ETL

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John W. Cobb **Date:** 7/1/2009

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name:	WSU	
				DOH Source #: S93
Multiple Source Nos:		Sample Type:	A	Sample Purpose: C
Date Received:	7/1/2009	Date Reported:	7/28/2009	Supervisor: JWC
Date Analyzed:	7/8/2009			
County:	WHITMAN			
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	509-335-3041		

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 29147	6/18/2009	CHINOOK M-39	Lead	0.00137	mg/L	EPA 200.8	ETL
125 29147	6/18/2009	CHINOOK M-39	Copper	0.143	mg/L	EPA 200.8	ETL
125 29148	7/1/2009	YAKIMA 754	Lead	0.00585	mg/L	EPA 200.8	ETL
125 29148	7/1/2009	YAKIMA 754	Copper	0.138	mg/L	EPA 200.8	ETL
125 29149	7/1/2009	YAKIMA 632	Lead	0.00143	mg/L	EPA 200.8	ETL
125 29149	7/1/2009	YAKIMA 632	Copper	0.313	mg/L	EPA 200.8	ETL

highest Value

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John W. Cobb **Date:** 7/28/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090702011-003

2008

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#: 93200Q
System Name: WSU EH&S
DOH Source #: S93
Multiple Source Nos:
Sample Type: D
Sample Purpose: C
Date Received: 7/18/2008
Date Reported: 7/29/2008
Supervisor: JWC
Date Analyzed: 7/28/2008
County: WHITMAN
Report To: Address: P.O. BOX 641172
City, State, ZIP PULLMAN, WA 99164
Phone Number: (509) 335-3041

30 Samples total

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 18259	7/18/2008	FOOD SERVICES	Copper	0.295	mg/L	EPA 200.8	DMB
125 18260	7/18/2008	EE/ME BUILDING	Lead	0.00622	mg/L	EPA 200.8	DMB
125 18260	7/18/2008	EE/ME BUILDING	Copper	0.198	mg/L	EPA 200.8	DMB
125 18261	7/18/2008	NEZ PERCE B5	Lead	0.0146	mg/L	EPA 200.8	DMB
125 18261	7/18/2008	NEZ PERCE B5	Copper	0.0179	mg/L	EPA 200.8	DMB
125 18262	7/18/2008	NEZ PERCE D14	Lead	0.00416	mg/L	EPA 200.8	DMB
125 18262	7/18/2008	NEZ PERCE D14	Copper	0.0338	mg/L	EPA 200.8	DMB
125 18263	7/18/2008	NEZ PERCE E	Lead	0.0146	mg/L	EPA 200.8	DMB
125 18263	7/18/2008	NEZ PERCE E	Copper	0.0793	mg/L	EPA 200.8	DMB
125 18264	7/18/2008	NEZ PERCE G25	Lead	0.00800	mg/L	EPA 200.8	DMB
125 18264	7/18/2008	NEZ PERCE G25	Copper	0.00740	mg/L	EPA 200.8	DMB
125 18265	7/18/2008	NEZ PERCE J36	Lead	0.00754	mg/L	EPA 200.8	DMB
125 18265	7/18/2008	NEZ PERCE J36	Copper	0.0110	mg/L	EPA 200.8	DMB
125 18266	7/18/2008	NEZ PERCE N59	Lead	0.00623	mg/L	EPA 200.8	DMB
125 18266	7/18/2008	NEZ PERCE N59	Copper	0.0154	mg/L	EPA 200.8	DMB
125 18267	7/18/2008	NEZ PERCE Q68	Lead	0.00362	mg/L	EPA 200.8	DMB
125 18267	7/18/2008	NEZ PERCE Q68	Copper	0.0153	mg/L	EPA 200.8	DMB
125 18268	7/18/2008	NEZ PERCE S80	Lead	0.00124	mg/L	EPA 200.8	DMB
125 18268	7/18/2008	NEZ PERCE S80	Copper	0.0130	mg/L	EPA 200.8	DMB

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the Instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level Indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John W. Cobb **Date:** 7/29/2008

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87693; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 080721012-025

2008

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: D	Sample Purpose: C
Date Received:	7/18/2008	Date Reported: 7/29/2008	Supervisor: JWC
Date Analyzed:	7/28/2008		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 18244	7/18/2008	CHINOOK A2	Lead	0.00368	mg/L	EPA 200.8	DMB
125 18244	7/18/2008	CHINOOK A2	Copper	0.0577	mg/L	EPA 200.8	DMB
125 18245	7/18/2008	CHINOOK J46	Lead	0.00158	mg/L	EPA 200.8	DMB
125 18245	7/18/2008	CHINOOK J46	Copper	0.0646	mg/L	EPA 200.8	DMB
125 18246	7/18/2008	CHINOOK L56	Lead	ND	mg/L	EPA 200.8	DMB
125 18246	7/18/2008	CHINOOK L56	Copper	0.0336	mg/L	EPA 200.8	DMB
125 18247	7/18/2008	CHINOOK N65	Lead	0.00149	mg/L	EPA 200.8	DMB
125 18247	7/18/2008	CHINOOK N65	Copper	0.0546	mg/L	EPA 200.8	DMB
125 18248	7/18/2008	CHINOOK P67	Lead	0.00110	mg/L	EPA 200.8	DMB
125 18248	7/18/2008	CHINOOK P67	Copper	0.0491	mg/L	EPA 200.8	DMB
125 18249	7/18/2008	CHINOOK Q74	Lead	0.00243	mg/L	EPA 200.8	DMB
125 18249	7/18/2008	CHINOOK Q74	Copper	0.0147	mg/L	EPA 200.8	DMB
125 18250	7/18/2008	CHINOOK W107	Lead	0.00136	mg/L	EPA 200.8	DMB
125 18250	7/18/2008	CHINOOK W107	Copper	0.0516	mg/L	EPA 200.8	DMB
125 18251	7/18/2008	CHINOOK Y116	Lead	0.00320	mg/L	EPA 200.8	DMB
125 18251	7/18/2008	CHINOOK Y116	Copper	0.126	mg/L	EPA 200.8	DMB
125 18252	7/18/2008	COLUMBIA D12	Lead	0.00667	mg/L	EPA 200.8	DMB
125 18252	7/18/2008	COLUMBIA D12	Copper	0.0276	mg/L	EPA 200.8	DMB
125 18253	7/18/2008	COLUMBIA G22	Lead	0.00415	mg/L	EPA 200.8	DMB
125 18253	7/18/2008	COLUMBIA G22	Copper	0.0658	mg/L	EPA 200.8	DMB
125 18254	7/18/2008	COLUMBIA J29	Lead	0.00527	mg/L	EPA 200.8	DMB
125 18254	7/18/2008	COLUMBIA J29	Copper	0.0831	mg/L	EPA 200.8	DMB
125 18255	7/18/2008	COLUMBIA M39	Lead	0.0107	mg/L	EPA 200.8	DMB
125 18255	7/18/2008	COLUMBIA M39	Copper	0.171	mg/L	EPA 200.8	DMB
125 18256	7/18/2008	COLUMBIA N45	Lead	0.00277	mg/L	EPA 200.8	DMB
125 18256	7/18/2008	COLUMBIA N45	Copper	0.0431	mg/L	EPA 200.8	DMB
125 18257	7/18/2008	COLUMBIA Q52	Lead	0.00430	mg/L	EPA 200.8	DMB
125 18257	7/18/2008	COLUMBIA Q52	Copper	0.177	mg/L	EPA 200.8	DMB
125 18258	7/18/2008	STIMSON HALL	Lead	ND	mg/L	EPA 200.8	DMB
125 18258	7/18/2008	STIMSON HALL	Copper	0.188	mg/L	EPA 200.8	DMB
125 18259	7/18/2008	FOOD SERVICES	Lead	0.0210	mg/L	EPA 200.8	DMB

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 080721012-016

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#: 93200Q
System Name: WSU EH&S
DOH Source #: S93
Multiple Source Nos:
Sample Type:
Sample Purpose: C
Date Received: 8/5/2008
Date Reported: 8/25/2008
Supervisor: JWC
Date Analyzed: 8/12/2008
County: WHITMAN
Report To: Address: P.O. BOX 641172
City, State, ZIP: PULLMAN, WA 99164
Phone Number: (509) 335-3041

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 19017	7/22/2008	COLUMBIA L-35	Lead	0.00311	mg/L	EPA 200.8	DMB
125 19017	7/22/2008	COLUMBIA L-35	Copper	0.111	mg/L	EPA 200.8	DMB
125 19018	7/25/2008	CHINOOK K-50	Lead	0.00224	mg/L	EPA 200.8	DMB
125 19018	7/25/2008	CHINOOK K-50	Copper	0.102	mg/L	EPA 200.8	DMB
125 19019	7/25/2008	NEZ PERCE L-47	Lead	0.00263	mg/L	EPA 200.8	DMB
125 19019	7/25/2008	NEZ PERCE L-47	Copper	0.134	mg/L	EPA 200.8	DMB
125 19020	8/4/2008	CHINOOK M-50	Lead	0.00132	mg/L	EPA 200.8	DMB
125 19020	8/4/2008	CHINOOK M-50	Copper	0.0933	mg/L	EPA 200.8	DMB

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John W. Cobb **Date:** 8/25/2008

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	93200Q	System Name: WSU	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: D	Sample Purpose: C
Date Received:	8/22/2008	Date Reported: 9/2/2008	Supervisor: JWC
Date Analyzed:	8/27/2008		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-6152	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst
125 19689	8/15/2008	CHINOOK U-24	Lead	0.00162	mg/L	EPA 200.8	ETL
125 19689	8/15/2008	CHINOOK U-24	Copper	0.0162	mg/L	EPA 200.8	ETL

Analyte	DOH#	SRL	AL
Lead	9	0.002 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

NDN(ot Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.

Lab Supervisor: John W. Cobb **Date:** 9/2/2008

Herbicides

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 515.3

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 70911	Collect Date:	5/24/2012	DOH Source #: S09
Multiple Source Nos:		Sample Type:	C	Sample Purpose: B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor: JWC
Date Analyzed:	6/1/2012			
County:	WHITMAN	Sample Location:	WELL 8	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0037	2,4-D	ND	ug/L	0.1	0.1	70	EPA 515.3	MAH	
0038	2,4,5-TP (Silvex)	ND	ug/L	0.2	0.2	50	EPA 515.3	MAH	
0134	Pentachlorophenol	ND	ug/L	0.04	0.04	1	EPA 515.3	MAH	
0137	Dalapon	ND	ug/L	1	1	200	EPA 515.3	MAH	
0139	Dinoseb	ND	ug/L	0.2	0.2	7	EPA 515.3	MAH	
0140	Picloram	ND	ug/L	0.1	0.1	500	EPA 515.3	MAH	

EPA Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0138	Dicamba	ND	ug/L	0.2	0.2		EPA 515.3	MAH	

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0135	2,4-DB	ND	ug/L	1.0	1.0		EPA 515.3	MAH	
0136	2,4,5-T	ND	ug/L	0.4	0.4		EPA 515.3	MAH	
0220	Bentazon	ND	ug/L	0.5	0.5		EPA 515.3	MAH	
0221	Dichloroprop	ND	ug/L	0.5	0.5		EPA 515.3	MAH	
0223	Acifluorofen	ND	ug/L	2.0	2.0		EPA 515.3	MAH	
0225	Dacthal (DCPA Acid Metabolites (A))	ND	ug/L	0.02	0.02		EPA 515.3	MAH	
0226	3,5-Dichlorobenzoic Acid	ND	ug/L	0.5	0.5		EPA 515.3	MAH	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-008

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0222	Total Dacthal	ND	ug/L	0.02	0.02		EPA 515.3	MAH	

State Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0224	Chloramben	ND	ug/L	0.2	0.2		EPA 515.3	MAH	
0228	4-Nitrophenol	ND	ug/L	0.5	0.5		EPA 515.3	MAH	

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

Pesticides, Herbicides - Well #4

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 515.3

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 27254	Collect Date:	5/12/2009	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor:	JWC
Date Analyzed:	5/19/2009				
County:	WHITMAN	Sample Location: S04 - WELL 4			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
37	2,4-D	ND	ug/L	0.2	0.2	70	EPA 515.3	SAT
38	2,4,5-TP (Silvex)	ND	ug/L	0.4	0.4	50	EPA 515.3	SAT
134	Pentachlorophenol	ND	ug/L	0.08	0.08	1	EPA 515.3	SAT
137	Dalapon	ND	ug/L	2.0	2.0	200	EPA 515.3	SAT
139	Dinoseb	ND	ug/L	0.4	0.4	7	EPA 515.3	SAT
140	Picloram	ND	ug/L	0.2	0.2	500	EPA 515.3	SAT

EPA Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
138	Dicamba	ND	ug/L	0.2	0.2		EPA 515.3	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
135	2,4-DB	ND	ug/L	1.0	1.0		EPA 515.3	SAT
136	2,4,5-T	ND	ug/L	0.4	0.4		EPA 515.3	SAT
220	Bentazon	ND	ug/L	0.5	0.5		EPA 515.3	SAT
221	Dichloroprop	ND	ug/L	0.5	0.5		EPA 515.3	SAT
223	Acifluorofen	ND	ug/L	2.0	2.0		EPA 515.3	SAT
225	Dacthal (DCPA Acid Metabolites (A))	ND	ug/L	0.1	0.1		EPA 515.3	SAT
226	3,5-Dichlorobenzoic Acid	ND	ug/L	0.5	0.5		EPA 515.3	SAT

Other

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
224	Chloramben	ND	ug/L	0.2			EPA 515.3	SAT
228	4-Nitrophenol	ND	ug/L	0.2			EPA 515.3	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-002

Anatek Labs, Inc.

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 525.2, 505

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 27254	Collect Date:	5/12/2009	DOH Source #: S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor: JWC

County: WHITMAN Sample Location: S04 - WELL 4

Report To: Address: P.O. BOX 641172
City, State, ZIP PULLMAN, WA 99164
Phone Number: (509) 335-3041

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
33	Endrin	ND	ug/L	0.02	0.02	2	EPA 505	5/18/2009	SAT
34	Lindane (HCH gamma)	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
35	Methoxychlor	ND	ug/L	0.2	0.2	40	EPA 505	5/18/2009	SAT
36	Toxaphene	ND	ug/L	2	2	3	EPA 505	5/18/2009	SAT
117	Alachlor	ND	ug/L	0.4	0.4	2	EPA 525.2	5/14/2009	EMP
119	Atrazine	ND	ug/L	0.2	0.2	3	EPA 525.2	5/14/2009	EMP
120	Benzo(a)pyrene	ND	ug/L	0.04	0.04	0.2	EPA 525.2	5/14/2009	EMP
122	Chlordane (Total)	ND	ug/L	0.4	0.4	2	EPA 505	5/18/2009	SAT
124	di(ethylhexyl)adipate	ND	ug/L	1.3	1.3	400	EPA 525.2	5/14/2009	EMP
125	di(ethylhexyl)phthalate	ND	ug/L	1.3	1.3	6	EPA 525.2	5/14/2009	EMP
126	Heptachlor	ND	ug/L	0.08	0.08	0.4	EPA 505	5/18/2009	SAT
127	Heptachlor Epoxide	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
128	Hexachlorobenzene	ND	ug/L	0.2	0.2	1	EPA 525.2	5/14/2009	EMP
129	Hexachlorocyclopentadiene	ND	ug/L	0.2	0.2	50	EPA 525.2	5/14/2009	EMP
133	Simazine	ND	ug/L	0.15	0.15	4	EPA 525.2	5/14/2009	EMP
153	PCB (As Total Arochlors)	ND	µg/L	0.2	0.2	0.5	EPA 505	5/18/2009	SAT

EPA Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
118	Aldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
121	Butachlor	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
123	Dieldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
130	Metolachlor	ND	ug/L	1	1		EPA 525.2	5/14/2009	EMP
131	Metribuzin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
132	Propachlor	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
254	Fluorene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
173	Aroclor 1221	ND	ug/L	0.5	0.5		EPA 505	5/18/2009	SAT
174	Aroclor 1232	ND	ug/L	0.1	0.5		EPA 505	5/18/2009	SAT
175	Aroclor 1242	ND	ug/L	0.1	0.3		EPA 505	5/18/2009	SAT
176	Aroclor 1248	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
177	Aroclor 1254	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
178	Aroclor 1260	ND	ug/L	0.1	0.2		EPA 505	5/18/2009	SAT
180	Aroclor 1016	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-002

Anatek Labs, Inc.

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State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
179	Bromacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
183	Prometon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
190	Terbacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
202	Diazinon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
208	EPTC	ND	ug/L	0.3	0.3		EPA 525.2	5/14/2009	EMP
232	4,4'-DDD	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
233	4,4'-DDE	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
234	4,4'-DDT	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
236	Cyanizine	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
239	Malathion	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
243	Trifluralin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
244	Acenaphthylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
245	Acenaphthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
246	Anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
247	Benzo(a)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
248	Benzo(b)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
249	Benzo(g,h,i)perylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
250	Benzo(k)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
251	Chrysene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
252	Dibenz(a,h)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
253	Fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
255	Indeno(1,2,3-cd)pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
256	Phenanthrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
257	Pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
258	Butylbenzylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
259	Di-n-butylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
260	Diethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
261	Dimethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John Coth **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Pesticides, Herbicide, - Well #6

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 515.3

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 27256	Collect Date:	5/12/2009	DOH Source #: S06
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor: JWC
Date Analyzed:	5/19/2009			
County:	WHITMAN	Sample Location: S06 - WELL 6		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
37	2,4-D	ND	ug/L	0.2	0.2	70	EPA 515.3	SAT
38	2,4,5-TP (Silvex)	ND	ug/L	0.4	0.4	50	EPA 515.3	SAT
134	Pentachlorophenol	ND	ug/L	0.08	0.08	1	EPA 515.3	SAT
137	Dalapon	ND	ug/L	2.0	2.0	200	EPA 515.3	SAT
139	Dinoseb	ND	ug/L	0.4	0.4	7	EPA 515.3	SAT
140	Picloram	ND	ug/L	0.2	0.2	500	EPA 515.3	SAT

EPA Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
138	Dicamba	ND	ug/L	0.2	0.2		EPA 515.3	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
135	2,4-DB	ND	ug/L	1.0	1.0		EPA 515.3	SAT
136	2,4,5-T	ND	ug/L	0.4	0.4		EPA 515.3	SAT
220	Bentazon	ND	ug/L	0.5	0.5		EPA 515.3	SAT
221	Dichloroprop	ND	ug/L	0.5	0.5		EPA 515.3	SAT
223	Acifluorofen	ND	ug/L	2.0	2.0		EPA 515.3	SAT
225	Dacthal (DCPA Acid Metabolites (A))	ND	ug/L	0.1	0.1		EPA 515.3	SAT
226	3,5-Dichlorobenzoic Acid	ND	ug/L	0.5	0.5		EPA 515.3	SAT

Other

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
224	Chloramben	ND	ug/L	0.2			EPA 515.3	SAT
228	4-Nitrophenol	ND	ug/L	0.2			EPA 515.3	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-004

WM #6

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 525.2, 505

System ID#: 93200Q
Lab/Sample Number: 125 27256
Multiple Source Nos:
Date Received: 5/12/2009

System Name: ~~WSU EH&S~~
Collect Date: 5/12/2009
Sample Type: ~~B~~
Date Reported: 6/4/2009

DOH Source #: S06
Sample Purpose: C
Supervisor: JWC

County: WHITMAN
Sample Location: S06 - WELL 6
Report To: Address: P.O. BOX 641172
City, State, ZIP: PULLMAN, WA 99164
Phone Number: (509) 335-3041

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
33	Endrin	ND	ug/L	0.02	0.02	2	EPA 505	5/18/2009	SAT
34	Lindane (HCH gamma)	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
35	Methoxychlor	ND	ug/L	0.2	0.2	40	EPA 505	5/18/2009	SAT
36	Toxaphene	ND	ug/L	2	2	3	EPA 505	5/18/2009	SAT
117	Alachlor	ND	ug/L	0.4	0.4	2	EPA 525.2	5/14/2009	EMP
119	Atrazine	ND	ug/L	0.2	0.2	3	EPA 525.2	5/14/2009	EMP
120	Benzo(a)pyrene	ND	ug/L	0.04	0.04	0.2	EPA 525.2	5/14/2009	EMP
122	Chlordane (Total)	ND	ug/L	0.4	0.4	2	EPA 505	5/18/2009	SAT
124	di(ethylhexyl)adipate	ND	ug/L	1.3	1.3	400	EPA 525.2	5/14/2009	EMP
125	di(ethylhexyl)phthalate	ND	ug/L	1.3	1.3	6	EPA 525.2	5/14/2009	EMP
126	Heptachlor	ND	ug/L	0.08	0.08	0.4	EPA 505	5/18/2009	SAT
127	Heptachlor Epoxide	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
128	Hexachlorobenzene	ND	ug/L	0.2	0.2	1	EPA 525.2	5/14/2009	EMP
129	Hexachlorocyclopentadiene	ND	ug/L	0.2	0.2	50	EPA 525.2	5/14/2009	EMP
133	Simazine	ND	ug/L	0.15	0.15	4	EPA 525.2	5/14/2009	EMP
153	PCB (As Total Arochlors)	ND	µg/L	0.2	0.2	0.5	EPA 505	5/18/2009	SAT

EPA Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
118	Aldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
121	Butachlor	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
123	Dieldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
130	Metolachlor	ND	ug/L	1	1		EPA 525.2	5/14/2009	EMP
131	Metribuzin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
132	Propachlor	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
254	Fluorene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
173	Aroclor 1221	ND	ug/L	0.5	0.5		EPA 505	5/18/2009	SAT
174	Aroclor 1232	ND	ug/L	0.1	0.5		EPA 505	5/18/2009	SAT
175	Aroclor 1242	ND	ug/L	0.1	0.3		EPA 505	5/18/2009	SAT
176	Aroclor 1248	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
177	Aroclor 1254	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
178	Aroclor 1260	ND	ug/L	0.1	0.2		EPA 505	5/18/2009	SAT
180	Aroclor 1016	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-004

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State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
179	Bromacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
183	Prometon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
190	Terbacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
202	Diazinon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
208	EPTC	ND	ug/L	0.3	0.3		EPA 525.2	5/14/2009	EMP
232	4,4'-DDD	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
233	4,4'-DDE	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
234	4,4'-DDT	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
236	Cyanizine	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
239	Malathion	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
243	Trifluralin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
244	Acenaphthylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
245	Acenaphthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
246	Anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
247	Benzo(a)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
248	Benzo(b)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
249	Benzo(g,h,i)perylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
250	Benzo(k)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
251	Chrysene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
252	Dibenz(a,h)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
253	Fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
255	Indeno(1,2,3-cd)pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
256	Phenanthrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
257	Pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
258	Butylbenzylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
259	Di-n-butylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
260	Diethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
261	Dimethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Coltrane **Date:** 6/4/2009

Pentachlor, Herbicide, - Well #7

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 515.3

System ID#:	93200Q	System Name:	WSU EH&S	
Lab/Sample Number:	125 27259	Collect Date:	5/12/2009	DOH Source #: S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose: C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor: JWC
Date Analyzed:	3/19/2009			
County:	WHITMAN	Sample Location: S08 - WELL 7		
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
37	2,4-D	ND	ug/L	0.2	0.2	70	EPA 515.3	SAT
38	2,4,5-TP (Silvex)	ND	ug/L	0.4	0.4	50	EPA 515.3	SAT
134	Pentachlorophenol	ND	ug/L	0.08	0.08	1	EPA 515.3	SAT
137	Dalapon	ND	ug/L	2.0	2.0	200	EPA 515.3	SAT
139	Dinoseb	ND	ug/L	0.4	0.4	7	EPA 515.3	SAT
140	Picloram	ND	ug/L	0.2	0.2	500	EPA 515.3	SAT

EPA Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
138	Dicamba	ND	ug/L	0.2	0.2		EPA 515.3	SAT

State Unregulated

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
135	2,4-DB	ND	ug/L	1.0	1.0		EPA 515.3	SAT
136	2,4,5-T	ND	ug/L	0.4	0.4		EPA 515.3	SAT
220	Bentazon	ND	ug/L	0.5	0.5		EPA 515.3	SAT
221	Dichloroprop	ND	ug/L	0.5	0.5		EPA 515.3	SAT
223	Acifluorofen	ND	ug/L	2.0	2.0		EPA 515.3	SAT
225	Dacthal (DCPA Acid Metabolites (A))	ND	ug/L	0.1	0.1		EPA 515.3	SAT
226	3,5-Dichlorobenzoic Acid	ND	ug/L	0.5	0.5		EPA 515.3	SAT

Other

DOH #	Analytes	Result	Units	SRL	Trigger	MCL	Method	Analyst
224	Chloramben	ND	ug/L	0.2			EPA 515.3	SAT
228	4-Nitrophenol	ND	ug/L	0.2			EPA 515.3	SAT

Notes: ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Code **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-007

Well #7

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Synthetic Organic Chemicals (SOC's) Analysis Report
EPA Test Method - EPA 525.2, 505

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 27259	Collect Date:	5/12/2009	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	5/12/2009	Date Reported:	6/4/2009	Supervisor:	JWC

County: WHITMAN Sample Location: S08 - WELL 7

Report To:
Address: P.O. BOX 641172
City, State, ZIP: PULLMAN, WA 99164
Phone Number: (509) 335-3041

EPA Regulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
33	Endrin	ND	ug/L	0.02	0.02	2	EPA 505	5/18/2009	SAT
34	Lindane (HCH gamma)	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
35	Methoxychlor	ND	ug/L	0.2	0.2	40	EPA 505	5/18/2009	SAT
36	Toxaphene	ND	ug/L	2	2	3	EPA 505	5/18/2009	SAT
117	Alachlor	ND	ug/L	0.4	0.4	2	EPA 525.2	5/14/2009	EMP
119	Atrazine	ND	ug/L	0.2	0.2	3	EPA 525.2	5/14/2009	EMP
120	Benzo(a)pyrene	ND	ug/L	0.04	0.04	0.2	EPA 525.2	5/14/2009	EMP
122	Chlordane (Total)	ND	ug/L	0.4	0.4	2	EPA 505	5/18/2009	SAT
124	di(ethylhexyl)adipate	ND	ug/L	1.3	1.3	400	EPA 525.2	5/14/2009	EMP
125	di(ethylhexyl)phthalate	ND	ug/L	1.3	1.3	6	EPA 525.2	5/14/2009	EMP
126	Heptachlor	ND	ug/L	0.08	0.08	0.4	EPA 505	5/18/2009	SAT
127	Heptachlor Epoxide	ND	ug/L	0.04	0.04	0.2	EPA 505	5/18/2009	SAT
128	Hexachlorobenzene	ND	ug/L	0.2	0.2	1	EPA 525.2	5/14/2009	EMP
129	Hexachlorocyclopentadiene	ND	ug/L	0.2	0.2	50	EPA 525.2	5/14/2009	EMP
133	Simazine	ND	ug/L	0.15	0.15	4	EPA 525.2	5/14/2009	EMP
153	PCB (As Total Arochlors)	ND	µg/L	0.2	0.2	0.5	EPA 505	5/18/2009	SAT

EPA Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
118	Aldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
121	Butachlor	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
123	Dieldrin	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT
130	Metolachlor	ND	ug/L	1	1		EPA 525.2	5/14/2009	EMP
131	Metribuzin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
132	Propachlor	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
254	Fluorene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
173	Aroclor 1221	ND	ug/L	0.5	0.5		EPA 505	5/18/2009	SAT
174	Aroclor 1232	ND	ug/L	0.1	0.5		EPA 505	5/18/2009	SAT
175	Aroclor 1242	ND	ug/L	0.1	0.3		EPA 505	5/18/2009	SAT
176	Aroclor 1248	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
177	Aroclor 1254	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
178	Aroclor 1260	ND	ug/L	0.1	0.2		EPA 505	5/18/2009	SAT
180	Aroclor 1016	ND	ug/L	0.2	0.2		EPA 505	5/18/2009	SAT

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

Anatek File # 090513019-007

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State Unregulated

DOH #	Analyte	Result	Units	SRL	Trigger	MCL	Method	Analysis Date	Analyst
179	Bromacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
183	Prometon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
190	Terbacil	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
202	Diazinon	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
208	EPTC	ND	ug/L	0.3	0.3		EPA 525.2	5/14/2009	EMP
232	4,4'-DDD	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
233	4,4'-DDE	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
234	4,4'-DDT	ND	ug/L	0.1	0.1		EPA 505	5/18/2009	SAT
236	Cyanizine	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
239	Malathion	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
243	Trifluralin	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
244	Acenaphthylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
245	Acenaphthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
246	Anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
247	Benzo(a)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
248	Benzo(b)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
249	Benzo(g,h,i)perylene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
250	Benzo(k)fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
251	Chrysene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
252	Dibenz(a,h)anthracene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
253	Fluoranthene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
255	Indeno(1,2,3-cd)pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
256	Phenanthrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
257	Pyrene	ND	ug/L	0.2	0.2		EPA 525.2	5/14/2009	EMP
258	Butylbenzylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
259	Di-n-butylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
260	Diethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP
261	Dimethylphthalate	ND	ug/L	0.4	0.4		EPA 525.2	5/14/2009	EMP

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Caulk **Date:** 6/4/2009

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C1320
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C1287

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 54400	Collect Date:	10/31/2014	DOH Source #:	SO4
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	10/31/2014	Date Reported:	11/10/2014	Supervisor:	JWC
Date Analyzed:	11/4/2014				
County:	WHITMAN	Sample Location:	WELL 4		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0045	Vinyl Chloride	ND	µg/L	0.5	0.5	2	EPA 524.2	SAT	
0046	1,1-Dichloroethylene	ND	µg/L	0.5	0.5	7	EPA 524.2	SAT	
0047	1,1,1-Trichloroethane	ND	µg/L	0.5	0.5	200	EPA 524.2	SAT	
0048	Carbon Tetrachloride	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0049	Benzene	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0050	1,2-Dichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0051	Trichloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0052	1,4-Dichlorobenzene	ND	µg/L	0.5	0.5	75	EPA 524.2	SAT	
0056	Dichloromethane	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0057	trans-1,2-Dichloroethylene	ND	µg/L	0.5	0.5	100	EPA 524.2	SAT	
0060	cis-1,2-dichloroethylene	ND	µg/L	0.5	0.5	70	EPA 524.2	SAT	
0063	1,2-Dichloropropane	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0066	Toluene	ND	µg/L	0.5	0.5	1000	EPA 524.2	SAT	
0067	1,1,2-Trichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0068	Tetrachloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	SAT	
0071	Chlorobenzene	ND	µg/L	0.5	0.5	100	EPA 524.2	SAT	
0073	Ethylbenzene	ND	µg/L	0.5	0.5	700	EPA 524.2	SAT	
0076	Styrene	ND	µg/L	0.5	0.5	100	EPA 524.2	SAT	
0084	1,2-Dichlorobenzene	ND	µg/L	0.5	0.5	600	EPA 524.2	SAT	
0095	1,2,4-Trichlorobenzene	ND	µg/L	0.5	0.5	70	EPA 524.2	SAT	
0160	Total Xylene	ND	µg/L	0.5	0.5	10000	EPA 524.2	SAT	
0074	m/p-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0075	o-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	SAT	

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25	--		EPA 524.2	SAT	
0028	Bromodichloromethane	ND	µg/L	0.5	--		EPA 524.2	SAT	
0029	Chlorodibromomethane	ND	µg/L	0.5	--		EPA 524.2	SAT	
0030	Bromoform	ND	µg/L	0.5	--		EPA 524.2	SAT	
0053	Chloromethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0054	Bromomethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0055	Chloroethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek File # 141031038-001

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0058	1,1-Dichloroethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0059	2,2-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0062	1,1-Dichloropropylene	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0064	Dibromomethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0070	1,3-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0072	1,1,1,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0078	Bromobenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0079	1,2,3-Trichloropropane	ND	µg/L	0.5	0.5	21	EPA 524.2	SAT
0080	1,1,2,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0081	o-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0082	p-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0083	m-Dichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT
0154	1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	SAT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0065	cis-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0069	trans-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0085	Fluorotrichloromethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0086	Bromochloromethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0087	Isopropylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0088	n-Propylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0089	1,3,5-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0090	tert-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0091	1,2,4-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0092	sec-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0093	p-Isopropyltoluene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0094	n-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0096	Naphthalene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0097	Hexachlorobutadiene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0098	1,2,3-Trichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0102	EDB (Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0103	DBCP(Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
0104	Dichlorodifluoromethane	ND	µg/L	0.5	0.5		EPA 524.2	SAT	
	methyl-t-butyl ether (MTBE)	ND	µg/L	0.5	70		EPA 524.2	SAT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Coll **Date:** 11/10/2014

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek File # 141031038-001

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S	
Lab/Sample Number:	125 70906	Collect Date:	5/24/2012	DOH Source #: S06
Multiple Source Nos:		Sample Type:	C	Sample Purpose: B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor: JWC
Date Analyzed:	6/4/2012			
County:	WHITMAN	Sample Location:	WELL 6	
Report To:	Address:	P.O. BOX 641172		
	City, State, ZIP	PULLMAN, WA 99164		
	Phone Number:	(509) 335-3041		

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0045	Vinyl Chloride	ND	µg/L	0.5	0.5	2	EPA 524.2	TGT	
0046	1,1-Dichloroethylene	ND	µg/L	0.5	0.5	7	EPA 524.2	TGT	
0047	1,1,1-Trichloroethane	ND	µg/L	0.5	0.5	200	EPA 524.2	TGT	
0048	Carbon Tetrachloride	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0049	Benzene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0050	1,2-Dichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0051	Trichloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0052	1,4-Dichlorobenzene	ND	µg/L	0.5	0.5	75	EPA 524.2	TGT	
0056	Dichloromethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0057	trans-1,2-Dichloroethylene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0060	cis-1,2-dichloroethylene	ND	µg/L	0.5	0.5	70	EPA 524.2	TGT	
0063	1,2-Dichloropropane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0066	Toluene	ND	µg/L	0.5	0.5	1000	EPA 524.2	TGT	
0067	1,1,2-Trichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0068	Tetrachloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0071	Chlorobenzene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0073	Ethylbenzene	ND	µg/L	0.5	0.5	700	EPA 524.2	TGT	
0076	Styrene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0084	1,2-Dichlorobenzene	ND	µg/L	0.5	0.5	600	EPA 524.2	TGT	
0095	1,2,4-Trichlorobenzene	ND	µg/L	0.5	0.5	70	EPA 524.2	TGT	
0160	Total Xylene	ND	µg/L	0.5	0.5	10000	EPA 524.2	TGT	
0074	m/p-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0075	o-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25	--		EPA 524.2	TGT	
0028	Bromodichloromethane	ND	µg/L	0.5	--		EPA 524.2	TGT	
0029	Chlorodibromomethane	ND	µg/L	0.5	--		EPA 524.2	TGT	
0030	Bromoform	ND	µg/L	0.5	--		EPA 524.2	TGT	
0053	Chloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0054	Bromomethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-003

Printed on: 14 June 2012 09:52:04

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0055	Chloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0058	1,1-Dichloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0059	2,2-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0062	1,1-Dichloropropylene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0064	Dibromomethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0070	1,3-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0072	1,1,1,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0078	Bromobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0079	1,2,3-Trichloropropane	ND	µg/L	0.5	0.5	21	EPA 524.2	TGT
0080	1,1,2,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0081	o-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0082	p-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0083	m-Dichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0154	1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0065	cis-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0069	trans-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0085	Flourotrichloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0086	Bromochloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0087	Isopropylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0088	n-Propylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0089	1,3,5-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0090	tert-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0091	1,2,4-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0092	sec-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0093	p-Isopropyltoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0094	n-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0096	Naphthalene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0097	Hexachlorobutadiene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0098	1,2,3-Trichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0102	EDB (Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0103	DBCP(Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0104	Dichlorodifluoromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
	methyl-t-butyl ether (MTBE)	ND	µg/L	0.5	70		EPA 524.2	TGT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-003

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	WA5393200	System Name:	WSU EH&S		
Lab/Sample Number:	125 70909	Collect Date:	5/24/2012	DOH Source #:	S08
Multiple Source Nos:		Sample Type:	C	Sample Purpose:	B
Date Received:	5/24/2012	Date Reported:	6/14/2012	Supervisor:	JWC
Date Analyzed:	6/4/2012				
County:	WHITMAN	Sample Location:	WELL 7		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0045	Vinyl Chloride	ND	µg/L	0.5	0.5	2	EPA 524.2	TGT	
0046	1,1-Dichloroethylene	ND	µg/L	0.5	0.5	7	EPA 524.2	TGT	
0047	1,1,1-Trichloroethane	ND	µg/L	0.5	0.5	200	EPA 524.2	TGT	
0048	Carbon Tetrachloride	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0049	Benzene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0050	1,2-Dichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0051	Trichloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0052	1,4-Dichlorobenzene	ND	µg/L	0.5	0.5	75	EPA 524.2	TGT	
0056	Dichloromethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0057	trans-1,2-Dichloroethylene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0060	cis-1,2-dichloroethylene	ND	µg/L	0.5	0.5	70	EPA 524.2	TGT	
0063	1,2-Dichloropropane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0066	Toluene	ND	µg/L	0.5	0.5	1000	EPA 524.2	TGT	
0067	1,1,2-Trichloroethane	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0068	Tetrachloroethylene	ND	µg/L	0.5	0.5	5	EPA 524.2	TGT	
0071	Chlorobenzene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0073	Ethylbenzene	ND	µg/L	0.5	0.5	700	EPA 524.2	TGT	
0076	Styrene	ND	µg/L	0.5	0.5	100	EPA 524.2	TGT	
0084	1,2-Dichlorobenzene	ND	µg/L	0.5	0.5	600	EPA 524.2	TGT	
0095	1,2,4-Trichlorobenzene	ND	µg/L	0.5	0.5	70	EPA 524.2	TGT	
0160	Total Xylene	ND	µg/L	0.5	0.5	10000	EPA 524.2	TGT	
0074	m/p-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0075	o-Xylene (MCL for Total)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0027	Chloroform	ND	µg/L	0.25	--		EPA 524.2	TGT	
0028	Bromodichloromethane	ND	µg/L	0.5	--		EPA 524.2	TGT	
0029	Chlorodibromomethane	ND	µg/L	0.5	--		EPA 524.2	TGT	
0030	Bromoform	ND	µg/L	0.5	--		EPA 524.2	TGT	
0053	Chloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0054	Bromomethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0055	Chloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0058	1,1-Dichloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-006

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0059	2,2-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0062	1,1-Dichloropropylene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0064	Dibromomethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0070	1,3-Dichloropropane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0072	1,1,1,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0078	Bromobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0079	1,2,3-Trichloropropane	ND	µg/L	0.5	0.5	21	EPA 524.2	TGT
0080	1,1,2,2-Tetrachloroethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0081	o-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0082	p-Chlorotoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0083	m-Dichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT
0154	1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst	Qualifier
0065	cis-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0069	trans-1,3-Dichloropropene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0085	Flourotrichloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0086	Bromochloromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0087	Isopropylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0088	n-Propylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0089	1,3,5-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0090	tert-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0091	1,2,4-Trimethylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0092	sec-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0093	p-Isopropyltoluene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0094	n-Butylbenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0096	Naphthalene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0097	Hexachlorobutadiene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0098	1,2,3-Trichlorobenzene	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0102	EDB (Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0103	DBCP(Scan Confirm 504.1)	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
0104	Dichlorodifluoromethane	ND	µg/L	0.5	0.5		EPA 524.2	TGT	
	methyl-t-butyl ether (MTBE)	ND	µg/L	0.5	70		EPA 524.2	TGT	

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 6/14/2012

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 120525002-006

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Environmental Health & Safety
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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 42568	Collect Date:	6/3/2010	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	6/3/2010	Date Reported:	6/11/2010	Supervisor:	JWC
Date Analyzed:	6/8/2010				
County:	WHITMAN	Sample Location:	S09		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	509-335-3041			

Well #8

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
45	Vinyl Chloride	ND	ug/L	0.5	0.5	2	EPA 524.2	CAS
46	1,1-Dichloroethylene	ND	ug/L	0.5	0.5	7	EPA 524.2	CAS
47	1,1,1-Trichloroethane	ND	ug/L	0.5	0.5	200	EPA 524.2	CAS
48	Carbon Tetrachloride	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
49	Benzene	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
50	1,2-Dichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
51	Trichloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
52	1,4-Dichlorobenzene	ND	ug/L	0.5	0.5	75	EPA 524.2	CAS
56	Dichloromethane	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
57	trans-1,2-Dichloroethylene	ND	ug/L	0.5	0.5	100	EPA 524.2	CAS
60	cis-1,2-dichloroethylene	ND	ug/L	0.5	0.5	70	EPA 524.2	CAS
63	1,2-Dichloropropane	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
66	Toluene	ND	ug/L	0.5	0.5	1000	EPA 524.2	CAS
67	1,1,2-Trichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
68	Tetrachloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	CAS
71	Chlorobenzene	ND	ug/L	0.5	0.5	100	EPA 524.2	CAS
73	Ethylbenzene	ND	ug/L	0.5	0.5	700	EPA 524.2	CAS
76	Styrene	ND	ug/L	0.5	0.5	100	EPA 524.2	CAS
84	1,2-Dichlorobenzene	ND	ug/L	0.5	0.5	600	EPA 524.2	CAS
95	1,2,4-Trichlorobenzene	ND	ug/L	0.5	0.5	70	EPA 524.2	CAS
160	Total Xylene	ND	ug/L	0.5	0.5	10000	EPA 524.2	CAS
74	m/p-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	CAS
75	o-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	CAS

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
27	Chloroform	ND	ug/L	0.5	0.5		EPA 524.2	CAS
28	Bromodichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
29	Chlorodibromomethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
30	Bromoform	ND	ug/L	0.5	0.5		EPA 524.2	CAS
53	Chloromethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
54	Bromomethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 100603069-005

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55	Chloroethane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
58	1,1-Dichloroethane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
59	2,2-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
62	1,1-Dichloropropylene	ND	ug/L	0.5	0.5	EPA 524.2	CAS
64	Dibromomethane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
70	1,3-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
72	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
78	Bromobenzene	ND	ug/L	0.5	0.5	EPA 524.2	CAS
79	1,2,3-Trichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
80	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	CAS
81	o-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	CAS
82	p-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	CAS
83	m-Dichlorobenzene	ND	ug/L	0.5	0.5	EPA 524.2	CAS
154	1,3-Dichloropropene	ND	ug/L	0.5	0.5	EPA 524.2	CAS

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
65	cis-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
69	trans-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
85	Flourotrichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
86	Bromochloromethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
87	Isopropylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
88	n-Propylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
89	1,3,5-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
90	tert-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
91	1,2,4-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
92	sec-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
93	p-Isopropyltoluene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
94	n-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
96	Naphthalene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
97	Hexachlorobutadiene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
98	1,2,3-Trichlorobenzene	ND	ug/L	0.5	0.5		EPA 524.2	CAS
102	EDB (Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	CAS
103	DBCP(Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	CAS
162	Dichlorodifluoromethane	ND	ug/L	0.5	0.5		EPA 524.2	CAS
	methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	70		EPA 524.2	CAS

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cahill **Date:** 6/11/2010

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Anatek File # 100603069-005

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 12860	Collect Date:	1/9/2008	DOH Source #:	S04
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	1/9/2008	Date Reported:	1/17/2008	Supervisor:	JWC
Date Analyzed:	1/14/2008				
County:	WHITMAN	Sample Location:	WELL #4		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-3041			

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
45	Vinyl Chloride	ND	ug/L	0.5	0.5	2	EPA 524.2	TGT
46	1,1-Dichloroethylene	ND	ug/L	0.5	0.5	7	EPA 524.2	TGT
47	1,1,1-Trichloroethane	ND	ug/L	0.5	0.5	200	EPA 524.2	TGT
48	Carbon Tetrachloride	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
49	Benzene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
50	1,2-Dichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
51	Trichloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
52	1,4-Dichlorobenzene	ND	ug/L	0.5	0.5	75	EPA 524.2	TGT
56	Dichloromethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
57	trans-1,2-Dichloroethylene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
60	cis-1,2-dichloroethylene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
63	1,2-Dichloropropane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
66	Toluene	ND	ug/L	0.5	0.5	1000	EPA 524.2	TGT
67	1,1,2-Trichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
68	Tetrachloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
71	Chlorobenzene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
73	Ethylbenzene	ND	ug/L	0.5	0.5	700	EPA 524.2	TGT
76	Styrene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
84	1,2-Dichlorobenzene	ND	ug/L	0.5	0.5	600	EPA 524.2	TGT
95	1,2,4-Trichlorobenzene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
160	Total Xylene	ND	ug/L	0.5	0.5	10000	EPA 524.2	TGT
74	m/p-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
75	o-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
27	Chloroform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
28	Bromodichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
29	Chlorodibromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
30	Bromoform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
53	Chloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
54	Bromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
55	Chloroethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

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58	1,1-Dichloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
59	2,2-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
62	1,1-Dichloropropylene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
64	Dibromomethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
70	1,3-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
72	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
78	Bromobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
79	1,2,3-Trichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
80	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
81	o-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
82	p-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
83	m-Dichlorobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
154	1,3-Dichloropropene	ND	ug/L	0.5	0.5	EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
65	cis-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
69	trans-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
85	Flourotrichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
86	Bromochloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
87	Isopropylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
88	n-Propylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
89	1,3,5-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
90	tert-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
91	1,2,4-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
92	sec-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
93	p-Isopropyltoluene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
94	n-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
96	Naphthalene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
97	Hexachlorobutadiene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
98	1,2,3-Trichlorobenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
102	EDB (Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
103	DBCP(Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
162	Dichlorodifluoromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 1/17/2008

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

Well #8

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 06902	Collect Date:	8/13/2007	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	8/13/2007	Date Reported:	8/22/2007	Supervisor:	JWC
Date Analyzed:	8/17/2007				
County:	WHITMAN	Sample Location: S09 - WELL #8			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
45	Vinyl Chloride	ND	ug/L	0.5	0.5	2	EPA 524.2	TGT
46	1,1-Dichloroethylene	ND	ug/L	0.5	0.5	7	EPA 524.2	TGT
47	1,1,1-Trichloroethane	ND	ug/L	0.5	0.5	200	EPA 524.2	TGT
48	Carbon Tetrachloride	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
49	Benzene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
50	1,2-Dichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
51	Trichloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
52	1,4-Dichlorobenzene	ND	ug/L	0.5	0.5	75	EPA 524.2	TGT
56	Dichloromethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
57	trans-1,2-Dichloroethylene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
60	cis-1,2-dichloroethylene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
63	1,2-Dichloropropane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
66	Toluene	ND	ug/L	0.5	0.5	1000	EPA 524.2	TGT
67	1,1,2-Trichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
68	Tetrachloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
71	Chlorobenzene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
73	Ethylbenzene	ND	ug/L	0.5	0.5	700	EPA 524.2	TGT
76	Styrene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
84	1,2-Dichlorobenzene	ND	ug/L	0.5	0.5	600	EPA 524.2	TGT
95	1,2,4-Trichlorobenzene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
160	Total Xylene	ND	ug/L	0.5	0.5	10000	EPA 524.2	TGT
74	m/p-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
75	o-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
27	Chloroform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
28	Bromodichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
29	Chlorodibromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
30	Bromoform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
53	Chloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
54	Bromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
55	Chloroethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

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58	1,1-Dichloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
59	2,2-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
62	1,1-Dichloropropylene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
64	Dibromomethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
70	1,3-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
72	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
78	Bromobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
79	1,2,3-Trichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
80	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
81	o-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
82	p-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
83	m-Dichlorobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
154	1,3-Dichloropropene	ND	ug/L	0.5	0.5	EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
65	cis-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
69	trans-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
85	Flourotrichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
86	Bromochloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
87	Isopropylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
88	n-Propylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
89	1,3,5-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
90	tert-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
91	1,2,4-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
92	sec-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
93	p-Isopropyltoluene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
94	n-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
96	Naphthalene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
97	Hexachlorobutadiene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
98	1,2,3-Trichlorobenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
102	EDB (Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
103	DBCP(Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
162	Dichlorodifluoromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 8/22/2007

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU		
Lab/Sample Number:	125 03015	Collect Date:	5/3/2007	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	A	Sample Purpose:	C
Date Received:	5/3/2007	Date Reported:	5/23/2007	Supervisor:	JWC
Date Analyzed:	5/7/2007				
County:	WHITMAN	Sample Location: S09 - WELL #8			
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

Well #8

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
45	Vinyl Chloride	ND	ug/L	0.5	0.5	2	EPA 524.2	TGT
46	1,1-Dichloroethylene	ND	ug/L	0.5	0.5	7	EPA 524.2	TGT
47	1,1,1-Trichloroethane	ND	ug/L	0.5	0.5	200	EPA 524.2	TGT
48	Carbon Tetrachloride	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
49	Benzene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
50	1,2-Dichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
51	Trichloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
52	1,4-Dichlorobenzene	ND	ug/L	0.5	0.5	75	EPA 524.2	TGT
56	Dichloromethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
57	trans-1,2-Dichloroethylene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
60	cis-1,2-dichloroethylene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
63	1,2-Dichloropropane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
66	Toluene	ND	ug/L	0.5	0.5	1000	EPA 524.2	TGT
67	1,1,2-Trichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
68	Tetrachloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
71	Chlorobenzene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
73	Ethylbenzene	ND	ug/L	0.5	0.5	700	EPA 524.2	TGT
76	Styrene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
84	1,2-Dichlorobenzene	ND	ug/L	0.5	0.5	600	EPA 524.2	TGT
95	1,2,4-Trichlorobenzene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
160	Total Xylene	ND	ug/L	0.5	0.5	10000	EPA 524.2	TGT
74	m/p-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
75	o-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
27	Chloroform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
28	Bromodichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
29	Chlorodibromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
30	Bromoform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
53	Chloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
54	Bromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
55	Chloroethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

Anatek File # 070504001-006

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58	1,1-Dichloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
59	2,2-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
62	1,1-Dichloropropylene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
64	Dibromomethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
70	1,3-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
72	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
78	Bromobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
79	1,2,3-Trichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
80	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
81	o-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
82	p-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
83	m-Dichlorobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
154	1,3-Dichloropropene	ND	ug/L	0.5	0.5	EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
65	cis-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
69	trans-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
85	Flourotrichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
86	Bromochloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
87	Isopropylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
88	n-Propylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
89	1,3,5-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
90	tert-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
91	1,2,4-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
92	sec-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
93	p-Isopropyltoluene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
94	n-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
96	Naphthalene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
97	Hexachlorobutadiene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
98	1,2,3-Trichlorobenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
102	EDB (Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
103	DBCP(Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
162	Dichlorodifluoromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John W. Cobb **Date:** 5/23/2007

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ENVIRONMENTAL HEALTH & SAFETY

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Volatile Organic Chemicals (VOC's) Analysis Report
EPA Test Method - EPA 524.2

System ID#:	93200Q	System Name:	WSU EH&S		
Lab/Sample Number:	125 00627	Collect Date:	2/12/2007	DOH Source #:	S09
Multiple Source Nos:		Sample Type:	B	Sample Purpose:	C
Date Received:	2/12/2007	Date Reported:	2/15/2007	Supervisor:	JWC
Date Analyzed:	2/13/2007				
County:	WHITMAN	Sample Location:	S09 - WELL #8		
Report To:	Address:	P.O. BOX 641172			
	City, State, ZIP	PULLMAN, WA 99164			
	Phone Number:	(509) 335-6152			

W.11 #8

EPA Regulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
45	Vinyl Chloride	ND	ug/L	0.5	0.5	2	EPA 524.2	TGT
46	1,1-Dichloroethylene	ND	ug/L	0.5	0.5	7	EPA 524.2	TGT
47	1,1,1-Trichloroethane	ND	ug/L	0.5	0.5	200	EPA 524.2	TGT
48	Carbon Tetrachloride	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
49	Benzene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
50	1,2-Dichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
51	Trichloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
52	1,4-Dichlorobenzene	ND	ug/L	0.5	0.5	75	EPA 524.2	TGT
56	Dichloromethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
57	trans-1,2-Dichloroethylene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
60	cis-1,2-dichloroethylene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
63	1,2-Dichloropropane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
66	Toluene	ND	ug/L	0.5	0.5	1000	EPA 524.2	TGT
67	1,1,2-Trichloroethane	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
68	Tetrachloroethylene	ND	ug/L	0.5	0.5	5	EPA 524.2	TGT
71	Chlorobenzene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
73	Ethylbenzene	ND	ug/L	0.5	0.5	700	EPA 524.2	TGT
76	Styrene	ND	ug/L	0.5	0.5	100	EPA 524.2	TGT
84	1,2-Dichlorobenzene	ND	ug/L	0.5	0.5	600	EPA 524.2	TGT
95	1,2,4-Trichlorobenzene	ND	ug/L	0.5	0.5	70	EPA 524.2	TGT
160	Total Xylene	ND	ug/L	0.5	0.5	10000	EPA 524.2	TGT
74	m/p-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
75	o-Xylene (MCL for Total)	ND	ug/L	0.5	0.5		EPA 524.2	TGT

EPA Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
27	Chloroform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
28	Bromodichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
29	Chlorodibromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
30	Bromoform	ND	ug/L	0.5	0.5		EPA 524.2	TGT
53	Chloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
54	Bromomethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
55	Chloroethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

Anatek File # 070212015-001

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58	1,1-Dichloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
59	2,2-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
62	1,1-Dichloropropylene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
64	Dibromomethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
70	1,3-Dichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
72	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
78	Bromobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
79	1,2,3-Trichloropropane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
80	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	0.5	EPA 524.2	TGT
81	o-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
82	p-Chlorotoluene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
83	m-Dichlorobenzene	ND	ug/L	0.5	0.5	EPA 524.2	TGT
154	1,3-Dichloropropene	ND	ug/L	0.5	0.5	EPA 524.2	TGT

State Unregulated

DOH #	Analytes	Results	Units	SRL	Trigger	MCL	Method	Analyst
65	cis-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
69	trans-1,3-Dichloropropene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
85	Flourotrichloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
86	Bromochloromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT
87	Isopropylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
88	n-Propylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
89	1,3,5-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
90	tert-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
91	1,2,4-Trimethylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
92	sec-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
93	p-Isopropyltoluene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
94	n-Butylbenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
96	Naphthalene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
97	Hexachlorobutadiene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
98	1,2,3-Trichlorobenzene	ND	ug/L	0.5	0.5		EPA 524.2	TGT
102	EDB (Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
103	DBCP(Scan Confirm 504.1)	ND	ug/L	0.5	0.5		EPA 524.2	TGT
162	Dichlorodifluoromethane	ND	ug/L	0.5	0.5		EPA 524.2	TGT

ND = Not Detected within the sensitivity of the instrument
Numerical Entry = Detection at level indicated
SRL - Minimum reporting level for Washington DOH
MCL - EPA maximum contaminant level
Trigger - Washington DOH response level. If results exceed this level, contact the DOH

Lab Supervisor: John. Cobb **Date:** 2/15/2007

APPENDIX G

Item 2 - Coliform Sampling Plan

Coliform Monitoring Plan
Washington State University/
Tula Young Hastings Farm
Water Systems

Completed by: Marty O'Malley
Title: Environmental Health Specialist

Date: January 1, 1992
Revised: June 15, 2015

I. MAP: - (See Attached)

II. NARRATIVE:44

1. Water System Name: Washington State University
2. System ID number: 93200Q
3. Water Sources:

DOH SOURCE #	SOURCE NAME	SOURCE CATEGORY	DEPTH (Ft.)	LOCATION			
				1/4,1/4 Sec.	Sec #	TWP	Range
S01^	Steam Plant Well #1	Well	247	NE/SE	05	14N	45E
S02#	Steam Plant Well #2	Well	214	NE/SE	05	14N	45E
S03^	Steam Plant Well #3	Well	223	NE/SE	05	14N	45E
S04	**Steam Plant Well #4**	**Well**	**275**	**NE/SE**	**05**	**14N**	**45E**
S05^	Whitlow Well	Well	396	NE/SW	34	15N	45E
S06	**Coliseum Well**	**Well**	**702**	**NW/NW**	**04**	**14N**	**45E**
S07a^	69880V Pullman	intertie		NW/NE	05	14N	45E
S07b^	69880V Pullman	intertie		NE/NE	05	14N	45E
S07c^	69880V Pullman	intertie		NW/SW	33	15N	45E
S07d^	69880V Pullman	intertie		NE/SE	32	15N	45E
S08	**Well # 7**	**Well**	**1004**	**NE/SW**	**05**	**14N**	**45E**
S09	**Well # 8**	**Well**	**813**	**NE/NW**	**04**	**14N**	**45E**

^ = EMERGENCY ONLY # = Abandoned

4. Storage/Reservoirs:

Name	Building Number	Capacity (Gallons)
East Reservoir	308A	2,000,000
West Reservoir	308B	2,000,000
Elevated Tank	309	100,000
North Fairway Reservoir	317	2,000,000
Roundtop Reservoir +	320	100,000

+ = Provides water to the golf course irrigation system only.

5. Booster Station:

a. The booster station transfers water from the low zone to the high zone.

6. Treatment Facilities:

A. Gas Chlorination
1. Location: At well sites S01, S03, S04, S05, S06, S08 and S09.
2. Type of Treatment: Gas chlorination.
3. Purpose: Disinfection.

7. Total Population Served (2009):

a. Fall / Spring Semesters:

Full-time residential population	7,260
Regular non-residential users	12,909
Total	20,169

b. June - July:

Full-time residential population	447
Regular non-residential users	6,305
Total	6,752

8. Service Connections (from WFI):

Type	Number
Full time residential units	4,096
Institutional buildings:	~ 250
Total service connections:	4,346

9. Number of Zones (Elevation): 2 (High & Low)

10. Population Served by Each Zone:

The high zone provides about 60% of the total water pumped by the wells, with the low zone providing approximately 40% of the water. A significant amount of the water used by the high zone goes to the Steam Plant for steam production and summer irrigation.

11. Number of Service Connections Sampled in Each Zone:

a. Low Zone: 60 Buildings
b. High Zone: 49 Buildings

SERVICE CONNECTION SAMPLE LOCATIONS
BY BUILDING NAME

Per the Groundwater Rule, within 24 hours of notification of a positive coliform sample, the well(s) that were in operation on the day of the positive sample shall be sampled prior to chlorination while the well is running, along with the repeat samples.

Building	Number	Zone	Repeat Sample t Upstream	Repeat Sample t Downstream
ABELSON	32	LOW	Eastlick (82A)	Fulmer (3)
ADBF	807A	HIGH	VTH (818)	Bustad (807)
ALBROOK LAB	71	LOW	Kimbrough (25)	Thermal Fluids Lab (57)
ALUMNI CENTER	138	HIGH	Meats Lab (98)	Hulbert (808)
ANIMAL SCIENCES LABS	100	HIGH	Food Quality (815)	Hulbert (808)
AVERY	809	LOW	Kimbrough (25)	Wilmer Davis (30)
BEASLEY COLISEUM	806	HIGH	Streit – Perham (81C)	Student Rec Center (819)
BIOTECH/LIFE SCIENCES	836	HIGH	Plant/Bio Sci (826)	Beasley Coliseum (806)
BOHLER GYM	11	LOW	Physical Ed Bldg (96)	Hollingberry Fieldhouse (9)
BRYAN	2	LOW	Murrow-East (33E)	Van Doren (37)
BUSTAD	807	LOW	French Admin (92)	Wegner (45)*
CARPENTER	20	LOW	Morrill (24)	Dana (56)
CENTRAL RECEIVING	358A	HIGH	General Storage (358B)	McCluskey (85A)
CHIEF JOE APT. F	676F	HIGH	Chief Joe (676A)	Chief Joe (676H)
CHINOOK APT. AA	679AA	LOW	Chinook (679D)	Chinook (679E)
CHINOOK APT. BB	679BB	LOW	Chinook (679R)	Chinook (679Z)
CLARK	99	HIGH	Johnson (76)	Animal Science(100)
CLEVELAND	86	LOW	Cleveland Annex (86A)	Daggy (803)
COLLEGE	4	HIGH	Holland Library (62)	Todd (55)
COLUMBIA APT. F	678F	LOW	Columbia (678K)	Columbia (678C)
COMMONS	5	LOW	Washington (15)	Cleveland (86)
COMMUNICATION ADDITION	33A	LOW	Thompson (1)	Morrill (24)
COMPTON UNION BUILDING (CUB)	63	HIGH	Holland Library (62)	Information Tech (812)
COOPER PUBLICATIONS	91	HIGH	Motor Pool 66A	Meats Lab (98)
CREAMERY ANNEX	353	HIGH	McCluskey (85A)	General Storage (358B)
CRIMSON BAKE SHOP	93C	LOW	Stephenson S (93S)	Stephenson N (93N)
DAGGY	803	LOW	Cleveland (86)	Carpenter (20)
DANA	56	LOW	Carpenter (20)	Sloan (78)
DODGEN (NRC)	74	HIGH	Golf Club House (365H)	Valley Crest A (675A)
EASTLICK	82A	LOW	Heald (82)	Morrill (24)
EE/ME	78A	LOW	Carpenter(20)	Hydraulics Lab (364)
EGGERT FARM	147A	HIGH	Feed Prep (362)	EH&S (90)
ENG. TEACHING & RES. LAB (ETRL)	58	LOW	Eng. Laboratory(46)	Dana (56)
ENVIRONMENTAL HEALTH & SAFETY	90	HIGH	LARC (811)	GCMS (141G)
FARM SERVICES	103A	HIGH	GCMS (141G)	Large Animal Barn (160A)
FEED PREP	362	HIGH	LARC (811)	Food Services (89)
FINE ARTS	97	LOW	Safety (84)	French Ad (92)
FOOD QUALITY	815	HIGH	FHSN (816)	Beasley Coliseum (806)
FOOD SCIENCE HUMAN NUTRITION	816	HIGH	Food Quality(815)	Biotech (836)
FOOD SERVICES	89	HIGH	Feed Prep(362)	Cooper (91)
FRENCH ADMINISTRATION	92	LOW	Bustad (807)	Lighty (92A)
FULMER	3	HIGH	Webster (801)	Abelson(32)
GENERAL STORAGE	358B	HIGH	Recycling (357)	Creamery Annex (353)
GOLF COURSE CLUB HOUSE	365H	HIGH	Dodgen (74)	Large Animal Barn (160A)
GRIMES WAY STEAM PLANT	840	HIGH	Seed House(115)	Cooper Publications (91)
HEALD	82	LOW	Eastlick (82A)	Cleveland (86)
HILLSIDE CAFÉ & MARKET	30	LOW	Honors (14) *	Kimbrough (25)
HONORS	14	LOW	NA	NA
HOLLAND LIBRARY	62	HIGH	CUB (63)	College (4)
HULBERT	808	HIGH	Clark (99)	Alumni Center (138)
INCINERATOR	60	HIGH	NA	NA

INFORMATION TECHNOLOGY	812	HIGH	CUB (63)	Fine Arts (97)
JOHNSON	76	HIGH	Hulbert (808)	Information Tech (812)
JOHNSON TOWER	94	LOW	Safety (84)	Webster (801)
KIMBROUGH	25	LOW	Avery (809)	Van Doren (37)
LARC	811	HIGH	EH&S (90)	Food Services (89)
LARGE ANIMAL BARN	160A	HIGH	Golf Club House (365H)	Farm Services (103A)
LARGE ANIMAL TEACHING BARN	120L	HIGH	Columbia (687F)	Raptor Facility (120C)
LIGHTY STUDENT SERVICES	92A	LOW	French Admin (92)	Bustad (807)
MCCLUSKEY	85A	HIGH	Feed prep (362)	Motor Pool (66A)
MCCOY	44	LOW	Wegner (45) *	Bustad (807)
MCEACHERN GRADUATE RES	805	LOW	Orton (87)	Olympia (42)
MEATS LAB	98	HIGH	Cooper Publications (91)	Hulbert (808)
MORRILL	24	LOW	Carpenter (20)	Eastlick (82A)
MOTOR POOL	66A	HIGH	McCluskey (85A)	Cooper Publications (91)
MURROW-EAST	33E	LOW	Bryan (2)	Murrow-West (33W)
MURROW-WEST	33W	LOW	Murrow-East(33E)	Eastlick (82A)
NEILL	70	LOW	Webster (801)	Southside Café (80)
NEZ PERCE APT. F	677F	HIGH	Nez Perce (677B)	Nez Perce (677H)
NORTHSIDE CAFÉ & MARKET	65A	LOW	Coman (72)	Streit-Perham (81C)
OWEN SCIENCE LIBRARY	810	LOW	Neil (70)	Cleveland (86)
PALOUSE RIDGE CLUBHOUSE	365H	HIGH	Dodgen Res. Facility (74)	Large Animal Barn (160A)
PHYSICAL EDUCATION	96	LOW	Van Doren (37)	Bohler (11)
PLANT BIOSCIENCE 1	826	HIGH	French Admin (92)	Beasley Coliseum (806)
RECYCLING	357	LOW	University Stores (358J)	Creamery Annex (353)
ROGERS	83	LOW	WSU Children's (88)	Crimson Bake Shop (93C)
SAFETY	84	LOW	CUB (63)	Smith SCUE (95)
SCUE	95	LOW	Neill (70)	Fine Arts (97)
AGRONOMY SEED HOUSE	115	HIGH	Alumni Center (138)	GWSP (840)
SLOAN	78	LOW	Dana (56)	Honors (14)
SMITH AG. ENGINEERING	54	LOW	Seed House (115)	French Admin (92)
SMITH GYM	12	LOW	Van Doren (37)	Physical Ed Bldg (96)
SOUTHSIDE CAFÉ	80	LOW	McEachern (805)	Neill (70)
STEPTOE Apt. B	665B	HIGH	Steptoe (665S)	Steptoe (665L)
STREIT-PERHAM	81C	LOW	Northside Café (65A)	Beasley (806)
STUDENT REC CENTER	819	HIGH	Beasley Coliseum (806)	Nez Perce (677H)
TERRACE APT.	650E	HIGH	Terrace (654)	Terrace (658)
THERMAL FLUIDS RESEARCH CTR.	57	LOW	ETRL (46)	Albrook (71)
THOMPSON	1	LOW	Bryan (2)	Murrow-West (33W)
TODD	55	HIGH	Fulmer (3)	College (4)
UNIVERSITY STORES	358J	HIGH	General Storage (358B)	Incinerator (60)
USDA NRCS	195D	HIGH	NRCS (195A)	NRCS (195G)
VALLEY CREST Apt. A	675A	HIGH	Food Quality(815)	Valley Crest (675C)
VAN DOREN	37	LOW	Kimbrough (25)	Avery (809)
VET ANIMAL HOLDING BARN	169	HIGH	Seed House (115)	Lge An Teach Barn (120L)
VET TEACHING HOSPITAL	818	LOW	Smith (807)	ADBF (807A)
WEGNER	45	HIGH	NA	NA
WASHINGTON	15	LOW	Commons (5)	WSU Children's Center (88)
WEBSTER	801	LOW	Fulmer (3)	Neil (70)
WILSON	40	HIGH	CUB (63)	College (4)
WSU CHILDREN'S CENTER	88	LOW	McEachern (805)	Rogers (83)
YAKIMA Apt. D	680D	LOW	Yakima (680B)	Yakima (680F)

t = Building within 5 active service connections of building listed.
* = Building on dead-end line or otherwise not routinely sampled.

Monthly / Annual Sampling Schedule

JANUARY	FEBRUARY	MARCH	APRIL	MAY
Beasley Coliseum (806)	Food Quality (815)	Food Services (89)	Beasley Coliseum (806)	Avery (809)
Chief Joe Apt. F (676F)	General Storage (358B)	Todd (55)	Chief Joe Apt. F (676F)	Chinook Apt. B (679 BB)
McEachern (805)	Vet Teaching Hospital (818)	Eggert Farm (147A)	Lighty Student Services (92A)	Clark (99)
CUB (63)	Golf Course Clubhouse (365H)	Terrace Apts (650E)	CUB (63)	Commons (5)
Chinook Apt A (679AA)	Avery (809)	Washington (15)	Chinook Apt A (679AA)	Cooper Publications (91)
Creamery Annex (353)	Holland Library (62)	Information Technology (812)	Creamery Annex (353)	EE/ME (78A)
Northside Café (65A)	College (4)	Johnson Tower (94)	Northside Café (65A)	USDA SCS (195D)
Columbia Apts (678F)	Chinook (679 BB)	Cleveland (86)	Columbia Apts (678F)	Food Quality (815)
Southside Café (80)	ADBF (807A)	French Ad (92)	Southside Café (80)	University Stores (358J)
Owen Science Library (810)	Commons (5)	Valley Crest Apts (675A)	Owen Science Library (810)	Golf Course Clubhouse (365H)
Crimson Bake Shop (93C)	Abelson (32)	Farm Services (103A)	Crimson Bake Shop (93C)	Holland Library (62)
Alumni Center (138)	Cooper Publications (91)	Smith Gym (12)	Alumni Center (138)	McCluskey (85A)
TYH Farm (895200): County Shop	**TYH FARM: Dairy Center**	**TYH FARM (895200): Beef Center**	**TYH FARM (895200): County Shop**	**TYH FARM (895200): Dairy Center**
			Spillman Farm (829814)	**Palouse Cons. Field Station (39055 J)**
			Smoot Hill (807952)	**Central Ferry (121534) - Kurt Tetrick**
WSU Children's Center (88)	Safety (84)	Carpenter (20)	WSU Children's Center (88)	Murrow-East (33E)
Streit/Perham (81C)	EE/ME (78A)	Yakima Apt D (680D)	Streit/Perham (81C)	Nez Perce Apts (677F)
Hulbert (808)	Thermal Fluids (57)	Johnson (76)	Van Doren (37)	Physical Education (96)
Dodgen Res. Facility (74)	Communication Addition (33A)	Morrill (24)	LARC (811)	Plant Biosciences (826)
FSHN (816)	Eastlick (82A)	GWSP (840)	Motor Pool (66A)	Recycling (357)
EH&S (90)	McCluskey (85A)	Student Rec Center (819)	EH&S (90)	Safety (84)
Heald (82)	Bryan (2)	Webster (801)	McCoy (44)	Sloan (78)
Hillside Café (30)	Rogers (83)	Meats Lab (98)	Hillside Café (30)	Smith Ag Eng. (54)
Feed Prep (362)	Dana (56)	Central Receiving (358A)	Large Animal Barn (160A)	Thompson (1)
Fine Arts (97)	BioTech/Life Sciences (836)	Bustad (807)	Neill (70)	ETRL (58)
Neill (70)	Animal Science Lab (100)	Bohler (11)	Rogers (83)	Vet Animal Holding Barn (169)
Murrow-West (33W)	Agronomy Seed House (115)	Fulmer (3)	Kimbrough (25)	Vet Teaching Hospital (818)
Steptoe Apt. B (665B)	Nez Perce Apts (677F)	SCUE (95)	Steptoe Apt. B (665B)	Webster (801)

JUNE	JULY
Daggy (803)	Albrook Lab (71)
Meats Lab (98)	Alumni Center (138)
SCUE (95)	Beasley Coliseum (806)
General Storage (358B)	Chief Joe Apts F (676F)
Washington (15)	Chinook (679AA)
Cleveland (86)	Owen Science Library (810)
Information Technology (812)	Creamery Annex (353)
Terrace Apts (650E)	CUB (63)
Student Rec Center (819)	EH&S (90)
Wilson (40)	Todd (55)
Food Services (89)	Columbia Apts (678F)
Bohler (11)	Rogers (83)
Valley Crest Apts (675A)	Steptoe Apts (665B)
Yakima Apt D (680D)	Streit/Perham (81C)
Carpenter (20)	WSU Children's Center (88)
TYH FARM (895200): Beef Center	**TYH FARM (895200): County Shop**

AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Avery (809)	Carpenter (20)	Chinook (679AA)	Avery (809)	Carpenter (20)
Chinook (679 BB)	Cleveland (86)	Columbia Apts (678F)	Chinook (679 BB)	Cleveland (86)
ADBF (807A)	Eastlick (82A)	GWSP (840)	McCoy (44)	Smith Ag Eng. (54)
Commons (5)	SCUE (95)	Owen Science Library (810)	Commons (5)	Kimbrough (25)
Cooper Publications(91)	Meats Lab (98)	Alumni Center (138)	Cooper Publications (91)	Meats Lab (98)
EE/ME (78A)	Yakima Apt D (680D)	Streit/Perham (81C)	Motor Pool (66A)	Bohler (11)
Abelson (32)	College (4)	Johnson Tower (94)	ETRL (58)	Wilson (40)
Food Quality (815)	Food Services (89)	Beasley Coliseum (806)	Food Quality (815)	Food Services (89)
General Storage (358B)	University Stores (358J)	Chief Jo Apts F (676F)	General Storage (358B)	University Stores (358J)
Golf Course Clubhouse (365H)	Terrace Apts (650E)	CUB (63)	Golf Course Clubhouse (365H)	Terrace Apts (650E)
Holland Library (62)	Information Technology (812)	Creamery Annex (353)	Holland Library (62)	Information Technology (812)
Murrow-West (33W)	Southside Café (80)	French Ad (92)	SCUE (95)	Albrook Lab (71)
TYH FARM (895200): Dairy Center	**TYH FARM (895200): Beef Center**	**TYH FARM (895200): County Shop**	**TYH FARM (895200): Dairy Center**	**TYH FARM (895200): Beef Center**
Dodgen Res. Facility (74)	Crimson Bake Shop (93C)	Farm Services (103A)	LARC (811)	Murrow-East (33E)
Feed Prep (362)	Agronomy Seed House (115)	Fulmer (3)	Large Animal Barn (160A)	Physical Education (96)
Fine Arts (97)	Northside Café (65A)	Washington (15)	Lighty Student Services (92A)	Recycling Building (357)
McEachern (805)	Communication Addition (33A)	Morrill (24)	Webster (801)	USDA Soil Cons. Service (195D)
McCluskey (85A)	Student Rec Center (819)	EH&S (90)	McCluskey (85A)	Student Rec Center (819)
Heald (82)	Dana (56)	Central Receiving (358A)	Clark (99)	Sloan (78)
FSHN (816)	Animal Science Lab (100)	Eggert Farm (147A)	EE/ME (78A)	Thompson (1)
Nez Perce Apts (677F)	Valley Crest Apts (675A)	Steptoe Apts (665B)	Nez Perce Apts (677F)	Valley Crest Apts (675A)
Bryan (2)	Thermal Fluids (57)	Johnson (76)	Plant Biosciences (826)	Todd (55)
Safety (84)	Webster (801)	WSU Children's Center (88)	Safety (84)	Washington (15)
Hulbert (808)	BioTech/Life Sciences (836)	Bustad (807)	Van Doren (37)	Vet Animal Holding Barn (169)
Vet Teaching Hospital (818)	Bohler (11)	Rogers (83)	Vet Teaching Hospital (818)	Yakima Apt D (680D)
Neill (70)	Hillside Café (30)	Smith Gym (12)	Neill (70)	Daggy (803)

Sample Location / Number of Samples per Location / Pressure System List

High Pressure System	Low Pressure System
Abelson (2)	Chinook 679AA (4)
College (2)	Chinook 679BB (4)
CUB (4)	Columbia Apts 678F (4)
Fulmer (2)	Crimson Bake Shop (3)
Holland Library (4)	McEachern (2)
Incinerator (2)	Rogers (4)
Information Technology (4)	Southside Café (3)
Todd (3)	WSU Children's Center (4)
Wilson (2)	Yakima Apt D (4)
Agronomy Seed House (2)	Albrook Lab (2)
Central Receiving (2)	Carpenter (4)
Cooper Publications (4)	Cleveland (4)
Creamery Annex (4)	Commons (4)
Feed Prep (2)	Daggy (2)
Food Services (4)	Dana (2)
General Storage (4)	EE/ME (4)
GWSP (2)	ETRL (2)
McCluskey (4)	Owen Science Library (4)
Motor Pool (2)	Sloan (2)
Recycling Building (2)	Thermal Fluids (2)
University Stores (3)	Washington (4)
Vet Animal Holding Barn (2)	Webster (4)
Alumni Center (4)	Avery (4)
Animal Science Lab (2)	Bohler (4)
BioTech/Life Sciences (2)	Bryan (2)
Clark (2)	Communication Addition (2)
Food Quality (4)	Eastlick (2)
FSHN (2)	Heald (2)
Hulbert (2)	Hillside Café (3)
Johnson (2)	Kimbrough (2)
Meats Lab (4)	Morrill (2)
Plant Biosciences (2)	Murrow-East (2)
Valley Crest Apts 675A (4)	Murrow-West (2)
	Northside Café (3)
Beasley Coliseum (4)	Physical Education (2)
Chief Joe Apts F (4)	Smith Gym (2)
Dodgen Res. Facility (2)	Streit/Perham (4)
Golf Course Clubhouse (4)	Thompson (2)
Large Animal Barn (2)	Van Doren (2)
Nez Perce Apts 677F (4)	
Steptoe Apts 665B (4)	ADBF (2)
Student Rec Center (4)	Bustad (2)
Terrace Apts 650E (4)	Fine Arts (2)
	French Ad (2)
EH&S (4)	Johnson Tower (2)
Farm Services 103A (2)	Lighty Student Services (2)
Eggert Farm (2)	McCoy (2)
LARC (2)	Neill (4)
USDA Soil Conservation Service 195D (2)	Safety (4)
	SCUE (4)
	Smith Ag Eng. (2)
	Vet Teaching Hospital (4)

Building	Number	# Samples	Months Sampled
ABELSON	32	2	FEB, AUG
ADBF	807A	2	FEB, AUG
AGRONOMY SEED HOUSE	115	2	FEB, SEPT
ALBROOK LAB	71	2	JULY, DEC
ALUMNI CENTER	138	4	JAN, APR, JULY, OCT
ANIMAL SCIENCES LAB	100	2	FEB, SEPT
AVERY	809	4	FEB, MAY, AUG, NOV
BEASLEY COLISEUM	806	4	JAN, APR, JULY, OCT
BIOTECH/LIFE SCIENCES	836	2	FEB, SEPT
BOHLER GYM	11	4	MAR, JUNE, SEPT, DEC
BRYAN	2	2	FEB, AUG
BUSTAD	807	2	MAR, OCT
CARPENTER	20	4	MAR, JUNE, SEPT, DEC
CENTRAL RECEIVING	358A	2	MAR, OCT
CHIEF JOE Apt. F	676F	4	JAN, APR, JULY, OCT
CHINOOK Apt. AA	679AA	4	JAN, APR, JULY, OCT
CHINOOK Apt. BB	679BB	4	FEB, MAY, AUG, NOV
CLARK	99	2	MAY, NOV
CLEVELAND	86	4	MAR, JUNE, SEPT, DEC
COLLEGE	4	2	FEB, SEPT
COLUMBIA Apt. F	678F	4	JAN, APR, JUNE, OCT
COMMONS	5	4	FEB, MAY, AUG, NOV
COMMUNICATION ADDITION	33A	2	FEB, SEPT
COMPTON UNION BUILDING (CUB)	63	4	JAN, APR, JULY, OCT
COOPER PUBLICATIONS	91	4	FEB, MAY, AUG, NOV
CREAMERY ANNEX	353	4	JAN, APR, JULY, OCT
CRIMSON BAKE SHOP	93C	3	JAN, APR, SEPT
DAGGY	803	2	JUNE, DEC
DANA	56	2	FEB, SEPT
DODGEN RESEARCH FACILITY (NRC)	74	2	JAN, AUG
EASTLICK	82A	2	FEB, SEPT
EE/ME	78A	4	FEB, MAY, AUG, NOV
ENG. TEACHING RESEARCH LAB (ETRL)	58	2	MAY, NOV
ENVIRONMENTAL HEALTH AND SAFETY	90	4	JAN, APR, JULY, OCT
FARM SERVICES	103A	2	MAR, OCT
FEED PREP	362	2	JAN, AUG
FINE ARTS	97	2	JAN, AUG
FOOD QUALITY	815	4	FEB, MAY, AUG, NOV
FOOD SCIENCE & HUMAN NUT	816	2	JAN, AUG
FOOD SERVICES	89	4	MAR, JUNE, SEPT, DEC
FRENCH ADMINISTRATION	92	2	MAR, OCT
FULMER	3	2	MAR, OCT
GENERAL STORAGE	358B	4	FEB, JUNE, AUG, NOV
GOLF COURSE CLUBHOUSE	365H	4	FEB, MAY, AUG, NOV
EGGERT FARM	147A	2	MAR, OCT
GWSP	840	2	JAN, AUG
HEALD	82	2	JAN, AUG
HILLSIDE CAFÉ & MARKET	30	4	FEB, MAY, AUG, NOV

HOLLAND LIBRARY	62	4	FEB, MAY, AUG, NOV
HULBERT	808	2	JAN. AUG
INFORMATION TECHNOLOGY	812	4	MAR, JUNE, SEPT, DEC
JOHNSON	76	2	MAR, OCT
JOHNSON TOWER	94	2	APR, NOV
KIMBROUGH	25	2	APR, NOV
LARC	811	2	APR, NOV
LARGE ANIMAL BARN	160A	2	APR, NOV
LIGHTY STUDENT SERVICES	92A	2	APR, NOV
McCLUSKEY	85A	4	FEB, MAY, AUG NOV
McCOY	44	2	JAN, AUG
McEACHERN GRADUATE RESIDENCE	805	2	JAN, AUG
MEATS LAB	98	4	MAR, JUNE, SEPT, DEC
MORRILL	24	2	APR, NOV
MOTOR POOL	66A	2	MAY, DEC
MURROW-EAST	33E	2	JAN, AUG
MURROW-WEST	33W	2	MAR, OCT
NEILL	70	4	JAN, APR, AUG, NOV
NEZ PERCE Apt. F	677F	4	JAN, APR, SEPT
NORTHSIDE CAFÉ & MARKET	65A	3	JAN, APR, SEPT
OWEN SCIENCE LIBRARY	810	4	JAN, APR, JUL, OCT
PLANT BIOSCIENCE 1	826	2	MAY, NOV
PHYSICAL EDUCATION	96	2	MAY, DEC
RECYCLING BUILDING	357	2	MAY. DEC
ROGERS	83	4	JAN, APR, JULY, OCT
SAFETY	84	4	FEB, MAY, AUG, NOV
SCUE	95	4	MAR, JUNE, SEPT, DEC
SLOAN	78	2	MAY, DEC
SMITH AG. ENGINEERING	54	2	MAY, DEC
SMITH GYM	12	2	MAR, OCT
SOUTHSIDE CAFÉ	80	3	JAN, APR, SEPT
STEPTOE Apt. B	665B	4	JAN, APR, JULY, OCT
STREIT-PERHAM	81C	4	JAN, APR, JULY, OCT
STUDENT REC CENTER	819	4	MAR, JUNE, SEPT, DEC
TERRACE APT.	650E	4	MAR, JUNE, SEPT, DEC
THERMAL FLUIDS RESEARCH CTR.	57	2	FEB, SEPT
THOMPSON	1	2	MAY, DEC
TODD	55	2	MAR, JULY, DEC
UNIVERSITY STORES	358J	3	MAY, SEPT, DEC
USDA SOIL CONSERVATION SERVICE	195D	2	MAY, DEC
VALLEY CREST Apt. A	675A	4	MAR, JUNE, SEPT, DEC
VAN DOREN	37	2	MAR, JUNE, SEPT, DEC
VET ANIMAL HOLDING BARN	169	2	APR, NOV
VET TEACHING HOSPITAL	818	4	MAY, DEC
WASHINGTON	15	4	MAR, JUN, OCT, DEC
WEBSTER	801	4	MAR, MAY, SEPT, NOV
WILSON	40	2	JUNE, DEC
WSU CHILDREN'S CENTER	88	4	JAN, APR, JULY, OCT

YAKIMA APT. D	680D	4	MAR, JUNE, SEPT, DEC

Modifications to the Coliform Sampling Plan by Year

1996: Kamiak Apts. and the South Fairway I.M. Field have been deleted from sampling program. The Yakima Apt. Complex and the Vet Teaching Hospital have been added.

May 16, 1996: Clearance was received from DOH to lower the required number of samples in June and July to 10. The sampling plan was modified and the following sites dropped from routine sampling: Stevens, McCroskey, Community and Duncan Dunn. The following sites were added: Lighty Student Services and the Recycle Building.

September 24, 1996: Heritage House was removed from the sampling program (the building was torn down). Added were the new Engineering Teaching and Research Laboratory Building (ETRL).

October 16, 1998: The Anthropology Lab was removed from the sampling program (the building was torn down). Chem. Stores and the Steffen Center were removed because of problems gaining access to the buildings. Routine sampling to the East and West reservoirs was discontinued per WDOH recommendation. The following locations were added to the sampling program: D I Facility, ADBF, Plant Growth - WRC, ANIMAL SCIENCES LABS, Bohler Annex and Clark.

1999: Routine monitoring of the booster station was discontinued.

August 2000: Wells 1, 3 & 4 designated as emergency use only. Well # 2 abandoned.

January 2001: Spillman was removed from the sampling program (the building was torn down). Added in its place was the new Student Rec Center (SRC).

January 14, 2002: Removed the motor pool, it is on a dead end line. Added the Creamery annex (353) and the Center for Undergraduate Education (CUE) (# 95)

March 2004: Removed IBC greenhouse, replaced with Grimes Way Steam Plant.

December 2004: Added School of Communication addition, removed 2 sampling of the Pullman Memorial Hospital. Changed Pullman Memorial Hospital to Student Health.

September 2005: Changed Student Health to Washington Building.

October 2005: Removed golf course club house, replaced with SRC, replaced motor pool with creamery annex.

December 2005: Removed the DI Facility (no potable supply), CASP (shut down); renamed Wilmer/Davis to Hillside, Regents to Northside, new energy plant to Grimes Way Steam Plant; temporarily replaced Rotunda with Stephenson Down-under, CUB with Wilson.

August 2006: Central Stores and Compton Union Building were removed from February and PBS-1 and Streit-Perham were added. Central Stores was removed from April and Bustad was added. CUB was removed from May and PBS-1 was added. Central Stores was removed from July and McCoy was added. McCoy was deleted from October and PBS-1 was added.

December 2006: Saved to Public Health - Public folder. Revised the population summary in August 2006 and added to 2007 plan. The following were added to the Service Connection Sample Locations: Center for Undergraduate Education, Creamery Annex, Golf Course Maintenance Shop, Grimes Way Steam Plant and Large Animal Barn.

June 17, 2007: Discontinued fluoridation (started in 1998).

December 2007: Added Southside Café (opening in spring); Golf Course Clubhouse and CUB (opening in fall). Added summary below of samples/building/year.

August 2008: Changed pool sampling from monthly to quarterly (Feb, May, Aug and Nov)

January 2009: Added CUB back into schedule; revised scheduling for other buildings. Deleted Ad Annex. Dropped pool sampling.

July 2010: Added Biotech/Life Sciences, Motor Pool and Tennis Court Restrooms. Removed the Student Book Corporation and EH&S Treatment Facility. Revised schedule for other buildings. Added Building Section Tables and new Groundwater Rule.

December 2010: “Nez Perce E” was changed to “Nez Perce D”. “677E” was changed to 677D. Removed December Tennis Courts and replaced it with Alumni Center.

June 2011: Food Science Human Nutrition was changed to quarterly sampling and was removed from September and then added to July and October. Steptoe Apt. B was removed from January and the Rec Center was removed from Nov to accommodate the new quarterly sampling for Food Science and Human Nutrition and stay within the sampling limit per month.

July 2011: Orton was added to September to make 25 WSU water system samples in September.

August 2011: Van Doren replaced Beasley Coliseum in December.

Sept 2011: Honors moved to Sept from August and Murrow West moved to August from Sept.

Oct 2011: Bustad moved to Oct. from Nov., Heald moved to Nov. from October. Bustad moved from April to May. Heald moved from May to April.

Jan 2012 Communication addition was replaced with Daggy Hall in Jan. Plant Growth Center (122) was removed from May and Nov and replaced with Chinook Apt BB in May and Johnson hall in Nov. Chinook Apt BB was removed from Aug and put in Feb to spread out the samples at the location better. French Administration was moved from Feb to Aug. Chinook Apt. BB was removed from June and was replaced with Cleveland Hall. Alumni Center was deleted from Nov and added to Sept. Coman was deleted from Sept and added to Nov. Chinook Apt BB was removed from Dec and Yakima Apt was added to Dec. Stimson was added to Sept. Plant Growth Center was removed from the monitoring plan. In May it was replaced with Chinook BB. In November it was replaced with Johnson Hall.

Feb 2012: Changed Valley Crest B (no sample site) to Valley Crest A; changed upstream sample site to Food Quality Building.

June 2012: Plant Science Greenhouse 114 was changed to Meats Lab 98. Nez Perce D 677D was changed to Nez Perce F. Plant Science Greenhouse 114 was changed to McEachern Graduate Residence 805 in Jan. Plant Science Greenhouse 114 was changed to Columbia Apt.F678F for Oct. Changed the sample days for Chinook Apt. AA.

July 2012: Replaced Plant Science Greenhouse with Central Production-Stephenson for October and updated the table indicating the months and number of times sampled.
October 2012: Need to revise Central Stores since it has moved. NRCS replaced with Dodgen Research Facility (NRC).

December 2012: Alumni Ctr and EH&S moved from December to November. Clark and Palouse Ridge Maintenance Fac added to December.

May 2015: Replaced Golf Course Maint. Facility with Eggert Farm. Replaced McAllister with Neill. Swapped Neill in March for Webster in February. Swapped Neill in October with Washington in September. Changed University Stores in June to General Storage.

Water Facilities Inventory Form - Residential Units - Fall 2009

Residence Hall	# of Rooms
Coman	79
Community	60
Duncan Dunn	77
Gannon	154
Goldsworthy	152
Honors	69
McCroskey	46
McEachern	294
Olympia	138
Orton	256
Perham	162
Regents	264
Rogers	256
Scott	79
Stephenson East	170
Stephenson North	170
Stephenson South	156
Stevens	56
Stimson	123
Streit	162
Waller	93
Wilmer-Davis	133
22 Residence Halls	**3149Rooms**

Apartment Complex	Available Apts	# of Buildings
Chief Joseph	96	5
Chinook	124	24
Columbia	54	14
Kamiak	100	13
Nez Perce	96	18
Steptoe	200	22
Terrace	99	9
Valley Crest	48	3
Yakama	130	15
Total	947	123
	3149	22

Total # Rooms/Apts	**4096**	
Total # Buildings		**145**

Tula Young Hastings Farm
Coliform Monitoring Plan

WATER SYSTEM NAME				SYSTEM I.D. NUMBER
WSU Tula Young Hasting Farm				**895200**
PEAK POPULATION SERVED			**SERVICE CONNECTIONS**	
~ 65			9	
TYPE SYSTEM	**DOH SOURCE NUMBER**		**CATEGORY**	**WELL DEPTH**
NTNC	S01, S02, S03 wellfield		Wells	S01 - 594 ft S02 - 432 ft
TREATMENT	**TREATMENT PROCESS**	**PURPOSE**	**STORAGE**	**STORAGE CAPACITY**
Chlorine	Gas chlorination	Disinfection	Reservoir	50,000 gal

Sampling Information

NUMBER OF ROUTINE SAMPLES REQUIRED BY REGULATIONS:	NUMBER OF SAMPLES SITES NEEDED TO REPRESENT THE DISTRIBUTION SYSTEM:
1	6

	TYPE	SITE #	LOCATION
SAMPLE SITE GROUP	ROUTINE	1	County Shop
	REPEAT	2	Dairy Center Office
	REPEAT	4	Swine Center Residence
	REPEAT/Trigger*	-	Well sample while in operation
SAMPLE SITE GROUP	ROUTINE	2	Dairy Center Office
	REPEAT	5	Dairy Center Residence
	REPEAT	11	Whitman County Shop Building
	REPEAT/Trigger*	-	Well sample while in operation
SAMPLE SITE GROUP	ROUTINE	3	Beef Center Teaching Wing
	REPEAT	5	Dairy Center Residence
	REPEAT	2	Dairy Center Office
	REPEAT/Trigger*	-	Well sample while in operation

* Per the Groundwater Rule, within 24 hours of notification of a positive coliform sample, the well that was in operation on the day of the positive sample shall be sampled prior to chlorination while the well is running, along with three (3) repeat samples (original collection site that was positive and 2 additional sites. The well sample serves as a REPEAT and Source Trigger Sample).

For maximum coverage of different branches of the distribution system, a decision to rotate the required routine sample(s) among different sample sites may be made. It is recommended that ROUTINE sampling sites be tested about 4 times per year or more often.

ROTATION SCHEDULE

MONTH	SAMPLE SITE(S)	MONTH	SAMPLE SITE(S)
JANUARY	County Shop	**JULY**	County Shop
FEBRUARY	Dairy Center	**AUGUST**	Dairy Center
MARCH	Beef Center	**SEPTEMBER**	Beef Center
APRIL	County Shop	**OCTOBER**	County Shop
MAY	Dairy Center	**NOVEMBER**	Dairy Center
JUNE	Beef Center	**DECEMBER**	Beef Center

The month after a positive coliform sample, five (5) FOLLOW-UP samples must be submitted. Below are the sires for the FOLLOW-UP samples. Sites designated as other sampling sites may be also used as FOLLOW-UP sites. Also, list any sites which will be used with any FOLLOW-UP.

MONTH AFTER SAMPLE SITES

The month following a positive sample the following sites will be sampled: County Shop (#1); Dairy Center (#2); Beef Center (#3); Whitman County Shop Building (#14); and Beef Center Residence (#6). This will completely cover the entire water system.

Preparation Information

SYSTEM NAME	**DATE PLAN COMPLETED**	**DATES MODIFIED**
Tula Young Hastings Farm	1-24-92	1-31-14
NAME OF PLAN PREPARER	**POSITION**	**DAYTIME PHONE #**
Gene Patterson	Public Health Manager	(509)335-3041
STATE REVIEWER	**DATE LAST REVIEW**	

APPENDIX G

Item 3 - WSU Chlorine Safety Procedures

Rev. 6-28-07

A minimum of two persons trained in these procedures is required for all cylinder changes; one equipped with a two-way radio and standing in the open door of the chlorinator room observing the other changing cylinders. Both must be wearing long-sleeved shirts, impermeable gloves and non-vented chemical goggles for protection against possible liquid chlorine leaks. The cuffs of their long-sleeved shirts must be pulled down and buttoned over the gauntlets of the gloves. Increased safety is afforded by both wearing their full-face respirators, in which case the use of goggles is not required. The portable chlorine monitor must be turned "On" and be immediately at hand. In the case of the chlorinator enclosure at the Dairy Farm, which is located outside, the observer must be close enough to lend timely assistance.

Well #4 (Near the Coal Pile at the Energy Plant)

1. Call WHITCOM prior to entering the chlorinator room and give notice that you will be working on the system, as your entry will trigger an alarm at WHITCOM. Your work on the system could trigger a chlorine alarm at WHITCOM also.

2. Turn on the ventilation fan.

3. Make sure that the handle for opening and closing the cylinder valve is in place on the valve.

4. If a leak occurs while you are changing cylinders, and the concentration of chlorine in air reaches 1 part per million (ppm) the strobe light on the exterior of the chlorinator room will activate and the buzzer alarm in the interior of the room will sound. If the concentration reaches 3 ppm, the strobe will continue and the exterior horn will activate. Also, WHITCOM will receive the silent alarm via the dialer. WHITCOM will also receive a silent alarm when there is a power failure that affects the detector. You must check your hand-held or the on-site monitor to determine the concentration of gas to air. If either monitor indicates a gas concentration of between 0.5-9.9 ppm, don the full-face respirators prior to further attempts to find and repair the source of the leak. If it appears that your repair efforts are successful, use the ammonia solution for verification. The on-site and hand-held detectors should indicate dilution of the concentration of chlorine in the chlorinator room by the operation of the ventilation fan and the open door. If the leak is stopped call WHITCOM to give verification.

   If the concentration of chlorine increases to greater than or equal to 10 ppm while you are working and/or the leak cannot be fixed, shut off the ventilation fan, close the door, retreat to a safe location upwind and notify WHITCOM that the leak cannot be stopped. Remain in the area upwind to be available for lending **advisory** assistance to the HazMat Team when they arrive, if requested. If necessary the HazMat Team will respond with the cylinder containment vessel.

5. When an unwitnessed leak occurs, WHITCOM will receive the silent alarm at 3 ppm and will notify the HazMat Team and the Facilities Operations Dispatcher. The Dispatcher should then contact Water Treatment on-duty or on-call personnel. The Water Distribution Specialist is responsible for contacting qualified maintenance personnel to respond and assist in making repairs to the chlorine system for continued operation of the well pump. If the unwitnessed leak is less than 3 ppm the Facilities Operations Dispatcher will not know about it until someone calls in and reports that the strobe light and intermittent audible alarm have activated. The Dispatcher should then notify WHITCOM so that the HazMat team can respond, and also contact Water Treatment on-duty or on-call personnel. Upon your arrival, you must report to the HazMat team's Incident Commander. You must not enter the chlorinator or pump rooms on any alarm until the facility is cleared by the HazMat team.

6. The Water Distribution Specialist is responsible for notifying the vendor of the leaky valve or cylinder as soon as possible.

Well #6 (Beasley Parking Lot) and Well #7 (Uphill of the Energy Plant on College Avenue)

The same procedure as with **Well #4** above.

END

APPENDIX G

Item 4 - WSU Cross Connection Control Program & Water Board Approval Letter

WASHINGTON STATE UNIVERSITY

Environmental Health and Safety

May 12, 2008

Jeff Johnson
Washington State Department of Health
Office of Drinking Water
Eastern Regional Office
1500 W. 4th Ave., Suite 305
Spokane, WA 99204

Re: WSU Water Board Approval of Cross Connection Control Program

Dear Mr. Johnson:

The WSU Water Board and administration officially approved the Cross Connection Control Program that covers the WSU Pullman (#93200Q), Tula Young Hastings Farm (#895200) and Prosser (#93195H) Water Systems in October 2006.

Please contact the WSU Water Board at 509-335-3041 if you have any further questions.

Sincerely,

Dwight Hagihara
WSU Water Board Co-Chair

Ev Davis
WSU Water Board Co-Chair

cc: Rob Corcoran
Calvin George, Taylor Engineering
Gene Patterson
Gary Wells

RECEIVED
MAY 20 2008
FACILITIES OPERATIONS

PO Box 641172, Pullman, WA 99164-1172
509-335-3041 • Fax: 509-335-4442 • Emergency 911 • ehs@wsu.edu • www.ehs.wsu.edu

WSU DRINKING WATER, CROSS-CONNECTION CONTROL AND WATER CONSERVATION PROGRAM

Revised January 15, 2010

PURPOSE **2**

AUTHORITY AND RESPONSIBILITY **2**

The Water Board 3
Facilities Operations 3
Environmental Health and Safety (EH&S) 4
Capital Planning and Development (CPD) 5
Housing and Dining Services 5
Regional Campuses and Research Units (RCRU) 6
Water System Users 7

PROGRAM ELEMENTS **8**

Construction, Cross-connection Control, Plan Review and Related Programs 8
Construction and Repair 8
Cross-connection Control 9
Plan Review and Design Standards 15
Water System Plans 15
Well Construction, Decommissioning, Maintenance, Source Approval and Interties 15
Water System Modifications or Additions 16
Sampling, Monitoring, Repairs, Emergency Procedures, Reporting and Recordkeeping Requirements 16
Sampling, Monitoring, Repairs and Emergency Procedures 16
Reporting, Public Notification and Recordkeeping 19
Sanitary Surveys, Vulnerability Assessments, Emergency Response Plans and Wellhead Protection 19
Sanitary Surveys 19
Vulnerability Assessments and Emergency Response Plans 19
Wellhead Protection and Sanitary Control Areas 19
Operating Permits and Water Works Operator Certification 20
Water Use Efficiency Rule and Water Conservation 20

PURPOSE

Washington State University (WSU) is responsible for planning, operating, sampling, maintaining and protecting University owned public drinking water systems and water supply connections to meet the requirements of WAC 246-290 through WAC 246-296, WAC 173-160 and WAC 51-56. WSU is also responsible for helping to ensure that the quality of water WSU facilities receive from non-WSU public water systems meets state and federal requirements.

AUTHORITY AND RESPONSIBILITY

The Water Board, comprised of staff from Facilities Operations, Environmental Health and Safety (EH&S), Housing and Dining Services, Capital Planning and Development, and Regional Campus and Research Unit (RCRU) representatives, has the ultimate authority and responsibility for all WSU water systems and facilities located around the state to meet all applicable regulations. The Water Board is also responsible for planning, constructing and repairing, operating, sampling, maintaining, and protecting WSU's public drinking water systems and water supply connections throughout the state to meet the requirements in WAC 246-290 through WAC 246-296, WAC 173-160 and WAC 51-56.

The Water Board must develop all policies, procedures, and this WSU Drinking Water, Cross-connection Control and Water Conservation Program document (hereinafter referred as the Program document) for more specific information. This Program document provides detailed planning, development, construction and repair, maintenance, sampling, monitoring, and operating procedures to ensure WSU drinking water systems are maintained and operated in a safe and cost effective manner. The most current version of this Program document is located on the WSU Environmental Health and Safety web site under drinking water at: http://www.ehs.wsu.edu/ph.asp.

The Water Board must coordinate with local administrative authorities of non-WSU water systems in all matters concerning cross-connection control (and other drinking water issues). The Water Board must document and describe such coordination, including delineation of responsibilities, in this Program document.

The Water Board must be co-chaired by the Facilities Operations and EH&S Directors. Regional Campus and Research Unit representatives may assign appropriate staff members to assist the board. The Water Board must meet at least annually. The Board must be comprised of the following positions:

Facilities Operations
Director
Director, Maintenance and Utilities Services
Water Distribution Manager
Water System Engineer

Environmental Health and Safety
Director
Public Health Manager
Facility Health and Safety Coordinator

AUTHORITY AND RESPONSIBILITY (cont.)

Housing and Dining Services
Director, Maintenance Services for Campus Life
Industrial Hygienist
Maintenance Coordinator

Capital Planning and Development
Director, Construction Service and Quality Assurance
Project Manager / Professional Engineer

Regional Campuses and Research Units
CAHNRS Business and Personnel Office Director
WSU Spokane – Facilities Operations Manager
WSU Tri-Cities – Environmental Health and Safety Officer
WSU Vancouver - Facilities Operations Manager

The Water Board

- Develops all drinking water programs, policies and procedures for WSU.
- Helps protect drinking water systems and water supply connections.
- Performs and enforces corrective actions.
- Ensures that qualified personnel are provided to develop and implement all applicable programs.
- Develops schedules for performing risk assessments.
- Develops a quality assurance program for backflow prevention assembly testing.
- Develops procedures for responding to water quality and backflow incidents.
- Provides educational programs for consumers about drinking water systems, conservation, cross-connection controls, etc.
- Coordinates with and notifies the Dept. of Health (DOH), local administrative and/or health authorities of any incidents, and documents the incidents.

Facilities Operations

- Operates and maintains all Group A and B water systems in Whitman County (excluding Palouse Conservation Field Station, operated by USDA, maintenance and repairs performed by Facilities Operations).
- Conducts limited monitoring of the drinking water system.

Facilities Operations (cont.)

- Coordinates master planning with the Infrastructure Master Planning Committee.

- Is responsible, along with Capital Planning, Development, and RCRU, for the design, plan and specification review, and construction of additions, modifications and new construction to WSU drinking water systems throughout the state.

- Provides bacteriological and chlorine disinfection water sampling for construction and repairs (or oversees the contractor that performs the sampling), with assistance from EH&S, RCRU, Housing and Dining Services and/or Capital Planning and Development. Facilities Operations or the contractor must provide the results to EH&S.

- Prior to water being used for drinking purposes, Facilities Operations must test all new backflow prevention assemblies in Whitman County and must obtain testing results from outside of Whitman County, and obtain satisfactory bacteriological sample results from repairs or maintenance. Facilities Operations (or the contractor if applicable) must provide bacteriological sample results to EH&S.

- Provides alternative drinking water sources if construction and/or maintenance require disruption of water services on a case by case basis.

- Prepares the annual Cross-connection control summary report and assists EH&S with the development and preparation of other regulatory reports as required.

Facilities Operations representative:

- A certified Water Distribution Manager 3 is in responsible charge of the daily operational activities of the water systems in Whitman County, and their treatment facilities and distribution systems that directly impact water quality and/or quantity of water as required per WAC 246-292.

Environmental Health and Safety (EH&S)

- Conducts bacteriological and chemical sampling for Whitman County water systems (excluding construction and repair samples) required by federal and state regulations, and assists Facilities Operations, Capital Planning and Development, RCRU and other WSU water systems around the state with their sampling responsibilities. Any required sampling for construction and repairs must be performed by the department or contractor making the repair. (Refer to the Construction and Repair section and the Sampling, Monitoring, Repair section below.).

- Investigates concerns regarding drinking water quality and performs sanitary surveys of drinking water systems, including wells, reservoirs, distribution systems and treatment facilities.

- **EH&S (cont.)**

- Reviews plans and specifications for new construction and remodels.

- Evaluates current and new regulations to help ensure WSU remains in compliance and maintains safe and healthy drinking water.

- Acts as the liaison with the Washington State Department of Health, Department of Ecology, local health departments or districts, and the EPA regarding regulatory compliance.

- Assists Facilities Operations with the development and preparation of various regulatory reports as required.

Capital Planning and Development (CPD)

- Coordinates with and receives approval from the Facilities Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

- Prior to water being used for drinking purposes, Capital Planning and Development (CPD) must obtain satisfactory bacteriological sample results and must have Facilities Operations test backflow prevention assemblies from new construction or repairs in Whitman County. Outside of Whitman County, the contractor must test backflow prevention assemblies prior to water being used for drinking purposes. RCRU or the contractor must provide bacteriological sample results to EH&S and the contractor must provide backflow prevention assembly test results, certified Backflow Assembly Testers (BATs) names, certification and telephone numbers to Facilities Operations.

Housing and Dining Services

- Coordinates with and receives approval from the Facilities Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

- Prior to water being used for drinking purposes, Housing and Dining Services must obtain satisfactory bacteriological sample and backflow prevention assembly testing results from new construction or repairs. Housing and Dining Services or the contractor must provide bacteriological sample results to EH&S and backflow prevention assembly testing results to Facilities Operations.

- Conducts maintenance on water lines and contracts with certified BATs to perform backflow prevention assembly testing. Housing and Dining Services must provide the certified BATs names, certification and telephone numbers to Facilities Operations if applicable.

Regional Campuses and Research Units (RCRU)

RCRU operates, maintains, and conducts limited monitoring of the drinking water systems located outside Whitman County, and coordinates water conservation efforts.

RCRU representatives:

- The RCRU Facilities Operations representative coordinates with and receives approval from the Facilities Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

- A certified Water Distribution Manager is in responsible charge of the daily operational activities of the WSU Prosser - IAREC water system, as well as Group B systems at Roza, Othello, Royal Slope and Lind Research Units, and their treatment facilities and distribution systems that directly impact water quality and/or quantity of water as required per WAC 246-292.

- The RCRU CPD representative coordinates master planning with the Infrastructure Master Planning Committee.

- The RCRU Facilities Operations and CPD representatives are responsible for the design and construction of additions and modifications to WSU drinking water systems across the state (in addition to Facilities Operations and CPD), review of plans and specifications for new construction and remodels, and ensuring that additions, modifications, new construction, and remodels are in compliance with all regulations.

- The EH&S representative assists RCRU Facilities Operations with bacteriological and chemical sampling outside of Whitman County (excluding construction and repair samples) as required by federal and state regulations, and assists Facilities Operations and other WSU water systems around the state with their sampling responsibilities. Any required sampling for construction and repairs must be performed by the department or contractor making the repair.

- The RCRU Facilities Operations, CPD and/or EH&S representative must obtain satisfactory bacteriological sample and backflow prevention assembly testing results from new construction or repairs prior to water being used for drinking purposes. RCRU or the contractor must provide bacteriological sample results to EH&S and backflow prevention assembly testing results to Facilities Operations. Certified BATs hired or contracted by RCRU must provide their names, certification and telephone numbers to Facilities Operations.

- The RCRU Facilities Operations or CPD representative must provide alternative drinking water sources if construction and/or maintenance require disruption of water service on a case by case basis.

RCRU representatives (cont.):

- EH&S representative investigates concerns regarding drinking water quality and performs sanitary surveys of drinking water systems, including wells, reservoirs, distribution systems and treatment facilities.

- EH&S representative acts as the liaison with the Washington State Department of Health, Department of Ecology, and the EPA regarding regulatory compliance.

- EH&S representative develops and prepares various regulatory reports as required.

EH&S in Pullman evaluates current and new regulations to help ensure WSU remains in compliance and maintains safe and healthy drinking water.

Water System Users

Any WSU department (including Housing and Dining Services), organization, non-WSU entity, or person that connects equipment, installs piping, or makes changes to water systems must receive prior approval from Facilities Operations Utilities or RCRU. Changes to water systems include tying into any WSU fire hydrant (refer to Fire Hydrant / Water Line Use and Backflow Prevention by Contractors below).

The following are the organizational alignments specifying what WSU entity and / or purveyor is responsible for what systems, facilities, and their appropriate programs:

<u>Facilities Operation in Pullman, WA</u>
Pullman Campus
Central Ferry Research Farm
Palouse Conservation Field Station (operated by USDA)
Smoot Hill Biological Field Study Area
Spillman Farm
Tula Young Hastings Farm

<u>Housing and Dining Services</u>
Pullman Campus departmental facilities

<u>Prosser Irrigated Agriculture Research and Extension Center</u>
Prosser Research and Extension Center
Lind Dry Land Research Unit
Othello Research Unit
Royal Slope Columbia Basin Research Unit #2 (operated by private organization)
Roza Research Unit

Water System Users (cont.)

WSU Tri-Cities Regional Campus

Puyallup Research and Extension Center
Puyallup Research and Extension Center
Mount Vernon Research and Extension Center

Wenatchee Tree Fruit Research and Extension Center
Tree Fruit Research and Extension Center
Columbia View Orchard Research Unit
Colockum Multiple Use Research Unit
Smith Tract

WSU Spokane
Spokane Regional Campus
Intercollegiate Center for Nursing (ICN) - Spokane
SIRTI (non-WSU building but WSU oversees by contracting)

WSU Vancouver
Vancouver Regional Campus
Vancouver Research and Extension Unit

PROGRAM ELEMENTS

Construction, Cross-connection Control, Plan Review and Related Programs

Construction and Repair

Facilities Operations or Capital Planning and Development must submit project reports and construction documents for Group A and B new systems, extension of systems, and improvements to DOH for approval prior to commencing construction with the exception of the activities listed in WAC 246-290-125. Facilities Operations or Capital Planning and Development must provide copies of project reports and construction documents to the Water Distribution Manager and EH&S. Refer also to Plan Review section below.

Any required bacteriological sampling for construction and repairs must be performed by the department or contractor making the repair. Refer to the Sampling, Repair and Emergency Procedures section for more information.

Cross-connection Control

By elimination or control of existing cross-connections between potable and non-potable water systems, plumbing fixtures, and industrial piping systems (including reclaimed and/or reuse water), WSU can maintain safe drinking water supplies. Establishment of a Cross-connection Control Program helps WSU comply with WAC 246-290-490, WAC 246-291-270, WAC 51-56-0600 and Uniform Plumbing Code (UPC) regulations. WSU must adhere to WAC 246-290-490 and WAC 246-291-270 for premises isolation (water supply to buildings) and the UPC and WAC 51-56-0600 for in-premises isolation (internal building water distribution).

Required Personnel and Responsibilities:

Water Distribution Manager:

- Responsible charge of the daily operational activities of the water systems, treatment facilities and distribution systems that directly impact water quality and/or quantity of water as required per WAC 246-292.

Cross-connection Control Specialist (CCS):

- Develops and implements the cross-connection control program (WAC 246-290-490(3) (c) through (g), and (j)).
- Assesses the risk for each potential connection to the water supply, and determines degree of hazard, degree of acceptable risk, and reliability required of the backflow preventer (WAC 246-290-490(4)(a)(i)).
- Determines the kind of backflow preventer required for each connection assessed for risk (WAC 246-290-490(4) (a) (ii)).
- Inspects backflow preventer installations to ensure that protection is provided commensurate with the assessed degree of hazard (WAC 246-290-490(7) (a) (i)).
- Develops cross-connection control procedures related to initial evaluation prior to service being provided to a new connection (WAC 246-290-490(3) (c) (i)).
- Initially evaluates existing connections for proper risk assessment and the application of appropriate backflow preventer (WAC 246-290-490(3) (c) (ii).
- Periodically reevaluates (on a schedule acceptable to the DOH, or whenever there is a change in use of a premises) all service connections to ensure the application of proper backflow prevention (WAC 246-290-490(3) (c) (iii)).
- Must inspect air gaps installed in lieu of approved backflow prevention assemblies, or must inspect backflow prevention assemblies for correct installation and approval status (WAC 246-290-490(7)(a)(ii)).

Backflow Assembly Tester (BAT):

- Tests approved backflow assemblies for proper operation (WAC 246-290-490(7) (a) (iii)).
- Inspects and/or tests approved air gaps and approved backflow assemblies; 1)at the time of installation; 2) annually or more frequently thereafter, 3) whenever there is a backflow incident, and/or; 4) whenever an assembly is repaired, reinstalled or relocated, or an air gap is re-plumbed (WAC 246-290-490(7)(b)).

Water Board:

- Per WAC 246-290-490(3)(a), (b), (h) and (i), develops this Program document that establishes legal authority to implement a cross-connection control program, describes operating policies, develops and implement procedures for responding to backflow incidents and educates consumers on cross-connection control.

There are additional duties of CCS's and BAT's associated with backflow prevention devices, which are a lower priority and are not included in this document.

NOTE: It is important that BATs report unapproved assemblies or assembly installations, uncovered during annual inspections or incident evaluations to the CCS. In general, all inspection and testing reports generated by BATs should be reviewed by the CCS and the Water Distribution Manager.

Using the above state certified Cross-connection Control Specialists and Backflow Assembly Testers (either associated with the Pullman campus, or using their own certified maintenance personnel, or hired as independent contractors), each regional campus, research station, etc. is ultimately responsible for ensuring that their own water systems or water supply connections to facilities for cross-connections and backflow prevention assemblies are maintained, inspected, and tested, and that records of all maintenance, inspections, and testing are retained.

Definitions:

All definitions, hazards, equipment, procedures, and installation practices must either follow WAC 246-290 and / or the most recent edition of the *Cross-connection Control Manual - Accepted Procedure and Practice*.

All new backflow prevention assembly models that are installed on WSU property must be used either from the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-connection Control and Hydraulic Research or must be listed or approved by other nationally recognized testing agencies (such as IAPMO, ANSI, or UL) acceptable to the local administrative authority. Such models are considered approved by the Department of Health (DOH). The current approved assemblies list is available from DOH upon request.

Approved air gap means a physical separation between the free-flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel. To be an air gap approved by DOH, the separation must be at least:

- Twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case be less than one inch, when unaffected by vertical surfaces (sidewalls); and:

- Three times the diameter of the supply piping, if the horizontal distance between the supply pipe and a vertical surface (sidewall) is less than or equal to three times the diameter of the supply pipe, or if the horizontal distance between the supply pipe and intersecting vertical surfaces (sidewalls) is less than or equal to four times the diameter of the supply pipe and in no case less than one and one-half inches.

Approved atmospheric vacuum breaker means an AVB of a make, model, and size that is approved by DOH. AVBs that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-connection Control and Hydraulic Research or that are listed or approved by other nationally recognized testing agencies (such as IAPMO, ANSI, or UL) acceptable to the local administrative authority are considered approved by DOH.

Approved backflow preventer means an approved air gap, an approved backflow prevention assembly, or an approved AVB. The terms "approved backflow preventer," "approved air gap," or "approved backflow prevention assembly" refer only to those approved backflow preventers relied upon by the purveyor for the protection of the public water system. The requirements of WAC 246-290-490 do not apply to backflow preventers installed for other purposes.

Approved backflow prevention assembly means an RPBA, RPDA, DCVA, DCDA, PVBA, or SVBA of make, model, and size that is approved by DOH. Assemblies that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-connection Control and Hydraulic Research or other entity acceptable to DOH are considered approved by DOH.

Backflow means the undesirable reversal of flow of water or other substances through a cross-connection into the public water system or consumer's potable water system.

Backflow assembly tester means a person holding a valid BAT certificate issued in accordance with WAC 246-292.

Backpressure means a pressure (caused by a pump, elevated tank or piping, boiler, or other means) on the consumer's side of the service connection that is greater than the pressure provided by the public water system and which may cause backflow.

Backsiphonage means backflow due to a reduction in system pressure in the purveyor's distribution system and/or consumer's water system.

Cross-connection means any actual or potential physical connection between a public water system or the consumer's water system and any source of nonpotable liquid, solid, or gas that could contaminate the potable water supply by backflow.

Cross-connection control program means the administrative and technical procedures the purveyor implements to protect the public water system from contamination via cross-connections as required in WAC 246-290-490.

Cross-connection control specialist means a person holding a valid CCS certificate issued in accordance with WAC 246-292.

Cross-connection control summary report means the annual report that describes the status of the purveyor's cross-connection control program.

High health cross-connection hazard means a cross-connection which could impair the quality of potable water and create an actual public health hazard through poisoning or spread of disease by sewage, industrial liquids or waste.

In-premises protection means a method of protecting the health of WSU consumers served by the WSU building's potable water system, located within the WSU building by the installation of an approved air gap or backflow prevention assembly at the point of hazard, which is generally a plumbing fixture.

Local administrative authority means the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted under chapter 19.27 RCW. The local administrative authority for all WSU water systems throughout the state is the WSU Water Board. For WSU premises or buildings that are served by a non-WSU water system, the local administrative authority is the water system purveyor that serves the WSU premises or buildings

Low health cross-connection hazard means a cross-connection that could cause an impairment of the quality of potable water to a degree that does not create a hazard to the public health, but does adversely and unreasonably affect the aesthetic qualities of such potable waters for domestic use.

Premises isolation means a method of protecting WSU public water systems by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the building water system from the purveyor's distribution system.

Purveyor means a WSU department that operates a WSU public water system. Purveyor also means the authorized agents of WSU. For non-WSU water systems, the purveyor is the local administrative authority that operates the non-WSU water system.

Inspections and Surveys:

All responsible entities must have a certified Cross-connection Control Specialist inspect and survey their Group A water system facilities on an annual basis or after a backflow incident per WAC 246-290-490(7)(b). For Group B water systems and WSU facilities on non-WSU public water systems, all responsible entities must have a certified Cross-connection Control Specialist inspect and survey them as determined by the Water Board or after a backflow incident. Facilities where cross-connections are found must be prioritized and funded based on risk. The responsible entity must provide access to the results of their inspections and surveys to Facilities Operations and EH&S for performing assessments for Minor Capital Safety funding. When an existing cross-connection poses a high health or system hazard, the purveyor must shut off water service to the premises, equipment, etc. until the cross-connection has been eliminated or controlled by the installation of a proper backflow prevention assembly. The Cross-connection Control Specialist and EH&S must be notified as soon as possible whenever a high health cross-connection hazard is found and/or the water has been shut off. Existing cross-connections that do not pose a high health hazard will be eliminated or controlled by the installation of a proper backflow prevention assembly as funding

and time allows. Non-University entities, which own buildings or equipment serviced by a WSU water system, will be required to install a service meter and premises isolation or in-premises isolation (backflow prevention assemblies) as determined by the WSU Cross Connection Control Specialist.

Capital Planning and Development and Facilities Operations must inspect all new or remodeled construction involving water systems.

All backflow prevention assemblies and air gaps must be tested and/or inspected annually by a Washington State Certified Backflow Prevention Assembly Tester using Washington State approved field testing procedures. All new backflow prevention assemblies that have been installed must be tested prior to being placed into service. The Washington State Certified Backflow Prevention Assembly Tester must provide the results of testing to Facilities Operations in a timely manner.

When annual testing and documentation of backflow prevention assemblies show consistent annual failures, semi-annual tests to verify the assemblies meet design standards must be performed.

All facilities used by non-WSU organizations that are serviced by a WSU water system must comply with all elements of this program.

Fire Hydrant / Water Line Use and Backflow Prevention by Contractors:

Prior to contractors tying into fire hydrants or other water lines and using any water, they must install an approved and tested backflow prevention assembly. The contractor has two options: 1) install their own backflow prevention assembly and have a Facilities Operations Backflow Assembly Tester (BAT) inspect the assembly or; 2) check out an approved and tested assembly from Facilities Operations. In either case, the BAT must date, initial, and attach a green “Quality Control” tag must be attached to the assembly. The tag is to be displayed such that it is readily visible to interested authorities. If the contractor checked out an assembly from Facilities Operations, they must return the backflow prevention assembly in working order to Facilities Operations when they are done using the fire hydrant / water line. Failure to return the backflow prevention assembly, or if the assembly is not in working order, will result in the contractor being charged for it.

Signage of Non-Potable Water:

As required by the latest edition of the Uniform Plumbing Code (UPC), all faucets, hose bibs, etc., that supply non-potable water must have signs posted adjacent to them that state:

CAUTION: NONPOTABLE WATER
DO NOT DRINK

Per WAC 296-800-15030, all emergency showers and eyewashes using non-potable water must have signs posted adjacent to them that state water is non-potable.

Backflow Prevention Assembly Recordkeeping:

Facilities Operations must keep complete records on all dates of installations, inspections and results, recommended protection, locations of backflow prevention assemblies and air gaps in systems, testing and maintenance reports. Housing and Dining Services must maintain documentation on their respective facilities and forward a copy of such records to Facilities Operations after the completion of the certification inspections or on an annual basis, which ever occurs first. Regional campuses and research stations must maintain documentation on their respective campuses and research stations and forward a copy of such records to Facilities Operations after the completion of the certification inspections or on an annual basis, which ever occurs first. Backflow assembly test kits must be annually verified and documented for accuracy to plus or minus 0.2 full scales. Records must be made available to EH & S or the Washington State Department of Health upon request.

Risk Assessments and Prioritizing Cross-connection Control Improvements:

In order to address the elimination of cross-connections in WSU potable water systems, a prioritization of projects is required. This is necessary due to the number of cross-connections discovered each year and the amount of funding available.

An assessment of each cross-connection discovered must be performed in order to prioritize and establish funding for the project. Environmental Health and Safety and Facilities Operations must perform assessments of candidates for funding jointly.

The CCS performs the risk assessment based on WAC 246-290-490(4). Using Tables 8 and 9 from the WAC along with the most recent edition of the Cross-connection Control Manual - Accepted Procedure and Practice, the CCS must determine the degree of hazard, probability, and source of contamination associated with the cross-connection, and the number of people it could potentially affect. The following describes the criteria used to establish priorities for correction of cross-connections based on the premises isolation, in-premises isolation, degree of hazard, and number of people potentially affected:

Risk Assessment Hierarchy (1 being the highest priority, 5 being the lowest):

1. Premises Isolation of buildings with the greatest number of high health cross-connection hazards takes precedence over Premises Isolation of buildings with fewer high health cross-connection hazards. *
2. In-premises Isolation of buildings with the greatest number of high health cross-connection hazards takes precedence over In-premises Isolation of buildings with fewer high health cross-connection hazards. *
3. In-premises Isolation of buildings with the greatest number of occupants with the same amount of high health cross-connection hazards as another building takes precedence over the other building with fewer building occupants. *
4. Premises Isolation of buildings with the greatest number of low health cross-connection hazards takes precedence over Premises Isolation of buildings with fewer low health cross-connection hazards. *
5. In-premises Isolation of buildings with the greatest number of occupants with the same amount of low health cross-connection hazards as another building takes precedence over the other building with fewer building occupants. *

* In cases where two different types of cross-connection hazards exist, but both require the same type of backflow prevention assembly, the hazard that is more likely to result in

contaminated water must be prioritized higher. Example: RPBAs are required for cross-connections involving: a) chemical feed equipment plumbed directly into potable water lines, and; b) potable water that is not protected from laboratory water, where the potential for equipment to be plumbed directly into the laboratory water exists. Therefore, the chemical feed equipment would be prioritized higher, since it is plumbed into a potable water line and is pressurized, than a laboratory water line that only has the potential for equipment to be connected to it.

In the Manual, Table 4-1 lists each type of backflow prevention assembly with the level of protection it provides. Tables 4-2, 4-3 and 4-4 describe premises, facilities and fixtures, equipment and areas requiring backflow prevention with the appropriate assembly listed. Therefore, it must be assumed that if an air gap is required, it is a higher hazard than if a Reduced Pressure Backflow Assembly (RPBA) is required, etc.

Plan Review and Design Standards

All plan reviews and design standards for new or remodeled construction involving water systems must be submitted to and reviewed by Facilities Operations, the Certified Cross-connection Control Specialist, the certified Water Distribution Manager, EH&S, Housing and Dining Services (if applicable), and RCRU (if applicable). All plans and work prepared must meet Group A and B water system engineering requirements and design standards, as well as the local administrative authority if applicable. Plans must be prepared under the direction of a professional engineer licensed in Washington.

Water System Plans

The Pullman campus system is required to submit a revised water system plan every six (6) years to DOH, and small water system plans are also required for small Group A water systems (Tula Young Hastings Farm and WSU Prosser). Facilities Operations must be responsible for Whitman County water system plans and RCRU is responsible for the WSU Prosser plan.

Well Construction, Decommissioning, Maintenance, Source Approval and Interties

Facilities Operations and RCRU, with assistance from EH&S, must be responsible for obtaining source water approval, interties with other water systems, water rights, and the construction and decommissioning of all WSU wells, including agricultural, municipal, industrial, domestic or commercial wells.

Water System Modifications or Additions

Contact the Director of Architectural and Engineering Services and the Water Distribution Manager, both at Facilities Operations, regarding all modifications or additions to WSU drinking water systems.

Facilities Operations recommends that WSU Pullman departments submit requests for water system modifications or additions through the myFacilities website. See BPPM 80.45 at http://www.wsu.edu/%7Eforms/PDF/BPPM/80-45.pdf.

WSU Pullman departments unable to access or utilize the myFacilities website may submit requests for water system modifications or additions to Facilities Operations; telephone 335-9007.

Non-Pullman units are to contact Facilities Operations to submit requests for water system modifications or additions; telephone 335-9007.

All University departments, organizations, persons, or non-University entities must receive approval from Facilities Operations **before**:

- Connections to water lines. All new water system point of use connections must have a service meter and premises isolation or in-premises isolation (backflow prevention assemblies) as determined by the WSU Cross Connection Control Specialist. Additionally, Non-University entities will be required to install a service meter and premises isolation or in-premises isolation (backflow prevention assemblies) as determined by the WSU Cross Connection Control Specialist, and reimburses the University for water used. Facilities Operations Water Distribution Manager will only turn on the system water to new services after receiving certification of backflow prevention testing, and verifying the installation of appropriate metering and backflow prevention assemblies.
- Connecting equipment to water lines,
- Repairing or maintaining piping,
- Drilling a well, or
- Making any changes to water systems.

Sampling, Monitoring, Repairs, Emergency Procedures, Reporting and Recordkeeping Requirements

Sampling, Monitoring, Repairs and Emergency Procedures

Sampling and Monitoring:

EH&S, Facilities Operations and RCRU must be responsible for all bacteriological and chemical sampling (excluding construction and repair sampling) with assistance from the Water Distribution Manager on daily monitoring. For installation of new lines and systems, and repairs, Facilities Operations, Housing and Dining Services, RCRU and/or Capital Planning and Development is responsible for ensuring that chlorination meets the most recent AWWA standards, and that adequate bacteriological sampling results are obtained. All bacteriological

sampling results from construction or repair projects must be submitted to EH&S and RCRU prior to use of the water for drinking purposes. See below for bacteriological sampling procedures.

Repairs:

Required bacteriological sampling for repairs must be performed by the department making the repair. Depending upon the type of repair, the following procedures must be followed:

Repair where water pressure not lost:

In these cases (such as a hole in a line) where only a patch is needed, the patch and hole must be properly disinfected first; however bacteriological sampling is not required.

Repair where water pressure was lost:

In these cases (such as a broken line) proper disinfection of lines per the most current AWWA standards and bacteriological sampling must be required. Water service to buildings can be resumed prior to obtaining satisfactory bacteriological sampling results.

NSF-approved temporary hoses may also be used when service to a building is needed as soon as possible. The temporary hose must be properly disinfected before use. After repairs have been completed, the repaired section of waterline must be disinfected according to the most current AWWA standards, flushed and a satisfactory bacteriological sample results obtained prior to placing the line back into service.

In cases where unsatisfactory sample results are obtained, the disinfection procedure, flushing and bacteriological sampling must be repeated until satisfactory results are obtained.

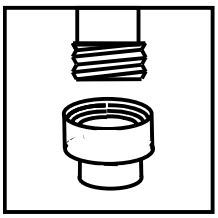
Bacteriological Sampling Procedures:

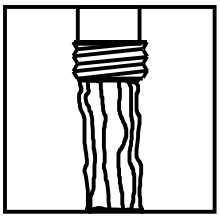
Samples must be delivered ASAP, but no later than 24 hours after being collected. EH&S or the laboratory can provide sample bottles and forms. Results are available approximately 24 hours after the laboratory has set up the sample.

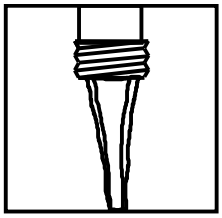
- Select a faucet or hose bib that is furthest from the point where chlorine was added to the line for disinfection.
- Remove any attachment from the faucet, including aerators, screens, washers, hose, and water filters. Once all attachments are removed, dry off the inside of the tap with paper towels.
- Disinfect the tap using a lighter, matches or bleach.
- Ensure a steady stream of <u>cold water only</u> has been running for at least five minutes. Before collecting the sample, turn the water down to a thin stream (about the width of a pencil) and let the water run one minute.
- With a black permanent marker fill out the sample bottle label with building name and tap location, room #, date and time.
- Remove the plastic seal on the cap.

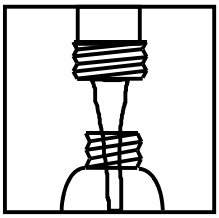
- To avoid contamination while taking the sample, hold the bottle near the bottom with one hand, hold the top of the cap with the other and then unscrew the cap. Do not: invert the cap, set the cap down, or touch any part of the cap that touches the bottle, or let anything touch the rim or inside of the cap. Do not touch the rim or inside of the bottle.
- There may be some liquid or powder in the sample bottle to neutralize the chlorine in the sample. Do not rinse it out.
- Hold the bottle under the constant stream of water, being careful not to touch the tap with the bottle.

Bacteriological Sampling Procedures (cont.):


Remove Attachments


Run 5 Minutes


Reduce Flow 1 Minute


Fill Bottle to Line

- Fill the bottle to the neck or indicated fill line, but do not dump any water out or allow the bottle to overflow.
- Remove the bottle from the water flow and replace the cap.
- Turn off the water and replace any attachments.
- If you feel the sample may have been contaminated, resample with a new bottle.
- If the sample(s) will not be delivered to the lab for more than three hours, store sample bottle(s) in a refrigerator or in a cooler with blue ice.

During normal business hours Monday through Thursday, samples with the completed forms must be delivered to:

Anatek Labs
1282 Alturas Drive
Moscow, ID 83483
Phone: 800-943-2839

In Moscow turn right on S Jackson St. (US 95 S or ID 8E)
Turn right onto Alturas Pkwy.
Turn left on Alturas Dr.
Anatek Labs is on the left.

On Friday, or after hours and weekends, samples and forms must be delivered to:

Whitman Hospital and Medical Center
1200 W Almota Rd.
Colfax, WA 99111
Phone: 509-397-3435

Emergency Procedures:

Departments must follow their emergency response plans and procedures.

Reporting, Public Notification and Recordkeeping

EH&S, Facilities Operations, Housing and Dining Services, Capital Planning and Development and RCRU must be responsible for all regulatory reporting and recordkeeping (excluding cross-connection control), and public notification in cases of water quality violations with assistance from the Water Distribution Manager. Facilities Operations, EH&S and RCRU is responsible for all cross-connection control recordkeeping.

Sanitary Surveys, Vulnerability Assessments, Emergency Response Plans and Wellhead Protection

Sanitary Surveys

A Qualified Sanitary Surveyor is required to perform Group A water system surveys, and EH&S and RCRU must be responsible for coordinating the surveys. Surveys are required every five (5) years.

Vulnerability Assessments and Emergency Response Plans

EH&S, Facilities Operations, Housing and Dining Services, RCRU and Public Safety must be responsible for vulnerability assessments and emergency response plans for their respective systems and facilities.

Wellhead Protection and Sanitary Control Areas

Facilities Operations, RCRU and EH&S must be responsible for maintaining wellhead protection and sanitary control areas around wellheads for Group A water systems responsible for maintaining wellhead. Group B water systems are not required to have a wellhead protection program, but are required to maintain sanitary control areas (100 foot radius) around wellheads. Facilities Operations and RCRU must ensure the wellhead protection program, when necessary, is incorporated into Water System Plans every six (6) years. EH&S and RCRU must ensure that the contaminant inventory list required for wellhead protection be updated every two (2) years with appropriate notification to regulatory and owner agencies.

Operating Permits and Water Works Operator Certification

All Group A water systems are required to have operating permits. In addition, the Pullman campus water system is required to have at least one certified Water Distribution Manager 3 (or 4) in responsible charge of the daily operational activities of the system. Smaller Group A water systems are required to have at least one certified Water Distribution Specialist.

Water Use Efficiency Rule and Water Conservation

In accordance with WAC 246-290, WSU must meet all Water Use Efficiency Rule requirements. These requirements, which include water conservation goals, are in WSU's most current Water System Plan.

Two representatives from WSU must serve on the Palouse Basin Aquifer Committee to promote water conservation at WSU facilities in Whitman County. For all other WSU water systems and facilities, the RCRU must promote water conservation at those locations.

APPENDIX G

Item 5 - Backflow Assembly Testing 2014 Annual Summary Report

Washington State Department of Health

Office of Drinking Water

Cross-Connection Control Program Summary Report For 2014

Describe the characteristics of the PWS's CCC Program at the end of 2014. Complete this form only if PWS had written CCC program plan, policies or procedures at end of 2014.

Part 1: Public Water System (PWS) Identification

PWS ID: 93200	PWS Name: WASHINGTON STATE UNIVERSITY	County: WHITMAN

Part 2: Cross-Connection Control (CCC) Program Characteristics

A. Type of Program Currently Implemented

Type of Program	Check One
Premises isolation only.	☐
Combination program: reliance on both premises isolation and in-premises protection.	☑
In transition from a combination program to a premises isolation only program.	☐

B. Coordination with Authority Having Jurisdiction (AHJ) on Cross-Connection Issues

Indicate the status of coordination with AHJs in your service area. The AHJ is the entity that enforces the Uniform Plumbing Code.
Check one box in each of last 3 columns for each AHJ in your service area.

AHJ No.	Name of AHJ (e.g., the City or County Building Department)	PWS Currently:		AHJ Declined to Coordinate
		Coordinates with AHJ	Has Written Agreement with AHJ	
1	WSU WATER BOARD	Y ☐ N ☑	Y ☐ N ☑	Y ☐ N ☑
2		Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
3		Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
4		Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐
5		Y ☐ N ☐	Y ☐ N ☐	Y ☐ N ☐

[1] If more than 5 AHJs, attach separate sheet giving the above information.

C. Corrective or Enforcement Actions Available to the Purveyor

Type of Corrective Action	Indicate Whether Available	Most Often Used (Check One)
Denial or discontinuance of water service.	Y ☑ N ☐	☐
Purveyor installs backflow preventer and bills customer.	Y ☑ N ☐	☐
Assessment of fines (in addition to elimination or control of cross-connection).	Y ☑ N ☐	☐
Other corrective actions (describe): PWS INSTALLS BACKFLOW ASSEMBLIES	Y ☑ N ☐	☑

D. CCC Program Responsibilities

Do not include enforcement action related procedures or circumstances.

CCC Program Activity	Responsible Party (Check one per row)	
	Customer	Purveyor
Hazard Evaluation by DOH-certified CCS	☐	☑
Backflow preventer (BP) ownership	☐	☑
BP installation	☐	☑
BP ***initial*** inspection (for proper installation - all BPs)	☐	☑
BP ***initial*** test (for testable assemblies)	☐	☑
BP ***annual*** inspection (Air Gaps and AVBs)	☐	☑
BP ***annual*** test (for testable assemblies)	☐	☑
BP maintenance and repair	☐	☑

E. Backflow Protection for Fire Protection Systems

Please remember to enter number of days allowed if you require retrofitting.

PWS coordinates with ***AHJ*** on CCC issues for fire protection systems(FPS).	Y ☑ N ☐ N/A ☐
PWS coordinates with ***local Fire Marshal*** on CCC issues for FPS.	Y ☑ N ☐ N/A ☐
PWS ensures backflow prevention is installed before serving ***new*** connections with FPS.	Y ☑ N ☐
PWS requires retrofits to ***high***-hazard FPS.	Y ☑ No. of days allowed: 90 N ☐ N/A ☐
PWS requires retrofits to ***low***-hazard FPS.	Y ☑ No. of days allowed: 180 N ☐ N/A ☐

F. Backflow Protection for Irrigation Systems

Minimum level of backflow prevention required on irrigation systems ***without*** chemical addition.	Not Addressed ☐ AVB ☐ PV/SVBA ☐ DCVA ☑ RPBA ☐
PWS currently inspects AVBs upon ***initial*** installation.	Y ☐ N ☐ N/A ☑
PWS currently inspects AVBs upon repair, reinstallation or relocation.	Y ☐ N ☐ N/A ☑

G. Used Water

PWS prohibits, by ordinance, rules, policy or agreement, the intentional return of used water (e.g. for heating or cooling) into the distribution system.	Y ☑ N ☐
If not prohibited at present, date plan to prohibit use.	N/A ☑
Current number of service connections returning used water to distribution system.	0

H. Backflow Protection for Auxiliary Water Supplies[1] NOT Interconnected with PWS

Indicate the minimum backflow preventer and type of protection required for service connections having unapproved auxiliary water supplies when they are NOT interconnected to the PWS. Check one box per row.

Existing service connections.	None ☑ DCVA ☐ RPBA ☐ AG ☐
Type of protection required.	None ☑ In-premises protection ☐ Premises isolation ☐
New service connections.	None ☑ DCVA ☐ RPBA ☐ AG ☐
Type of protection required.	None ☑ In-premises protection ☐ Premises isolation ☐

[1] An auxiliary water supply is any water supply on or available to customer's premises in addition to the purveyor's potable water supply.

I. Backflow Protection for Tanker Trucks and Temporary Water Connections

Minimum level of backflow protection (installed on or associated with the truck) required for tanker trucks taking water from PWS.	AG ☐ DCVA ☐ RPBA ☑ Not Specified ☐ Tanker trucks not allowed ☐
PWS requires tanker trucks to obtain water at designated filling sites each equipped with permanently installed backflow preventer(s).	Y ☑ (Min. protection: DCVA ☐ RPBA ☑) N ☐ N/A ☐ No sites provided ☐
PWS currently accepts tanker trucks approved by other PWSs without further inspection or testing.	Y ☐ N ☑ N/A ☐
Minimum level of backflow protection required for temporary water connections (e.g. for construction sites).	AG ☐ DCVA ☐ RPBA ☑ Not specified ☐ Temp. connections not allowed ☐
PWS requires testing each time the temporary connection backflow preventer is relocated.	Y ☑ N ☐ N/A ☐ (Temp. connections not allowed)
PWS provides approved backflow preventer for temporary connections.	Y ☑ N ☐ N/A ☐ (Temp. connections not allowed)

J. Backflow Protection for Non-Residential Connections

For each category shown, indicate whether PWS has non-residential connections of that type and the **minimum** level of ***premises isolation*** backflow protection required (whether or not PWS currently has that type of customer).

Type of Connection	PWS has Customers of this Type	Minimum Premises Isolation Backflow Protection Required
Commercial	Y ☑ N ☐	Not Required ☐ DCVA ☑ RPBA ☐
Industrial	Y ☑ N ☐	Not Required ☐ DCVA ☑ RPBA ☐
Institutional	Y ☑ N ☐	Not Required ☐ DCVA ☑ RPBA ☐

K. Backflow Protection for Wholesale Customers

Indicate whether the PWS requires backflow protection at interties with wholesale customers (other PWSs).

Type of Intertie	PWS has (plans to have) Customers of this Type	Backflow Protection Required
Existing	Y ☑ N ☐	Not specified / Not required ☐ Always required ☑ Required only if purchaser's CCC program is inadequate ☐ Minimum required (if applicable): DCVA ☑ RPBA ☐
New	Y ☐ N ☑	Not specified / Not required ☐ Always Required ☐ Required only if purchaser's CCC program is inadequate ☐ Minimum required (if applicable): DCVA ☐ RPBA ☐

L. Exceptions to Mandatory Premises Isolation

PWS's written CCC Program Plan *allows* system to grant Exceptions to mandatory premises isolation per WAC 246-290-490(4)(b(iii).	Y ☐ N ☐ Doesn't Address ☑
PWS currently grants new Exceptions.	Y ☐ N ☑
PWS granted Exceptions in previous reporting years.	Y ☐ N ☑

Part 3: CCC Program Record-Keeping and Inventory

Indicate the type or name of computer software used by the PWS to track CCC records.

Cross-Track (BMI) ☐ BPMS ☑ XC2 (Engsoft) ☐ Tokay ☐ Other commercial CCC software (specify) ☐

Custom developed for or by PWS[1] ☐ Other non-CCC software (e.g. Excel) ☐ None Used ☐

[1] Do not include commercial CCC software customized for PWS. If PWS uses customized commercial software, check the box for the appropriate commercial software name.

Part 4: Comments and Clarifications

Enter comments or clarifications to any of the information provided in this report.

Part No.	Date Added	Comment
Pt 2K	2/16/11	WSU has interties with the city of PULLMAN for use in emergencies only. The connections are not metered. Personnel from both entities must be on site to use.

Part 5: CCC Program Summary Completion Information

I certify that the information provided in this CCC Program Summary is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Tim Leachman		Title: CCS
Signature:		Date: 06/23/2015
Phone: (509) 335-9345	E-mail*: trleachman@wsu.edu	
I certify that the information provided in this report accurately represents the status and description of this water system's CCC Program.		
PWS Mgr/Owner Name[2]: Greg Streva		Title: Utilities Supervisor
Signature:	Op. Cert. No.: 012610	Date: 06/23/2015

*Required Field. For security reasons, an e-mail address must be provided. DOH will e-mail you to confirm any changes made to your data

[1] The CCC Program Manager is generally the CCS responsible for developing and implementing the PWS's CCC program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility and/or oversight of the CCC program. This person doesn't need to be in charge of the entire water system.

Washington State Department of Health

Office of Drinking Water

Severe Health Hazard Facility for 2014 Annual Summary Report

PWS ID: 93200	PWS Name: WASHINGTON STATE UNIVERSITY	County: WHITMAN

Part 1: Backflow Protection Status

Describe the backflow protection status at the end of 2014 for each *wastewater treatment plant and nuclear facility* your system serves.

Facility Index # 1 / Facility Name, Physical Address, and NPDES Permit Number	Status of Backflow Protection at End of 2014 (check one box per row)							
	Premises Isolation RP *and* In-plant Air Gap(s)	Premises Isolation RP but *No* In-Plant Air Gap(s)	Premises Isolation Air Gap	Fixture Protection Only	No Protection At All	Unknown	Exception Granted	Other (explain in Comment Section)
Name Dodgen Nuclear Reactor **Address** Roundtop Drive **City** Pullman **Zip** 99164 **NPDES Permit#**	◉	○	○	○	○	○	○	○
Facility Type	**Nuclear Reactor**							
Comment	**DODGEN NUCLEAR REACTOR CENTER**							

Part 2: Report Completion Information

I certify that the information provided in this CCC Activities Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Tim Leachman		Title: CCS
Signature:		Date: 06/23/2015
Phone: (509) 359-9345	E-mail: trleachman@wsu.edu	
I have reviewed this report and certify that the information provided is complete and accurate to the best of my knowledge.		
PWS Mgr./Owner Name[2]: Greg Streva		Title: Utilities Supervisor
Signature:	Op. Cert. No.: 012610	Date: 06/23/2015

[1] CCC Program Manager is generally the CCS who is responsible for development and implementation of the PWS's CCC Program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility and/or oversight of the CCC program.

Washington State Department of Health

Office of Drinking Water

Public Water System Cross-Connection Control Activities Annual Summary Report for Year 2014

Part 1: Public Water System (PWS) and Cross-Connection Control Specialist (CCS) Information

PWS ID: 93200	PWS Name: WASHINGTON STATE UNIVERSITY	County: WHITMAN
Provide name and Cert No. of CCS who develops and implements your CCC program		
CCS Name (last, first & mi): Leachman, Tim		CCS Phone: (509) 335-9345
CCS Cert No.: 01214	BAT Cert. No. (if applicable):	
CCS is (check one):	PWS owner or employee ☑	On contract to PWS ☐ Volunteer or other ☐

Part 2: Status of Cross-Connection Control (CCC) Program at end of 2014

PWS has(check one box in each column below):	
A written CCC program plan Y ☑ N ☐	CCC implementation activities Y ☑ N ☐

(Written program may be a separate document, or part of water system plan or small water system management program).

Provide information regarding PWS's specific CCC Program Elements

Program Element Number	Description of Element [See WAC 246-290-490(3)]	This Program Element is Currently:	
		Included in Written Program	Being Implemented or Is Completed
1	Legal Authority Established	Y ☑ N ☐	Y ☑ N ☐
2	Hazard Evaluation Procedures and Schedules	Y ☑ N ☐	Y ☑ N ☐
3	CCC Procedures and Schedules	Y ☑ N ☐	Y ☑ N ☐
4	Certified CCS Provided	Y ☑ N ☐	Y ☑ N ☐
5	Backflow Preventer Inspection and Testing	Y ☑ N ☐	Y ☑ N ☐
6	Testing Quality Control Assurance Program	Y ☑ N ☐	Y ☑ N ☐
7	Backflow Incident Response Procedures	Y ☐ N ☑	Y ☑ N ☐
8	Public Education Program	Y ☑ N ☐	Y ☑ N ☐
9	CCC Records	Y ☑ N ☐	Y ☑ N ☐
10	Reclaimed Water Permit	Y ☐ N ☐ N/A ☑	Y ☐ N ☐ N/A ☑

Part 3A: System Characteristics at End of 2014

Indicate the number of connections of each type that the PWS serves (whether or not they are protected by backflow preventers). **Estimate if necessary.**

Type of Service Connection	Number
Residential (As defined by PWS)	4254
All Other (Include dedicated fire sprinkler and irrigation lines and PWS-owned facilities such as water and wastewater treatment plants and pumping stations, parks, piers and docks.)	252
Total Number of Connections	4506

Part 3B: Cross-Connection Control for High-Hazard Premises or Systems Served by the PWS

If PWS does not serve any high-hazard premises or systems, check here ☐ and go to Part 4A.

- Complete all cells. Enter zero (0) in cells if PWS does not serve such premises.
- Estimate number of connections served if necessary (OK to use phone book).
- Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections at end of 12/31/2014			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP	C. With Column B AG Inspected or RP Tested [2]	D. Granted Exception from Mandatory Premises Isolation
Agricultural (farms and dairies)	9	9	9	0
Beverage bottling plants (including breweries)	0	0	0	0
Car washes	1	1	1	0
Chemical plants	3	3	3	0
Commercial laundries and dry cleaners	0	0	0	0
Both reclaimed water and potable water provided	0	0	0	0
Film processing facilities	1	1	1	0
Dedicated fire protection systems with chemical addition or using unapproved auxiliary supplies	0	0	0	0
Food processing plants (including canneries, slaughter houses, rendering plants)	4	4	4	0
Hospitals, medical centers, nursing homes, veterinary, medical and dental clinics, and blood plasma centers	9	6	6	0
Separate irrigation systems using purveyor's water supply and chemical addition[4]	0	0	0	0
Laboratories	76	38	38	0
Metal plating industries	0	0	0	0
Petroleum processing or storage plants	1	1	1	0
Piers and docks	0	0	0	0
Radioactive material processing plants or nuclear reactors	1	1	1	0
Survey access denied or restricted	0	0	0	0
Wastewater lift/pump stations (non-residential only)	0	0	0	0
Wastewater treatment plants	0	0	0	0
Unapproved auxiliary water supply interconnected with potable water supply	0	0	0	0
air port	1	1	1	0
feed mill	1	1	1	0
Totals	107	66	66	0

[1]Count multiple connections or parallel installations as ***separate*** connections.

[2]Count only those connections with AG or RPBA installed for premises isolation. Don't include connections with in-premises protection only, or connections with DCVA/DCDAs installed for premises isolation.

[3]Count only those connections whose premises isolation preventers were inspected (AG) or tested (RPBA) during 2014.

[4]For example, dedicated lines to irrigation systems in parks, playgrounds, golf courses, cemeteries, estates, etc.

[5]Premises with hazardous materials or processes (requiring isolation by AG or RPBA) such as: aircraft and automotive manufacturers, pulp and paper mills, metal manufacturers, military bases, and wholesale customers that pose a high hazard to the PWS. May be grouped together in categories, e.g.: other manufacturing or other commercial. If needed, attach additional sheet giving same information as requested in table.

Part 3C: Cross-Connection Control for Medical Category High-Hazard Premises Served by the PWS

If PWS does not serve any medical type premises, check here ☐ and go to Part 4A.

- Complete all cells. Enter zero (0) in cells if PWS does not serve such premises.
- Estimate number of connections served if necessary (OK to use phone book).
- Hazard evaluations do not need to be done to complete this table.

Type of High-Hazard Premises or Systems [WAC 246-290-490(4)(b)]	Number of Connections at end of 12/31/2014			
	A. Being Served Water by PWS[1]	B. With Premises Isolation by AG/RP	C. With Column B AG Inspected or RP Tested[2]	D. Granted Exception from Mandatory Premises Isolation
Hospitals				
Hospitals (include psychiatric hospitals and alcohol and drug treatment centers)	1	1	1	0
Facilities for Treatment and Care of Patients Not Located in Hospitals Counted Above				
Same day surgery centers	0	0	0	0
Out-patient clinics and offices	1	1	1	0
Alternative health out-patient clinics and offices	0	0	0	0
Psychiatric out-patient clinics and offices	0	0	0	0
Chiropractors	0	0	0	0
Hospice care centers	0	0	0	0
Childbirth centers	0	0	0	0
Kidney dialysis centers	0	0	0	0
Blood centers	0	0	0	0
Dental clinics and offices	0	0	0	0
Facilities for Housing Patients				
Nursing homes	0	0	0	0
Boarding homes	0	0	0	0
Residential treatment centers	0	0	0	0
Other Medical-Related Facilities				
Mortuaries	0	0	0	0
Morgues and autopsy facilities (not in hospitals)	1	1	1	0
Veterinarian offices, clinics and hospitals	6	3	3	0
All other (describe in Part 6: Comments on page 6)	0	0	0	0
Totals	9	6	6	0

[1]Count multiple connections or parallel installations as ***separate*** connections.

[2]Count only those connections with AG or RPBA installed for premises isolation. Don't include connections with in-premises protection only, or connections with DCVA/DCDAs installed for premises isolation.

[3]Count only those connections whose premises isolation preventers were inspected (AG) or tested (RPBA) during 2014.

Part 4A: Backflow Preventer Inventory and Testing Data During Year 2014

- Complete all cells. Enter zero (0) if there are no backflow preventers in that category.
- Count only the backflow preventers that the PWS relies upon for protection of the distribution system. If your records do not distinguish between premises isolation and in-premises protection preventers, enter all data in Premises Isolation section and check the box.
- Count AVBs on irrigation systems only. **If you do not track AVBs, enter "UNK".**
- Count multiple tests or failures for any particular backflow preventer as one test or failure for that backflow preventer.
- Multiple Service or Parallel Connections: Count each assembly separately.
- Assemblies on Dedicated Fire or Irrigation Lines: Count as Premises Isolation Assemblies.

If PWS does not track AVBs Check here: ☐

	Backflow Preventer Category and Testing/Inspection Information	Air Gap	RPBA	RPDA	DCVA	DCDA	PVBA	SVBA	AVB
Premises Isolation, including preventers isolating PWS-owned facilities. ***If In-Premises Protection preventers are also included, check here.*** ☐									
Rows 1-3 pertain ONLY to Premises Isolation preventers in service at beginning of 2014									
1	In service on 1/1/2014	0	133	2	128	6	0	0	0
2	Inspected and/or Tested in 2014[1]	0	133	2	128	6	0	0	0
3	Failed Inspection or Test in 2014	0	9	0	5	0	0	0	0
Rows 4 - 6 pertain ONLY to NEW Premises Isolation preventers installed during 2014									
4	New preventers installed in 2014[2]	0	25	0	8	0	0	0	0
5	Inspected and/or Tested in 2014[1]	0	25	0	8	0	0	0	0
6	Failed inspection or test in 2014[3]	0	0	0	0	0	0	0	0
7	Preventers taken out of service in 2014[3]	0	0	0	0	0	0	0	0
Premises Isolation Total at end of 2014[4]		0	158	2	136	6	0	0	0
In-Premises Protection (Fixture Protection or Area Isolation), including preventers within PWS-owned facilities.									
Rows 8 - 10 pertain ONLY to In-Premises Protection Preventers in service at beginning of 2014									
8	In service on 1/1/2014	25	511	1	128	0	53	7	0
9	Inspected and/or Tested in 2014[1]	25	511	1	128	0	53	0	0
10	Failed Inspection or Test in 2014	0	24	0	3	0	0	0	0
Rows 11 - 13 pertain ONLY to NEW In-Premises Protection Preventers installed during 2014									
11	New preventers installed in 2014[2]	0	57	0	33	0	4	0	0
12	Inspected and/or Tested in 2014[1]	0	57	0	33	0	4	0	0
13	Failed inspection or test in 2014	0	0	0	0	0	0	0	0
14	Preventers taken out of service in 2014[3]	0	0	0	0	0	0	0	0
In-Premises Protection Total at end of 2014[4]		25	568	1	161	0	57	7	0
Grand Total at end of 2014		25	726	3	297	6	57	7	0

[1]Initial and/or routine annual inspection (for proper installation and approval status) and/or test (for testable assemblies only using DOH/USC test procedures).Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at beginning of 2014. Replacement preventers may be of a different type than the original.

[2]Includes preventers installed on connections where backflow prevention was not previously required and any preventers that replaced those in service at the beginning of 2014. Replacement preventers may be of a different type than the original.

[3]New or existing preventers taken out of service, whether or not they were replaced by the same type or different type of preventer.

[4]Total at end of 2014 should be equal to the number of preventers in service at beginning of 2014 plus those installed during 2014 minus the number of preventers taken out of service during 2014.

Part 4B: Other Implementation Activities in 2014

Complete all cells. Enter zero (0) if not applicable.

Activity or Condition	Number
New service connections evaluated for cross-connection hazards to PWS in 2014.	0
New service connections requiring backflow protection to protect PWS.[1]	0
Existing service connections evaluated for cross-connection hazards to PWS in 2014.	20
Existing service connections requiring backflow protection to protect PWS.[1,2]	5
Exceptions granted to high-hazard premises per WAC 246-290-490(4)(b) in 2014.[3]	0
CCC enforcement actions taken by PWS during 2014.[4]	0

[1]Include services where either premises isolation or in-premises preventers were required to protect the PWS.

[2]Include existing services that need new, additional or higher level backflow prevention.

[3]A DOH Exceptions to Hazard Premises Form *must* be attached for each exception granted during the year.

[4]"Enforcement actions" mean actions taken by the PWS (such as water shut-off, PWS installation of backflow preventer) when the customer fails to comply with PWS's CCC requirements.

Part 5: Backflow Incidents and "Off-Normal" Events in 2014

	Backflow Incidents, Risk Factors and Indicators during 2014	Number (Enter 0 if none)	Check if Data Not Available
Backflow Incidents during 2014			
1	Backflow incidents that contaminated the PWS[5].	0	☐
2	Backflow incidents that contaminated the customer's drinking water system ***only***[5].	0	☐
Risk Factors for Backflow during 2014			
3	Distribution main breaks per 100 miles of pipe.	2.00	☐
4	Low pressure events (<20 psi in PWS distribution system).	0	☐
5	Water outage events.	0	☐
Indicators of Possible Backflow during 2014			
6	Total health-related complaints received by PWS.[6]	0	☐
7	Received during BWA or PN events.[7]	0	☐
8	Received during low pressure or water outage events.	0	☐
9	Total aesthetic complaints (color, taste, odor, air in lines, etc.).	2	☐
10	Received during BWA or PN events.[7]	0	☐
11	Number of these complaints received during low pressure or water outages events.	0	☐

[5]Complete and submit a Backflow Incident Report form for each known backflow incident.

[6]Such as stomach ache, headache, vomiting, diarrhea, skin rashes, etc.

[7]"**BWA**" means ***Boil Water Advisory*** and "**PN**" means ***Public Notification*** for water quality reasons.

Part 6: Comments and Clarifications

Enter comments or clarifications to any of the information included in this report. Note for on-screen completion: Comments will not "word wrap" from one line to the next. Press to continue on new line. Maximum length of each comment is 255 characters, including spaces.

Part No.	Date Added	Comment
Gener	6/4/12	WSU is the process of implementing fines for illicit water connections WSU is replacing backfows on carbonated soda machines with stainless steel assemblies
Gener	6/26/14	myself and the new bats have learned a lot about accountability , and the importance of educating the campus community on back flow prevention

Part 7: Report Completion Information

I certify that the information provided in this CCC Activities Report is complete and accurate to the best of my knowledge.		
CCC Program Mgr. Name[1]: Tim Leachman		Title: CCS
Signature:		Date: 06/23/2015
Phone: (509) 335-9345	E-mail: trleachman@wsu.edu	
I have reviewed this report and certify that the information provided is complete and accurate to the best of my knowledge.		
PWS Mgr./Owner Name[2]: Greg Streva		Title: Utilities Supervisor
Signature:	Op. Cert. No.: 012610	Date: 06/23/2015

[1] CCC Program Manager is generally the CCS who is responsible for development and implementation of the PWS's CCC Program.

[2] The person that the CCC Program Manager reports to or other manager having direct responsibility and/or oversight of the CCC program.

APPENDIX G

Item 6 - Cross Connection Hazard Locations List

FF #	Priority	Status	Location	Description	Group	Fund Cycle	1517 MCS Share	Other Share	Total	Running Balance	Proj Mgr
	1		0082 Heald Hall	Install In-Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	25,000	
	2	DEFERRED	0358A RECEIVING & DELIVERY	Install Premises Isolation	CrossConnection	1517 MCS	30,000	0	30,000	55,000	
	3		0817 IBC PLANT GROWTH FACILITY	Replumb for cross connections	CrossConnection	1517 MCS	50,000	0	50,000	105,000	
	4		0815 FOOD QUALITY BLDG	Install In-Premises Isolation	CrossConnection	1517 MCS	30,000	0	30,000	135,000	
	5		0816 FOOD SCIENCE/HUMAN NUTRITION	Install In-Premises Isolation	CrossConnection	1517 MCS	30,000	0	30,000	165,000	
	6		0005 COMMONS	Install Premises Isolation	CrossConnection	1517 MCS	30,000	0	30,000	195,000	
	7		0033 MURROW ADDITION & WEST	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	220,000	
	8		0111 ENTOMOLOGY GREENHOUSES	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	245,000	

	9		0171A MOOBERRY TRACK SERVICES BLDG	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	270,000	
	10		0197 USDA ENDO DISEASE FARM - AREA	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	295,000	
	11		0412 SMOOT HILL COMPLEX	Install Premises Isolation	CrossConnection	1517 MCS	30,000	0	30,000	325,000	
	12		0012 SMITH GYMNASIUM	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	350,000	
	13		0371 AGR ENGR RESEARCH LAB BLDG - USDA	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	375,000	
	14		0086 CLEVELAND	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	400,000	
	15		0803 DAGGY HALL - ACADEMIC	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	425,000	
	16		0089 FOOD SERVICE BUILDING	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	450,000	

	17		0094 JOHNSON TOWER - WEST	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	475,000	
	18		0096 PHYSICAL EDUCATION BUILDING	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	500,000	
	19		0092 FRENCH ADMINISTRATION	Install Premises Isolation	CrossConnection	1517 MCS	25,000	0	25,000	525,000	
	20		0100 ANIMAL SCIENCE LAB BUILDING	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	550,000	
	21		0372 BAILEY FIELD	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	575,000	
	23		0078 SLOAN HALL	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	24		0045 WEGNER	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	25		0818 VETERINARY TEACHING HOSPITAL	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	27		(1) 0358E Anthropology Storage Bldg; (2) 0808 Hulbert	Install Premise Isolation	CrossConnection	1517 MCS	30,000	0	30,000	#REF!	

	28		(1) 0138 Lewis Alumni Center; (2) 0092 Lighty	Install Premise Isolation	CrossConnection	1517 MCS	30,000	0	30,000	#REF!	
	29		(1) 0032 Science; (2) 0840 Grimes Way Steam Plant	Install In-Premise Isolation	CrossConnection	1517 MCS	30,000	0	30,000	#REF!	
	30		(1) 0404 Bryan; (2) 0111A Entomology Greenhouse Storage	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	31		(1) 0110 Fertilizer Storage; (2) 0054 LJSmith; (3) 0055 Todd; (4) 0801 Webster; (5) 0097 Fine Arts	Install Premise Isolation	CrossConnection	1517 MCS	50,000	0	50,000	#REF!	

	32		(1) 0020 Carpenter; (2) 0009 Hollingbery Field House; (3) 0812 Info Tech	Install Premise Isolation	CrossConnection	1517 MCS	30,000	0	30,000	#REF!	
	33		(1) 0040 Wilson Hall; (2) 0814 Exp Animal Lab Bldg; (3) 0094 Johnson Tower; (4) 0811 LARC	Install Premise Isolation	CrossConnection	1517 MCS	50,000	0	50,000	#REF!	
	34		(1) 0817A IBC Greenhouse; 0118 Instructional Greenhouse; (3) 0098 Meats Lab; (4) 0122 Plant Growth Center; (5) - 109B USDA Plant Intro Headhouse B	Install In-Premise Isolation	CrossConnection	1517 MCS	50,000	0	50,000	#REF!	

	35		(1) 0182 Wildlife Biology Holding; (2) 0809 Avery; (3) 0035 Stimson	Install In-Premise Isolation	CrossConnection	1517 MCS	30,000	0	30,000	#REF!	
	36		(1) 0115 Agronomy Seed; (2) 0194C Entomology Res Lab; (3) 0113 Hort Greenhouses A, B, C; (4) 0143C Isolation Bldg; (5) 0114 Plant Sci Greenhouse	Install Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	37		(1) 0150 Ensminger Pavilion; (2) 0144 Cattle Feeding Lab; (3) 0145 Cattle Feeding Lab Annex; (4) 0004 College Hall	Install Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	

	38		(1) 0404 Ensminger Beef Cattle Center; (2) 0090 EHS bldg; (3) 0003C Fulmer Syn; (4) 0047 NeuroScience Bldg; (5) 0180 Steffen Center	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	
	39		(1) 0166 Vet Maintenance; (2) 0140 Vet Res Large Animal; (3) 0068 Vet Storage Bldg; (4) 0362 Feed Prep;	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	

	40		(1) 0166 Vet Maintenance; (2) 0140 Vet Res Large Animal; (3) 0068 Vet Storage Bldg; (4) 0362 Feed Prep;	Install In-Premise Isolation	CrossConnection	1517 MCS	25,000	0	25,000	#REF!	

APPENDIX G

Item 7 - Backflow Assembly List

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
Time: *11:14 AM*

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name:
Facility Address: 702, PULLMAN

Facility Type: LAWN IRRIGATION
Hazard Level: Low
Facility ID: 305
Account No: 305
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	A022640	01-Jul-2008	Irrigation w/o Chemicals	NE LAWN PIT CLEVELAND	
Febco, 805Y, 2", DCVA		01-Jul-2008	Irrigation w/o Chemicals	NORTH FLAG LANE ISLAND FIRE PIT	
Febco, 805Y, 2", DCVA	AM5864	01-Jul-2008	Irrigation w/o Chemicals	PIT SOUTH OF REGENTS IN PARKING LOT BY HYDRANT	
Febco, 805Y, 2", DCVA	W5006	01-Jul-2005	Irrigation w/o Chemicals	LAWN BETWEEN A AND B PIT REGENTS	
Febco, 805Y, 2", DCVA	X3198	01-Jul-2005	Irrigation w/o Chemicals	NW LAWN PIT NE OF HYDRANT RENGENTS 65A	
Febco, 805Y, 2", DCVA	V1847	01-Jul-2006	Irrigation w/o Chemicals	SW PIT SE OF HYDRANT REGENTS A	
Febco, 850, 2", DCVA	H09603	01-Jul-2008	Irrigation w/o Chemicals	N LAWN WEST OF LOADING DOCK	
Rainbird, DCA200, 2", DCVA	80678	01-Jul-2008	Irrigation w/o Chemicals	S PIT LAWN AVERY	
Rainbird, DCA200, 2", DCVA	80427	01-Jul-2008	Irrigation w/o Chemicals	NORTH PIT THOMPSON	
Febco, 805Y, 2", DCVA	?	01-Jul-2008	Irrigation w/o Chemicals	BETWEEN WILMER DAVIS & DUNCON DUNN	
Hersey/Grinnell, FDC, 2", DCVA	83954	01-Jul-2008	Irrigation w/o Chemicals	NORTH PIT CLEVELAND	
Hersey/Grinnell, #2, 4", DCVA	82641	01-Jul-2008	Irrigation w/o Chemicals	WOMAN'S PLAY FIELD LAWN MECH ROOM BLDG 12 SMITH	
Febco, 805Y, 2", DCVA		01-Jul-2008	Irrigation w/o Chemicals	E LAWN BETWEEN SIDEWALK AND FENCE PRES. RES. 031	
Febco, 850U, 1/2", DCVA	H00965	01-Jul-2008	Irrigation w/o Chemicals	NORTH SHRUBS FINE ARTS	
Rainbird, DCA, 2", DCVA	68908	01-Jul-2008	Irrigation w/o Chemicals	EAST PIT LAWN BLDG. C REGENTS	
Febco, 805Y, 2", DCVA	167479	01-Jul-2008	Irrigation w/o Chemicals	NW CORNER NEXT TO STREET SMITH CENTER 95	
Febco, 805Y, 2", DCVA	A6524	01-Jul-2005	Irrigation w/o Chemicals	NW SECTION BY TRANE A/C UNIT COUGAR DEPOT	
Febco, 805Y, 2", DCVA	A5719	01-Jul-2008	Irrigation w/o Chemicals	S LAWN PIT FINE ARTS	
Toro, BDC, 4", DCVA	12492	01-Jul-2006	Irrigation w/o Chemicals	LAWN E SIDE OF TRACK BLDG 171	
Febco, 805, 2 1/2", DCVA	5787	01-Jul-2008	Irrigation w/o Chemicals	NORTH PIT CARPENTER FIELD BEHIND MORRILL	
Febco, 850, 2", DCVA	A07522	01-Jun-2008	Irrigation w/o Chemicals	SE CORNER OF WHITE HALL LAWN	
Rainbird, DCA200, 2", DCVA	80348	01-Jul-2008	Irrigation w/o Chemicals	SOUTH LAWN NEIL	
Rainbird, DCA200, 2", DCVA	80428	01-Jul-2008	Irrigation w/o Chemicals	NORTH LAWN SLOAN 078	
Febco, 805, 1", DCVA	19839	01-Jul-2008	Irrigation w/o Chemicals	MECH ROOM NEXT TO FIELD HOUSE REC. RENTAL	
Febco, 850, 1 1/2", DCVA	H01103	01-Jun-2008	Irrigation w/o Chemicals	SOUTH PARKING LOT ALONG STREET ACROSS FROM DAG	
Rainbird, 200, 2", DCVA		01-Jul-2007	Irrigation w/o Chemicals	NW PIT CARPENTER	
Febco, 805Y, 2", DCVA	T1466	01-Jul-2008	Irrigation w/o Chemicals	NE PIT LAWN REGENTS	
Febco, 805Y, 2", DCVA	A149117	01-Jul-2008	Irrigation w/o Chemicals	EAST LAWN FULMER SYN	
Rainbird, DCA200, 2", DCVA	80370	01-Jul-2008	Irrigation w/o Chemicals	WEST LAWN VIF	
Rainbird, DCA150, 2", DCVA	80031	01-Jul-2008	Irrigation w/o Chemicals	SW PIT IN LAWN COLLEGE	
Rainbird, 200, 2", DCVA	80716	01-Jul-2008	Irrigation w/o Chemicals	N PIT LAWN AVERY	
Rainbird, DCA200, 2", DCVA	80384	01-Jul-2008	Irrigation w/o Chemicals	SOUTH PIT BRYAN	
Febco, 805Y, 2", DCVA	BC0749	01-Jul-2008	Irrigation w/o Chemicals	NORTH OF SOUTH FIRE HYDRANT SPOKANE ST.PARKING L	
Hersey/Grinnell, FDC, 2", DCVA	83974	01-Jul-2008	Irrigation w/o Chemicals	W PIT LAWN HOLLAND LIBRARY	

Febco, 805Y, 2", DCVA	X3002	01-Jul-2008	Irrigation w/o Chemicals	PARKING SPRINKLERS MONROE ST.
Febco, 850, 2", DCVA	2H00305	01-Jul-2007	Irrigation w/o Chemicals	ACCESS ROAD WEST SIDE CENTER SLOAN&EEME
Hersey/Grinnell, FDC, 2", DCVA	83985	01-Jul-2008	Irrigation w/o Chemicals	NE LAWN PIT NORTH OF SIDEWALK CHILLER PLANT
Febco, 805Y, 2", DCVA		01-Jul-2006	Irrigation w/o Chemicals	SE DRIVEWAY SE CORNER 10' FROM SIDWALK PINE MANO
Febco, 805Y, 2", DCVA	A149056	01-Jul-2008	Irrigation w/o Chemicals	SE LAWN SHRUBS FULMER SYN
Febco, 805Y, 2", DCVA	A149700	01-Jul-2008	Irrigation w/o Chemicals	SW PIT LAWN McCROSKEY
Febco, 805Y, 2", DCVA	U9901	01-Jul-2008	Irrigation w/o Chemicals	SE PIT THOMPSON
Wilkins, 350, 3", DCVA	J15197	01-Jun-2008	Irrigation w/o Chemicals	S LAWN WEST LOADING DOCK
Wilkins, 950XL, 2", DCVA	873332	01-Jul-2008	Irrigation w/o Chemicals	SE CORNER PIT BOHLER
Rainbird, 200, 2", DCVA	779500	01-Jul-2008	Irrigation w/o Chemicals	SOUTH LAWN PARKING HOSPITAL
Febco, 805, 2 1/2", DCVA	B12515	01-Jul-2008	Irrigation w/o Chemicals	SOUTH OF SIDEWALK ABOVE SMITH GYM
Febco, 850, 3/4", DCVA	H00671	01-Jun-2008	Irrigation w/o Chemicals	WEST OF ARCH BEHIND PRES. RES.
Febco, 850UVB, 2", DCVA	H00933	01-Jul-2008	Irrigation w/o Chemicals	COMMONS MECH. RM. TUNNEL
Watts, 007M2QT, 1 1/2", DCVA	78189	01-Jul-2008	Irrigation w/o Chemicals	NE. SPRING AND COLLEGE, SKATE PARK

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name:
Facility Address: 703, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 309
Account No: 309
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 2", DCVA	84788	16-Jul-2004	Irrigation w/o Chemicals	ORTON PLAYFIELD SE	
Ames, 2000 SS, 4", DCVA	2AK1435	01-Aug-2007	Irrigation w/o Chemicals	PIT EAST OF DRIVEWAY OFF OLYMPIA AVE VET TEACHING	
Beeco, #2, 3", DCVA	89579	17-Jul-2005	Irrigation w/o Chemicals	SE PIT SW OF MAIN BLDG IN TREES STEPHEN 93C	
Febco, 850, 2", DCVA	H09477	01-Aug-2007	Irrigation w/o Chemicals	E LAWN NEED 2" OPERATING NUT WRENCH ORTEN HALL	
Hersey/Grinnell, FDC, 2", DCVA	84818	01-Aug-2007	Irrigation w/o Chemicals	GANNON N LAWN	
Febco, 805Y, 2", DCVA	A149709	01-Aug-2007	Irrigation w/o Chemicals	McCOY W LAWN	
Febco, 765, 1", PVBA	AD3427	15-Jul-2005	Irrigation w/o Chemicals	OUTSIDE HOSE BIBBS 3RD SUPPLY ROOM GRAD DORM	
Febco, 805Y, 2", DCVA	AB7533	01-Aug-2007	Irrigation w/o Chemicals	COLUMBIA LAUNDRY MECH ROOM	
Febco, 805Y, 2", DCVA	AB7527	01-Aug-2007	Irrigation w/o Chemicals	CHINOOK VILLAGE RECREATION BLDG. LAUNDRY	
Febco, 805Y, 2", DCVA	AB7698	01-Aug-2007	Irrigation w/o Chemicals	CHINOOK VILLAGE LOWER LAUNDRY	
Febco, 765, 2", PVBA		01-Aug-2005	Irrigation w/o Chemicals	3RD SUPPLY ROOM LAWN SPRINKLER GRAD DORM	
Hersey/Grinnell, FDC, 2", DCVA	81799	01-Aug-2006	Irrigation w/o Chemicals	ORTEN HALL NW LAWN	
Beeco, #2, 3", DCVA	89756	01-Aug-2007	Irrigation w/o Chemicals	SW PIT LOADING DOCK STEPHEN CENTER 93C	
Febco, 805Y, 2", DCVA	AM5981	01-Aug-2007	Irrigation w/o Chemicals	YAKIMA VILLAGE BETWEEN BLDG. G&H	
Rainbird, 200, 2", DCVA	779259	01-Aug-2007	Irrigation w/o Chemicals	McALLASTER SW PIT UNDER BRIDGEWALK	
Febco, 850, 2", DCVA	H08039	01-Aug-2005	Irrigation w/o Chemicals	PIT MAIN HALL WEST SIDE ISLAND STEPHEN CENTER 93C	
Hersey/Grinnell, FDC, 3/4", DCVA	88102	01-Aug-2007	Irrigation w/o Chemicals	OBSERVATION HILL PIT NEXT TO ROAD FEED HORSE PAS	
Hersey/Grinnell, FDC, 2", DCVA	84787	01-Aug-2007	Irrigation w/o Chemicals	ORTON PLAY FIELD NW	
Febco, 850, 3", DCVA	527	01-Aug-2007	Irrigation w/o Chemicals	ORTON PLAYFIELD PIT IN PLAYFIELD SW CORN	
Febco, 805Y, 2", DCVA		01-Aug-2006	Irrigation w/o Chemicals	CHILD CARE CENTER R.O. NW PIT	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
Time: *11:14 AM*

Wilkins, 950XL, 2", DCVA		01-Aug-2007	Irrigation w/o Chemicals	YAKIMA VILLAGE BETWEEN BLDG.P&N
Hersey/Grinnell, FDC, 2", DCVA	84832	01-Aug-2007	Irrigation w/o Chemicals	GOLDSWORTHY SW LAWN
Febco, 805Y, 1", DCVA	A014375	01-Aug-2007	LIVESTOCK WATER	VET TEACHING PIT OUTSIDE OF HORSE CORRALS ON OLY
Hersey/Grinnell, FDC, 2", DCVA	84834	01-Aug-2007	Irrigation w/o Chemicals	GOLDSWORTHY E LAWN BY BASKETBALL COURT
Hersey/Grinnell, FDC, 2", DCVA	84793	01-Aug-2007	Irrigation w/o Chemicals	DAY CARE CENTER R.O. DAY CARE AREA SE LAWN
Hersey/Grinnell, FDC, 2", DCVA	84825	01-Aug-2007	Irrigation w/o Chemicals	GANNON W LAWN
Hersey/Grinnell, FDC, 2", DCVA	85489	17-Jul-2006	Irrigation w/o Chemicals	ORTEN HALL N.W. OF SMALL LOADING DOCK
Febco, 825Y, 1", RPBA	217818	01-Aug-2007	Irrigation w/o Chemicals	MT. SHEEP PEN NORTH OF HIGHWAY 270
Febco, 850, 1 1/2", DCVA	H00466	01-Aug-2007	Irrigation w/o Chemicals	McALLISTER MECH. RM. SO. WALL

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name:
Facility Address: 704, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 310
Account No: 310
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AH6787	01-Aug-2006	Irrigation w/o Chemicals	TENNIS COURTS RESTROOMS LAWN SPRINKLER EAST SI	
Wilkins, 550, 6", DCVA	W95756	01-Aug-2007	Fire Sprinkler w/o Chemical Addition	CREAMERY OUTSIDE PIT FIRE SPRINKLER SYSTEM	
Watts, 709, 3", DCVA	127584	01-Aug-2007	Irrigation w/o Chemicals	NEW INTERMURAL FIELD SOUTH FAIRWAY PIT SOUTH RES	
Watts, 700, 2", DCVA	804344	01-Aug-2007	Irrigation w/o Chemicals	JOHNSON HALL NE PIT LAWN	
Watts, 007M1QT, 2", DCVA	83597	01-Aug-2007	Irrigation w/o Chemicals	NEZ PIERCE OUTSIDE S LAWN SMALL BUILDING	
Febco, 850, 2", DCVA	H12154	01-Aug-2007	Irrigation w/o Chemicals	TRUFF FARM WEST VAULT /PUMP	
Watts, 709, 3", DCVA	102727	01-Aug-2007	Irrigation w/o Chemicals	VALLEY CREST E LAWN	
Febco, 850, 2", DCVA	H12153	01-Aug-2007	Irrigation w/o Chemicals	TURF FARM WEST SIDE PUMP	
Watts, 007M1QT, 2", DCVA	83608	01-Aug-2007	Irrigation w/o Chemicals	TERRACE APTS. SW OF BLDG. 800	
Watts, 007M1QT, 2", DCVA	86937	01-Jul-2007	Irrigation w/o Chemicals	EAST OF BLDG. 200 TERRACE APTS	
Febco, 860U, 3/4", RPBA	H00574	01-Aug-2007	LAB	TURF FARM REST RM.	
Watts, 007M1QT, 2", DCVA	86934	01-Aug-2007	Irrigation w/o Chemicals	TERRACE APTS. EASTSIDE S.E. BLDG. 100 #2	
Watts, 007M1QT, 2", DCVA	149896	01-Aug-2007	Irrigation w/o Chemicals	JOHNSON HALL SW PIT LAWN	
Febco, 765, 2", PVBA	05734	01-Aug-2007	Irrigation w/o Chemicals	GO;F COURSE 9TH TEE	
Watts, 007M1QT, 2", DCVA	84937	01-Aug-2007	Irrigation w/o Chemicals	STEPTOE VILLAGE NE A BLDG ON HILL FOR GARDENS	
Febco, 805Y, 2", DCVA		01-Aug-2007	Irrigation w/o Chemicals	BEASLEY COLISEUM S.OF SPACE #517	
Febco, 805Y, 2", DCVA	AM5897	01-Aug-2007	Irrigation w/o Chemicals	BEASLEY COLISEUM S PARKING LOT	
Watts, 007, 2", DCVA	06236	24-Jul-2005	Irrigation w/o Chemicals	SOUTH FAIRWAY RD. PARKING PIT NORTH SIDE	
Watts, 700, 2", DCVA	803539	01-Aug-2007	Irrigation w/o Chemicals	JOHNSON HALL SE PIT IN LAWN	
Watts, 007M1QT, 2", DCVA	87002	01-Aug-2007	Irrigation w/o Chemicals	TERRACE APTS. WESTSIDE S.E. BLDG. 100	
Febco, 850, 1 1/2", DCVA	H00483	01-Aug-2007	Irrigation w/o Chemicals	N. FAIRWAY RD. BEHIND FIRE HYDRANT	
Febco, 805Y, 2", DCVA	X4865	01-Aug-2005	Irrigation w/o Chemicals	BEASLEY COLISEUM E PARKING LOT	
Watts, 007M1QT, 2", DCVA	86932	01-Aug-2007	Irrigation w/o Chemicals	KAMIAK APTS. NW A BLDG	
Watts, 007M1QT, 2", DCVA	83740	01-Aug-2005	Irrigation w/o Chemicals	TERRACE APTS. E. OF BLDG. 600	
Watts, 007M1QT, 2", DCVA	835593	01-Aug-2007	Irrigation w/o Chemicals	KAMIAK APTS. SW F BLDG	

Febco, 805Y, 2", DCVA	W2319	01-Aug-2007	Irrigation w/o Chemicals	RM 115 CREAMERY BOILER ROOM LAWN SPRINKLER
Febco, 850, 1 1/2", DCVA	H00459	01-Aug-2007	Irrigation w/o Chemicals	ACROSS ST. FROM GOLF 365A ENTERANCE BY TRANSEFO
Rainbird, DCA, 2 1/2", DCVA	100265	01-Aug-2007	Irrigation w/o Chemicals	STEPTOE APTS. BUILDING F LEFT SIDE IN BACK OF LAUND
Febco, 850, 1 1/2", DCVA	H00468	01-Aug-2007	Irrigation w/o Chemicals	N. FAIRWAY RD. & COUNTRY RD. BUSS TURN AROUND
Febco, 805Y, 2", DCVA		01-Aug-2007	Irrigation w/o Chemicals	BASEBALL FIELD W PIT SCRUB BEDS
Febco, 850, 2", DCVA	H00904	01-Aug-2006	Irrigation w/o Chemicals	BEASLEY COLISEUM GO UNDER S OVERDOOR TO EXIT DO
Febco, 805, 2 1/2", DCVA	B1497	01-Feb-2007	Irrigation w/o Chemicals	FOOD&HUMANE NUTRITION B10 LAWN SPRINKLER LOWE
Ames, 2000 SS, 3", DCVA	V0307020PW	01-Aug-2007	Irrigation w/o Chemicals	VALLEY PLAYFIELD VAULT
Rainbird, 200, 2", DCVA	778628	01-Aug-2007	Irrigation w/o Chemicals	NRC S PIT
Watts, 007M1QT, 2", DCVA	83739	01-Aug-2007	Irrigation w/o Chemicals	TERRACE APT. S.E.YARD NEXT TO PARK BLDG. 800

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ADBF
Facility Address: 807A 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 2
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009M2-QT, 3/4", RPBA	138815	01-Oct-2007	INDUSTRIAL WATER	LOWER MECH INDUSTRIAL MAKE-UP	
Watts, 007, 3", DCVA	04258	01-Oct-2007	DOMESTIC COLD WATER	LOWER MECH ROOM BOTTOM DCW	
Watts, 009M2-QT, 2", RPBA	122524	01-Oct-2007	LAB COLD WATER	LOWER MECH BOTTOM LAB COLD WATER	
Watts, 009M2-QT, 2", RPBA	122516	01-Oct-2007	LAB COLD WATER	LOWER MECH TOP LAB COLD WATER	
Watts, 007, 3", DCVA	04264	01-Oct-2007	DOMESTIC COLD WATER	LOWER MECHANICAL	
Febco, 805YD, 6", DCVA	9608201108	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH FIRE SPRINKLER NE CORNER	
Watts, 009M2-QT, 3/4", RPBA	142167	01-Oct-2006	INDUSTRIAL WATER	LOWER MECH INDUSTRIAL MAKE-UP WATER	
Febco, 825Y, 2", RPBA	A30523	01-Oct-2007	Irrigation w/o Chemicals	BASEMENT MECH LAWN SPRINKLER EAST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ADMIN ANNEX
Facility Address: 38 700, PULLMAN

Facility Type: ADMINASTRATION BLDG.
Hazard Level: High
Facility ID: 3
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	RH8771	01-Oct-2007	HEAT MAKEUP	MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: AGRONOMY SEED HOUSE
Facility Address: 115 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 290
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	H21008	01-Oct-2007	LAB COLD WATER	RM. 102 N. E. CORNER	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: AIRPORT
Facility Address: 3200 AIRPORT COMPLEX NORTH, PULLMAN

Facility Type: AIRPORT
Hazard Level: Low
Facility ID: 4
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 950XL, 2", DCVA	2065870	01-Apr-2008	Fire Dept. Connection	TANK FILL, S.W.CORNER FIRE HOUSE	
Febco, 825Y, 3/4", RPBA	T7666	01-Apr-2008	Boiler Feed Lines	BOILER RM E. WALL	
Watts, 007M2, 2", DCVA	16660	01-Apr-2008	DOMESTIC COLD WATER	FIREHOUSE	
Febco, 805Y, 2", DCVA	???????	01-Apr-2008	Irrigation w/o Chemicals	IRRIGATION, E. SIDE N. ENTRANCE MIAN TERMINAL	
Febco, 870, 4", DCVA	9606181352	01-May-2008		BOILER RM N WALL	
Febco, 805Y, 2 1/2", DCVA	6073	01-Apr-2008	DOMESTIC COLD WATER	BOILER RM E WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ALBROOK
Facility Address: 71 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 5
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1", RPBA	272250	01-Oct-2007	HEAT MAKEUP	UPPER PLATFORM BY SOUTH ROLL UP DOOR	
Rainbird, DCA200, 2", DCVA	88715	01-Oct-2007	Irrigation w/o Chemicals	SE WALL INSIDE OF ALBROOK GO IN DOOR BY CHILLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ALUMNI CENTER
Facility Address: 138 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 6
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 2", DCVA	107422	01-Jun-2008	Irrigation w/o Chemicals	LAWN SPRINKLER INSIDE MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ANIMAL SCIENCE
Facility Address: 100 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 7
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909M1QT, 1 1/4", RPBA	292669	01-Oct-2007	LAB	BASEMENT MECH LOWER LAB INDUSTRIAL WATER	
Febco, 805YD, 6", DCVA	95020716	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH FIRE SPRINKLER	
Watts, 909, 1 1/2", RPBA	293456	01-Oct-2007	LAB	UPPER DOM. WATER	
Watts, 909M1QT, 1 1/4", RPBA	280645	01-Oct-2007	LAB	BASEMENT MECH UPPER LAB INDUSTRIAL WATER	
Watts, 009M2QT, 3/4", RPBA	88985	01-Oct-2007	Boiler Feed Lines	BASEMENT MECH HOT WATER HEAT MAKEUP	
Watts, 909, 1 1/2", RPBA	292774	01-Oct-2007	LAB	LOWER DOM COLD WATER SUPPLY	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ARABIAN BARN
Facility Address: 140 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: Low
Facility ID: 9
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA	A033920	01-Jun-2006	LIVESTOCK WATER	RIGHT HAND SIDE OF DRIVEWAY PIT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ARBORETUM
Facility Address: 0 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 10
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 3", DCVA	B7775	01-Jun-2008	Irrigation w/o Chemicals	WILSON ROAD/ELLIS WAY IRRIGATION	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: AVERY
Facility Address: 700 809, PULLMAN

Facility Type: School
Hazard Level: Low
Facility ID: 11
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 3", DCVA	124839	01-Oct-2007	Premise Isolation	001 MAIN WATER LINE MECH ROOM	
Febco, 805Y, 2", DCVA	T1317	01-Oct-2007	Premise Isolation	ROOM 01 MAIN WATER MECH ROOM	
Watts, 709, 3", DCVA	124840	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	RM 001 HOSE RACK UNDER EXPANSION TANK BY DOOR	
Watts, 709, 3", DCVA	101908	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	JANITOR ROOM 1ST FLOOR HOSE RACK	
Febco, 825Y, 2", RPBA	V5666	01-Nov-2007	Boiler Feed Lines	RM 001 MECH ROOM HOT WATER MAKEUP	
Febco, 805YD, 3", DCVA	B9251	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	ROOM 01 MECH ROOM FIRE SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BEAR PENS
Facility Address: 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 14
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 3", DCVA		01-Jun-2008	Irrigation w/o Chemicals	SE CORNER LARGE OUTSIDE PEN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BEASLEY COLISEUM
Facility Address: 806 700, PULLMAN

Facility Type: GYM
Hazard Level: High
Facility ID: 16
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BD2255	01-Oct-2007	CHILLED WATER MAKEUP	RM 53 WEST WALL BASEMENT MECH ROOM	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BEAVER POND
Facility Address: 182 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 17
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	246677	01-Jun-2008	LAB COLD WATER	BATHROOM	
Febco, 860, 2", RPBA	H03741	01-Jun-2008	LIVESTOCK WATER	VAULT WEST OF BLDG.182	
Febco, 825Y, 3/4", RPBA	238127	01-Jun-2008	BIO. LAB HOT WATER	BATHROOM LEFTHAND	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BEEF BREEDING
Facility Address: 145 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 19
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 2", DCVA	111532	01-Jun-2008	LIVESTOCK WATER	ANIMAL SCIENCE ROAD E IN PIT ANIM HUSBANDRY RD E	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BEEF CENTER
Facility Address: 404A 705, TULA FARM

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 21
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 975XL, 1", RPBA	1581184	01-Aug-2007	LAB HOT WATER	RM 106 MAIN BLDG IN BREEZEWAY LAB HW	
Hersey/Grinnell, FDC, 2", DCVA	83984	01-Aug-2007	LIVESTOCK WATER	RM 106 MAIN BLDG IN BREEZEWAY	
Febco, 825Y, 1", RPBA	X7130	01-Aug-2007	LAB COLD WATER	RM 106 LAB CW	
Febco, 825Y, 2", RPBA	AA4369	01-Aug-2007	DOMESTIC COLD WATER	RM 120 MECH MAIN CW LOWER	
Febco, 825Y, 2", RPBA	AA4341	01-Aug-2007	DOMESTIC COLD WATER	MECH ROOM 120 MAIN CW EAST UPPER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BOHLER
Facility Address: 11 700, PULLMAN

Facility Type: GYM
Hazard Level: Low
Facility ID: 22
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 4", DCVA	178124	01-Oct-2007	DOMESTIC COLD WATER	BASEMENT MECHANICAL RM.	
Air Gap, AG, 3", AG		01-Oct-2007	Pool/Spa	POOL TANK	
Watts, 007, 1/2", DCVA		01-Oct-2007	HEAT RECLAIM	BASEMENT MECH SKID UNIT	
Watts, 709, 4", DCVA		01-Oct-2007	GYM	BASEMENT MECH ROOM	
Watts, 009M2QT, 2", RPBA	117793	01-Oct-2007	HOT TUB	MEZZANINE LEVEL HOT TUB MAKEUP	
Watts, 009M2QT, 3/4", RPBA	147225	01-Oct-2007	HEAT RECLAIM	NE PENTHOUSE	
Watts, 009M2QT, 3/4", RPBA	160266	01-Oct-2007	HEAT RECLAIM	SE PENTHOUSE	
Ames, 400B, 2", RPBA	000194	01-Oct-2007	Pool/Spa	BASEMENT MECH ROOM POOL MAKEUP	
Watts, 009QT, 1", RPBA	136472	01-Oct-2007	Beverage Dispenser with CO2	RM 126 UNDER SINK	

Watts, 009M2QT, 3/4", RPBA	162100	01-Oct-2007	AUTO WASHER	LAUNDRYROOM

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BOHLER ADDITION
Facility Address: 11A 700, PULLMAN

Facility Type: GYM
Hazard Level: Low
Facility ID: 24
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 007M1, 2", DCVA	42112	01-Oct-2007	Irrigation w/o Chemicals	RM 109 RCH ROOM NORTH OF ROLLUP DOOR IRRIGATION	
Watts, 709, 6", DCVA	250639	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	B95M	
Watts, 009QT, 1/2", RPBA	48923	01-Oct-2007	Film Processors	ROOM 197 DARK ROOM LOWER UNDER SINK	
Watts, 007M1, 2", DCVA	42134	01-Oct-2007	Premise Isolation	MECH ROOM UPPER DOM WATER NORTH OF ROLL UP DOO	
Watts, 007M1, 2", DCVA	42105	01-Oct-2007	Premise Isolation	MECH ROOM LOWER DOME WATER N OR ROLL UP DOOR	
Watts, 009QT, 1/2", RPBA	55489	01-Oct-2007	Film Processors	RM 197 DARK ROOM TOP UNDER SINK	
Watts, 009M2QT, 3/4", RPBA	85550	01-Oct-2007	HEAT MAKEUP	PENTHOUSE HW HEAT MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BOILER PLANT
Facility Address: 27 700, PULLMAN

Facility Type: BOILER PLANT
Hazard Level: High
Facility ID: 27
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 3", RPBA	1120346	01-Nov-2007	Boiler Feed Lines	BASEMENT EAST WALL BOTTOM	
Febco, 860, 3", RPBA	280818	01-Nov-2007	Boiler Feed Lines	BASEMENT WEST WALL BOTTOM	
Watts, 909, 3/4", RPBA	228912	01-Nov-2007	HEAT RECLAIM	MAINLEVEL BETWEEN #6 & #8 BOILER N OF GENERATOR	
Febco, 860, 3", RPBA	111121224	01-Nov-2007	Boiler Feed Lines	BASEMENT EAST WALL TOP	
Febco, 860, 2 1/2", RPBA	280957	01-Nov-2007	Boiler Feed Lines	BASEMENT WEST WALL TOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BOOKIE
Facility Address: 64 700, PULLMAN

Facility Type: Commercial
Hazard Level: High
Facility ID: 28
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	AA4669	01-Nov-2007	CHILLED WATER MAKEUP	MECH RM B16 CHILLED WATER	
Febco, 825Y, 2", RPBA	AA3883	01-Nov-2007	CHILLED WATER MAKEUP	B 16 MECH ROOM COOLING TOWER	
Air Gap, AG, , AG		01-Nov-2007	GLYCOL SYSTEM	GLYCOL TANK SOUTH WALL MECH ROOM	
Ames, 2000 SE, 6", DCVA	2BKC190	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	LOWER LEVEL NW CLOSET	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BOTANY PLOT
Facility Address: 183 701, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 29
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	AG5563	01-Jun-2008	HOSE WATER	LEWIS PAINE GREENHOUSE WATER	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BRYAN
Facility Address: 2 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 30
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 350, 4", DCVA		01-Oct-2007	Fire Sprinkler w/o Chemical Addition	RM. 126 BASEMENT MECH. RM.	
Febco, 825Y, 3/4", RPBA	AG2288	01-Oct-2007	Boiler Feed Lines	RM 122 MECH ROOM HOT WATER MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: BUSTAD
Facility Address: 807 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 32
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 6", DCVA	9908201327	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	RM 36 NE WALL LOWER MECH ROOM FIRE LINE	
Febco, 765, 3/4", PVBA	AA3709	01-Oct-2007	BIO. LAB COLD WATER	270J UNDER SINK	
Febco, 765, 1/2", PVBA	16647	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Watts, 909, 3", RPBA	203338	01-Oct-2007	LAB COLD WATER	RM 36 LAB COLD WATER	
Febco, 825Y, 1", RPBA	AA4874	01-Oct-2007	BIO. LAB COLD WATER	OUTSIDE PENTHOUSE EAST END BIOHAZARD SERVES 438	
Wilkins, 375, 2 1/2", RPBA	L26701	01-Oct-2007	LAB COLD WATER	RM 36	
Febco, 825Y, 1 1/2", RPBA	BD0348	01-Oct-2007	INDUSTRIAL WATER	LOWER MECH ROOM	
Febco, 860UBV, 3/4", RPBA	H01109	01-Oct-2007	BIO. LAB COLD WATER	CHEM WASTE STORAGE IN BREEZEWAY	
Febco, 825Y, 1", RPBA	AG2864	01-Oct-2007	BIO. LAB HOT WATER	OUTSIDE PENTHOUSE EAST END BIO LAB SERVES RM 438	
Febco, 765, 1/2", PVBA	16663	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16637	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16648	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16668	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16673	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16650	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16649	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16653	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16639	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16640	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Watts, 909, 3", RPBA	168650	01-Nov-2007	LAB	RM 36 MAIN COLD WATER LINE LOWER	
Febco, 765, 1/2", PVBA	16625	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16634	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 850, 3/4", DCVA	H66816	01-Oct-2007	Air Compressor	BASEMENT MECH. RM MED. AIR COMP.	
Febco, 765, 1/2", PVBA	16641	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16840	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 765, 1/2", PVBA	16638	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR CLEANER BETWEEN FLOORS	
Febco, 825Y, 3/4", RPBA	BD5705	01-Oct-2007	HEAT MAKEUP	EAST MECH RM CW AND HW UPPER S WALL RM 104	

Febco, 765, 1/2", PVBA	16662	01-Oct-2007	Flushing Floor Drain	MECH ROOM FLOOR LEANER BETWEEN FLOORS
Watts, 909, 3", RPBA	168488	01-Nov-2007	LAB	RM 36
Febco, 825Y, 1 1/2", RPBA	BDO331	01-Oct-2007	INDUSTRIAL WATER	RM 36

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: BUTCH'S PARK
Facility Address: 0 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 33
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AB7704	01-Jun-2008	Irrigation w/o Chemicals	NE PIT LAWN SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: CARPENTER
Facility Address: 20 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 34
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 6", DCVA	B10181	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH ROOM FIRE SPRINKLER	
Febco, 825Y, 1", RPBA	AA6049	01-Nov-2007	HEAT MAKEUP	RM B HWH MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: CARVER FARM
Facility Address: 120H 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 36
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	AA5019	01-Nov-2004	Water Softener	BUILDING H SOFT WATER UNITS	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: CATTLE FEEDING
Facility Address: 144 700, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 37
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AB7528	01-Nov-2007	LIVESTOCK WATER	RM 1 SOUTH WALL	
Febco, 765, 3/4", PVBA	69390	01-May-2007	LIVESTOCK WATER	RM 1 HSE BIBBS AND LAB	
Febco, 825Y, 2", RPBA	S6469	01-Nov-2007	LAB	RM 10 DOMESTIC COLD WATER MAIN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: CATTLE REPRODUCTION
Facility Address: 145 700, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 38
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 2", DCVA	165327	01-Nov-2007	LIVESTOCK WATER	WATERERS FOR CATTLE N WALL	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CATTLE REPRODUCTION LAB BLD 144A
Facility Address: 144A 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 39
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 2", DCVA	131921	01-Jun-2008	LIVESTOCK WATER	OUTSIDE CATTLE WATERERS IN WEST PIT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CENTER FOR UNDERGRADUATE EDUCAT
Facility Address: 095 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 40
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909QT, 3/4", RPBA	495219	01-Dec-2007	HEAT MAKEUP	P103 HOT WATER MAKEUP	
Watts, 709, 2 1/2", DCVA	104669	01-Dec-2007	DOMESTIC COLD WATER	P110 TOP MAIN WATER	
Watts, 909M1QT, 2", RPBA	353626	01-Dec-2007	CHILLED WATER MAKEUP	600 E COOLING WATER MAKEUP	
Watts, 850, 6", DCVA	0011081331	01-Dec-2007	Fire Sprinkler w/o Chemical Addition	P110 FIRE MAIN	
Watts, 709, 2 1/2", DCVA	104571	01-Dec-2007	DOMESTIC COLD WATER	P110 BOTTOM MAIN WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CENTRAL STORES
Facility Address: 360A WSU, PULLMAN, 700

Facility Type: DRY STOREAGE
Hazard Level: Low
Facility ID: 1
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, #2, 6", DCVA	303345	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	WEST STORE ROOM WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CENTRAL FERRY GREENHOUSE USDA
Facility Address: 9110 710, CENTRAL FERRY

Facility Type: RESEARCH STATION
Hazard Level: High
Facility ID: 314
Account No: 314
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	RH6062	01-Aug-2005	Irrigation with Chemicals	EAST END GREENOUSE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHIEF JOSEPH
Facility Address: 676 700, PULLMAN

Facility Type: FAMILY HOUSEING
Hazard Level: High
Facility ID: 42
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	52459	01-Nov-2007	HEAT MAKEUP	MECH ROOM UNIT "C"	
Watts, 009, 3/4", RPBA	53072	01-May-2007	HEAT MAKEUP	MECH ROOM UNIT "A"	
Watts, 009, 3/4", RPBA	53062	01-May-2007	HEAT MAKEUP	MECH ROOM UNIT "E"	
Watts, 009, 3/4", RPBA	52463	01-Nov-2007	HEAT MAKEUP	MECH ROOM UNIT "B"	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHIEF JOSEPH
Facility Address: 704, PULLMAN

Facility Type: Residential - Multi-Family
Hazard Level:
Facility ID: 43
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709M2, 3", DCVA	100848	01-Aug-2007		OUTSIDE MASTER PADLOCK	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHILD CARE (ROGERS/ORTON)
Facility Address: 88 700, PULLMAN

Facility Type: DAY CARE
Hazard Level: High
Facility ID: 44
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 975XLU, 3/4", RPBA	1685511	01-Nov-2007	Dishwasher with Chemicals	KITHEN DISHWASHER	
Watts, 709, 4", DCVA	170958	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	LOWER MECH ROOM RIE SPRINKLER WEST WALL	
Watts, 009M2, 3/4", RPBA	21818	01-Nov-2007	GLYCOL SYSTEM	MECH ROOM ICE MELTER SUPPLY E WALL	
Febco, 825Y, 2", RPBA	AK3838	01-Nov-2007	DAY CARE	MECH ROOM MAIN COM WATER S WALL TOP	
Watts, 009QT, 1/2", RPBA	24286	01-Nov-2007		RM 120 KITCH UNDER SINGLE SINK JUICE MACHINE	
Febco, 825Y, 2", RPBA	AK3839	01-Nov-2007	DAY CARE	MECH ROOM MAIN DOM WATER S WALL BOTTOM	
Febco, 805Y, 2", DCVA	AO9476	01-Nov-2007	DAY CARE	MECH NORTH WALL HW SUPPLY	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHILD CARE CENTER
Facility Address: 88 703

Facility Type:
Hazard Level: Low
Facility ID: 45
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	A149660	01-Aug-2007	Irrigation w/o Chemicals	CHILD CARE CENTER R. O. SW PIT	3 0

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHILLED WATER STORAGE TANK BUILDIN
Facility Address: 832A 701, PULLMAN

Facility Type: CHILLED WATER PLANT
Hazard Level: Low
Facility ID: 46
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA		01-Jun-2008	Irrigation w/o Chemicals	LAWN SPRINKER SE OF CHILLED WATER TANK	
Watts, 909, 4", RPBA	177232	01-Jun-2008	CHILLED WATER MAKEUP	S WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CHILLER PLANT
Facility Address: 813 700, PULLMAN

Facility Type: CHILLED WATER PLANT
Hazard Level: High
Facility ID: 49
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BH3702	01-May-2007	CHILLED WATER MAKEUP	NORTH WALL MIDDLE S.	
Febco, 825Y, 2", RPBA	BH3754	01-May-2007	CHILLED WATER MAKEUP	NORTH WALL MIDDLE N.	

Febco, 825Y, 2", RPBA	BH3772	01-May-2007	CHILLED WATER MAKEUP	NORTH WALL BOTTOM S.
Febco, 825Y, 2", RPBA	BH3789	01-Nov-2007	CHILLED WATER MAKEUP	NORTH WALL BOTTOM
Febco, 825Y, 2", RPBA	BH3756	01-May-2007	CHILLED WATER MAKEUP	NORTH WALL TOP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CLARK
Facility Address: 99 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 52
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BB6819	01-May-2007	CHILLED WATER MAKEUP	PENTHOUSE MECH	
Febco, 825Y, 2", RPBA	BB6973	01-Nov-2007	CHILLED WATER MAKEUP	PENTHOUSE MECH	
Wilkins, 975, 3", RPBA	GL0372	01-Nov-2007	LAB COLD WATER	RM 11 MAIN LAB WATER	
Wilkins, 475, 4", RPBA	Q01254	01-Nov-2007	COOLING TOWER MAKEUP	RM. 11 SO. WALL	
Watts, 909, 4", RPBA	191185	01-May-2007	LAB	RM 11 LOWER MECH SOUTH WALL	
Wilkins, 350, 6", DCVA	J15333	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	SO. WALL FIRE SYSTEM RM 11	
Hersey/Grinnell, FDC, 2", DCVA	84783	01-Nov-2007	Irrigation w/o Chemicals	MECH ROOM BASEMENT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CLEVELAND
Facility Address: 86 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 54
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 4", DCVA	F0402271139	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	RM. 32	
Febco, 825Y, 1", RPBA	BG7020	01-Nov-2007	HEAT MAKEUP	BASEMENT MECH HW HEAT MAKEUP SOUTH WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: COLLEGE HALL
Facility Address: 4 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 55
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	BG4413	01-Nov-2007	BIO. LAB COLD WATER	RM 12H BOTTOM	
Febco, 805Y, 2", DCVA	W1359	01-Nov-2007	LAB COLD WATER	RM 12H EAST	
Febco, 805Y, 2", DCVA	W1370	01-Nov-2007	LAB COLD WATER	12 H WEST	
Febco, 825Y, 1", RPBA	AM8920	01-Nov-2007	BIO. LAB COLD WATER	12H TOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: COMMONS
Facility Address: 5 700, PULLMAN

Facility Type: OFFICE BLDG.
Hazard Level: High
Facility ID: 58
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	A049652	01-Nov-2007	LAB COLD WATER	RM 18A LOWER COLD WATER SOUTH WALL	
Febco, 825Y, 1", RPBA	A049651	01-Nov-2007	LAB HOT WATER	18A UPPER HOT WATER SOUTH WALL	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: COMMUNITY
Facility Address: 6 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 59
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA	B17351	01-Dec-2007	Fire Sprinkler w/o Chemical Addition	STORAGE ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: COOPER PUBLICATION
Facility Address: 91 700, PULLMAN

Facility Type: PRINTING FAC.
Hazard Level: High
Facility ID: 60
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	R7234	01-Dec-2007	DOMESTIC COLD WATER	RM 83 BUILDING SUPPLY SOUTH	
Febco, 805, 6", DCVA		01-Dec-2008	Fire Sprinkler w/o Chemical Addition	RM 4 SW CORNER FIRE SPRINKLER	
Febco, 825Y, 1 1/2", RPBA	R7367	01-Dec-2007	DOMESTIC COLD WATER	RM 83 BUILDING SUPPLY NORTH	
Febco, 825Y, 3/4", RPBA	R8208	01-Dec-2007	HEAT RECLAIM	RM 83 HOT WATER HEAT SUPPLY	
Febco, 825 YAR, 1", RPBA	N4055	01-Dec-2007	GLYCOL SYSTEM	RM 83 GLYCOL SYSTEM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: COOPER PUBLICATIONS BLDG 91
Facility Address: 091 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 61
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 1 1/2", DCVA	85450	01-Jun-2008	Irrigation w/o Chemicals	TUNNEL	
Hersey/Grinnell, FDC, 2", DCVA	85460	01-Jun-2008	Irrigation w/o Chemicals	PIT EAST OF SHRUBS	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CREAMERY ANNEX
Facility Address: 353 701, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 63
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 6", DCVA	9908271250	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	MAIN FLOOR WEST WALL FIRE LINE	
Febco, 860, 1 1/2", RPBA	02681	01-Jun-2008	LAB	2ND FLOOR WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: CUB
Facility Address: 63 700, PULLMAN

Facility Type: KITCHEN
Hazard Level: High
Facility ID: 64
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/4", RPBA	288222	01-Dec-2006	REFRIGERATION COOLING WATER	B2 MECH ROOM MAKEUP ABOVE HEATING PUMPS	
Febco, 805Y, 2", DCVA	AH5581	01-Dec-2003	DOMESTIC COLD WATER	LOWER MECH ROOM MAIN DOMESTIC WATER CENTER	
Febco, 805Y, 2", DCVA	AH5572	01-Dec-2006	DOMESTIC COLD WATER	L MECH ROOM MAIN DOMESTIC WATER LOWER	

Febco, 825Y, 1", RPBA	RH2987	16-Nov-2002	Beverage Dispenser with CO2	TACO BELL UNDER COUNTER PEPSI MACHINE
Febco, 805Y, 2", DCVA	AH5559	01-Dec-2006	DOMESTIC COLD WATER	LOWER MECH ROOM MAIN DOM WATER TOP
Febco, 825Y, 1", RPBA	AG2337	01-Dec-2006	HEAT MAKEUP	RM 237
Febco, 825Y, 1", RPBA	AG2321	01-Dec-2006	HEAT MAKEUP	SB2 HWH SUPPLY UP LADDER ABOVE DOM. WATER

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: DAGGY
Facility Address: 803 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 67
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/2", RPBA	BI2615	01-Dec-2006	CHILLED WATER MAKEUP	RM 371 MECH ROOM	
Hersey/Grinnell, 6CM, 2", RPBA	2474	01-Dec-2006	Irrigation w/o Chemicals	RM 147 MECH ROOM	
Febco, 825Y, 1 1/2", RPBA	BE4195	01-Dec-2006	CHILLED WATER MAKEUP	MECH ROOM CHILLED AND HW MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: DANA HALL
Facility Address: 56 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 68
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	144008	01-Dec-2007	DOMESTIC COLD WATER	BASEMENT MECH PREMISE ISOLATION COLD WATER	
Watts, 700, 3/4", DCVA	307893	01-Dec-2007	REFRIGERATION COOLING WATER	REFRIGERATION COMPRESSOR	
Watts, 909, 1 1/2", RPBA	80586	01-Dec-2007	LAB	B1 MAIN LINE LOWER	
Watts, 909, 1 1/2", RPBA	80736	01-Dec-2007	LAB	B1 MAIN LAB WATER UPPER	
Watts, 909, 3/4", RPBA	11369	01-Dec-2007	HEAT MAKEUP	RM B1 HW HEAT MAKUP	
Febco, 805Y, 2", DCVA	142764	01-Dec-2007	DOMESTIC COLD WATER	BASEMENT PREMISE ISOLATION BOTTOM COLD WATER	
Watts, 909, 3/4", RPBA	11368	01-Dec-2007	HEAT MAKEUP	RM 356 MECH ROOM HOT WATER HEAT MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: DEER PEN 167
Facility Address: 167 701, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 69
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 3/4", DCVA	88113	01-Jun-2008	LAB COLD WATER	MAIN DCW NORTH OF FENCE IN PIT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: DEIONIZE PLANT
Facility Address: 358G 700, PULLMAN

Facility Type: DEIONIZATION PLANT
Hazard Level: High
Facility ID: 70
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	A105251	01-Feb-2008	LAB COLD WATER	MECH	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: DUNCAN DUNN
Facility Address: 7 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 71

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 4", DCVA	B17200	01-Dec-2007	Fire Sprinkler w/o Chemical Addition	FIRE SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: EASTLICK
Facility Address: 82A 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 72

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 1", RPBA	A03099	01-Jan-2004	BIO. LAB COLD WATER	CLOSET IN JANITOR RM ON LEVEL "B"	
Febco, 805Y, 2", DCVA	AB7544	01-Jan-2008	Irrigation w/o Chemicals	M2 LAWN SPRINKLER WEST WALL	
Febco, 825Y, 2", RPBA	AA7749	01-Jan-2008	BIO. LAB COLD WATER	B60M BIOHAZARD COLD WATER	
Febco, 860, 2", RPBA	A02990	01-Jan-2008	LAB COLD WATER	BASEMENT MECH TOP LAB CW WEST WALL	
Febco, 825Y, 3/4", RPBA	BG6921	01-Jan-2008	COOLING TOWER MAKEUP	RM 460 COOLING TOWER MAKEUP BOTTOM W WALL	
Febco, 825Y, 3/4", RPBA	BG6888	01-Jan-2008	GLYCOL SYSTEM	RM 460 GLYCOL MAKEUP W WALL TOP	
Febco, 825Y, 3/4", RPBA	AF6179	01-Jan-2008	GLYCOL SYSTEM	M2 GLYCOL HEAT RECOVERY MAKEUP WEST WALL	
Febco, 805Y, 2 1/2", DCVA	C5713	01-Jan-2008	Irrigation w/o Chemicals	M2 LAWN SPRINKLER	
Febco, 860, 2", RPBA	H00229	01-Jan-2008	LAB HOT WATER	M2 LAB HOT WATER UPPER	
Febco, 825Y, 2", RPBA	K9724	01-Jan-2008	LAB HOT WATER	M2 LOWER LAB HOT WATER	
Ames, 2000 SS, 6", DCVA	2610171	01-Jan-2007	Fire Sprinkler w/o Chemical Addition	LOWER MECH FIRE SPRINKLER SYSTEM	
Febco, 825, 3", RPBA	C7612	01-Jul-2007	LAB	M2 MAIN WATER EAST	
Febco, 825Y, 3/4", RPBA	AB0252	01-Jan-2008	BIO. LAB COLD WATER	M51S LAB FISH WATER ELEVATOR ROOM	
Febco, 825Y, 2", RPBA	K9433	01-Jan-2008	BIO. LAB HOT WATER	B60M LAB HOT WATER NORTH	
Febco, 860, 2", RPBA	A02708	01-Jan-2008	LAB COLD WATER	BASEMENT MECH BOTTOM LAB CW WEST WALL	
Febco, 825, 3", RPBA	07509	01-Jul-2007	LAB	M2 MAIN WATER WEST	
Febco, 805, 2", DCVA	06119	01-Jan-2004	Irrigation w/o Chemicals	M2 LAWN SPRINKLER LOWER MECH RM	
Febco, 825Y, 1", RPBA	AB1302	01-Jul-2007	BIO. LAB COLD WATER	B60 BIOHAZARD MECH ROOM EAST	
Febco, 860, 1 1/4", RPBA	A00211	01-Jan-2004	BIO. LAB HOT WATER	CLOSET IN JANITOR RM ON LEVEL "B"	
Febco, 860, 2", RPBA	A02340	01-Jan-2008	LAB COLD WATER	M2 MIDDLE LAB CW WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: EDUCATION ADDITION
Facility Address: 086A 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 317

Account No: 317
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	H27326	01-Nov-2007	HEAT MAKEUP	NORTH WALL basesment mech.rm.	
Wilkins, 350, 3", DCVA	J16491	01-Nov-2007	DOMESTIC COLD WATER	MAIN WATER BASEMENT MECH RM.	
Febco, 850, 4", DCVA	F0312011849	01-Nov-2007	Fire Sprinkler w/o Chemical Addition	FIRE SPRINKLER SYSTEM BASEMENT MECH. RM.	

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Febco, 805YB, 3/4", DCDA	H002097	01-Nov-2007	DOMESTIC COLD WATER	FIRE SPRINKLER SYSTEM BASEMENT MECH. RM.

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: EEME
Facility Address: 78A 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 73
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825, 2 1/2", RPBA	C4268	01-Jan-2009	DOMESTIC COLD WATER	RM2 MAIN WATER MIDDLE	
Febco, 825Y, 1", RPBA	D5451	01-Jul-2007	GLYCOL SYSTEM	GLYCOL MAKEUP GO THROUGH ROOM 205	
Febco, 825Y, 3/4", RPBA	B7144	01-Jul-2007	GLYCOL SYSTEM	GLYCOL HW SUPPLY LOWER	
Febco, 825Y, 1", RPBA	D4729	01-Jan-2008	GLYCOL SYSTEM	PENTHOUSE OUT ON ROOF LEVEL 3 SE CORNER GLYCOL	
Febco, 825Y, 1 1/2", RPBA	C4823	01-Jan-2008	LAB COLD WATER	RM 2 LAB WATER UPPER	
Febco, 825, 2 1/2", RPBA	C4269	01-Jan-2008	DOMESTIC COLD WATER	RM2 MAIN WATER LOWER	
Febco, 825Y, 1 1/2", RPBA	C4848	01-Jan-2006	LAB COLD WATER	RM 2 LAB WATER LOWER	
Kennedy, B2, 6", DCVA	E20400 E19775	01-Jan-2008	Fire Sprinkler w/o Chemical Addition	RM 2 FIRE SPRINKLER LINE	
Febco, 825, 2 1/2", RPBA	C4266	01-Jan-2008	Irrigation w/o Chemicals	RM2 LAWN SPRINKLERS UPPER	
Febco, 825Y, 1", RPBA	B15970	01-Jul-2005	COOLING TOWER MAKEUP	ROOF BY COOLING TOWER EEME 78A	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ENDO DISEASE HORSE LAB
Facility Address: 197L 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 300
Account No: 300
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	005664	01-Jun-2008	LIVESTOCK WATER	S. WALL MECH. RM.	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ENGINEERING LAB
Facility Address: 46 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 74
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	A006960	01-Jan-2008	LAB COLD WATER	RM 59 EAST WALL CENTER OF ROOM	
Febco, 825Y, 2", RPBA	AJ9272	01-Jan-2008	LAB COLD WATER	BOTTOM TUNNEL	
Febco, 825Y, 2", RPBA	AJ9238	01-Jan-2008	LAB COLD WATER	TOP TUNNEL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ENVIRONMENTAL HEALTH
Facility Address: 90 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 75
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	X5042	01-Jan-2008	LIVESTOCK WATER	B4 N WALL BEAR WATER	
Febco, 825Y, 2", RPBA	Y9912	01-Jan-2008	DOMESTIC COLD WATER	B4 MAIN WATER TOP NORTH WALL	
Febco, 825Y, 2", RPBA	W2531	01-Jan-2008	DOMESTIC COLD WATER	B4 MAIN WATER BOTTOM	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ET QUARANTINE BLDG 165C
Facility Address: 165C 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 76
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 2", RPDA	H00335	01-Jun-2008	LIVESTOCK WATER	HOT BOX ON ROUNDTOP ROAD	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ETRL
Facility Address: 58 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 77
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009M2QT, 1 1/2", RPBA	62990	01-Jan-2008	CHILLED WATER MAKEUP	CHILLED WATER HEAT EXCHANGER	
Watts, 909QT, 3/4", RPBA	432093	01-Jan-2008	CHILLED WATER MAKEUP	BASEMENT MECH CHILLED WATER MAKEUP TOP	
Febco, 825Y, 1", RPBA	24720	09-Jan-2003		RM 2	
Watts, 909QT, 1", RPBA	400473	01-Jan-2008	HEAT MAKEUP	BASEMENT MECH HWH MAKEUP BOTTOM (CENTER AISLE)	
Watts, 007M2QT, 2", DCVA	25786	01-Jan-2008	Irrigation w/o Chemicals	BASEMENT MECH IRRIGATION WEST WALL	
Watts, 007M1QT, 2", DCVA	37601	01-Jan-2008	DOMESTIC COLD WATER	BASEMENT MECH DOME CW UPPER CENTER AISLE	
Febco, 825Y, 3/4", RPBA	247020	01-Jan-2008	CHILLED WATER MAKEUP	RM. 2 CENTER WALL	
Watts, 007M1QT, 2", DCVA	37607	01-Jan-2008	DOMESTIC COLD WATER	BASEMENT MECH DOM CW BOTTOM CENTER AISLE	
Watts, 909, 4", RPBA	184747	01-Jul-2007	LAB COLD WATER	BASEMENT MECH LAB CW BOTTOM CENTER AISLE	
Watts, 009M2QT, 2", RPBA	677990	23-Apr-2003		LOWER MECH ROOM	
Watts, 007M1QT, 2", DCVA	37602	01-Jan-2008	DOMESTIC COLD WATER	BASEMENT MECH DOM CW MIDDLE CENTER AISLE	
Febco, 850, 6", DCVA	961213153	01-Jan-2008	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH FIRE LINE SW WALL	
Watts, 909, 4", RPBA	186471	01-Jan-2008	LAB COLD WATER	BASEMENT MECH LAB CW TOP CENTER AISLE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: EXPERIMENTAL ANIMAL LAB
Facility Address: 814 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 78
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1 1/2", DCVA	Q6697	01-Jan-2008	Water Softener	RM 300 WATER CONDITIONER RENT HOUSE	
Febco, 825, 2 1/2", RPBA	4651	01-Jan-2008	LIVESTOCK WATER	RM 50 CHICK WATER	
Febco, 825, 2", RPBA		01-Jan-2008	LIVESTOCK WATER	RM 50 ANIMAL WATER TAKES KIT 905058	
Febco, 825, 3", RPBA	4651	01-Jan-2008	INDUSTRIAL WATER	RM 50 INDUSTRIAL WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FARM WAY PLAY FIELD
Facility Address: 702, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 79
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid

Rainbird, 200, 2", DCVA	779332	01-Jun-2008	Irrigation w/o Chemicals	SOUTH PIT LAWN IRRIGATION

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FEED MILL
Facility Address: 362 700, PULLMAN

Facility Type: ANIMAL FEED MILL
Hazard Level: Low
Facility ID: 80
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 3", DCVA	122551	01-Feb-2008	DOMESTIC COLD WATER	RM 105B MAIN DOM WATER	
Febco, 805YD, 4", DCVA	B2732	01-Feb-2008	Fire Sprinkler w/o Chemical Addition	RM 105B FIRE SPRINKLER	
Watts, 909, 3/4", RPBA	122089	01-Feb-2008	Water Softener	RM 105B SOFT WATER CONDITIONER MECH RM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FIELD HOUSE
Facility Address: 9 700, PULLMAN

Facility Type: PRACTICE FAC.
Hazard Level: Low
Facility ID: 81
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 4", DCVA	9608191421	01-Feb-2008	Fire Sprinkler w/o Chemical Addition	TRACK AREA SW CORNER FIRE MAIN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FINE ARTS
Facility Address: 097 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 82
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	R2401	01-Feb-2008	HEAT MAKEUP	PENTHOUSE HWH MAKEUP UPPER MECH ROOM	
Febco, 825Y, 3/4", RPBA	BD5704	01-Feb-2008	HEAT MAKEUP	ROOF TOP SE CORNER PIT CW AIR TANKS	
Febco, 825Y, 1", RPBA	BD1419	01-Feb-2008		4TH MECH EAST WALL ACROSS FROM HEAT EXCHANGER	
Febco, 825Y, 1", RPBA	BD1427	01-Feb-2008		4TH MECH EAST WALL ACROSS FROM HT EXCHANGER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FOOD AND HUMAN NUTRITION
Facility Address: 816 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 84
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 575, 1 1/2", RPBA	Z18908	01-Aug-2007	LAB COLD WATER	G1 LAB CW TOP	
Watts, 909, 2 1/2", RPBA	103220	01-Aug-2007	DOMESTIC COLD WATER	G10M MAIN DCW LOWER	
Febco, 825Y, 1", RPBA	P4601	01-Aug-2007	INDUSTRIAL WATER	B10 INDUSTRIAL WATER	
Wilkins, 575, 3/4", RPBA	Z18902	01-Feb-2008	HEAT MAKEUP	G1 HWH INDUSTRIAL CW	
Wilkins, 575, 1 1/2", RPBA	Z15373	01-Aug-2007	LAB COLD WATER	G1 LAB CW BOTTOM	
Wilkins, 575, 2 1/2", RPBA	Z24198	01-Aug-2007	DOMESTIC COLD WATER	G1 MAIN CW TOP	
Wilkins, 575, 2 1/2", RPBA	Z24199	01-Feb-2008	DOMESTIC COLD WATER	G1 MAIN CW BOTTOM	
Febco, 805Y, 1", DCVA	V5390	01-Feb-2008		G20F WATER SUPPLY TO PRESSURE VALVE	
Watts, 800, 1/2", PVBA	Z2033	01-Aug-2007	VACUM PUMP	B10 VACUUM PUMP	

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Watts, 909, 2 1/2", RPBA	103093	01-Aug-2007	DOMESTIC COLD WATER	G10M MAIN DCW UPPER

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FOOD QUALITY (CREAMERY)
Facility Address: 815 700, PULLMAN

Facility Type: Food Processing Plant
Hazard Level: High
Facility ID: 85
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 575, 1 1/4", RPBA	Z01295	01-Feb-2007	LAB HOT WATER	RM 239 LAB HW TOP	
Febco, 825Y, 2", RPBA	A07895	01-Feb-2008	LAB COLD WATER	RM 103H NORTH WALL	
Watts, 800, 1/2", PVBA	M507017	01-Feb-2008	AUTO WASHER	RM 110 MILK CAN WASHER	
Wilkins, 575, 1", RPBA	Z16176	01-Feb-2008	LAB COLD WATER	RM 103J MILK LAB CW TO CLEAN BOILER	
Wilkins, 575, 1 1/4", RPBA	Z01303	01-Aug-2007	LAB COLD WATER	RM 239 LAB CW TOP	
Wilkins, 575, 1 1/4", RPBA	Z01297	01-Feb-2008	LAB HOT WATER	LAB HW BOTTOM RM 239	
Wilkins, 575, 3/4", RPBA	Z22490	01-Feb-2007	HEAT MAKEUP	RM 239 HWH MAKEUP	
Febco, 860, 3/4", RPBA	H02984	01-Feb-2008	CHILLED WATER MAKEUP	RM 119A N WALL ICE MACHINE ROOM	
Wilkins, 575, 1", RPBA	Z16177	01-Feb-2008	INDUSTRIAL WATER	RM 115 INDUSTRIAL CW	
Wilkins, 575, 1 1/4", RPBA	Z18384	01-Feb-2008	LAB COLD WATER	RM 239 LAB CW BOTTOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FOOD SERVICE
Facility Address: 089 700, PULLMAN

Facility Type: Government
Hazard Level: High
Facility ID: 86
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	L4333	01-Aug-2007	COOLING TOWER MAKEUP	138A COOLING TOWER UPPER MECH ROOM I	
Watts, 909, 1", RPBA	123444	01-Feb-2008	INDUSTRIAL WATER	18A SPRAY BOOTH PAINT SHOP	
Febco, 825Y, 3/4", RPBA	L4499	01-Aug-2007	CHILLED WATER MAKEUP	138A CHILLED WATER UPPER MECH ROOM	
Febco, 805Y, 6", DCVA	C6670	01-Feb-2008	Fire Sprinkler w/o Chemical Addition	RM 26 FIRE SPRINKLER CARPENTER SHOP	
Febco, 805Y, 4", DCVA	C7793	01-Feb-2008	REFRIGERATION COOLING WATER	RM 15 REFRIG COMPRESSORS LOWER MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FOOD SERVICE
Facility Address: 089 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 87
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	S1099	01-Jun-2008	Irrigation w/o Chemicals	S LAWN SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FOX &DOG RUN
Facility Address: 198A 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 299
Account No: 299
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	P8657	01-Feb-2008	LIVESTOCK WATER	PIT	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FRENCH AD.
Facility Address: 092 700, PULLMAN

Facility Type: ADMINASTRATION BLDG.
Hazard Level: High
Facility ID: 88
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	BJ5232	01-Feb-2006	COOLING TOWER MAKEUP	ELEV MACH ROOM ROOFTOP	
Febco, 825Y, 1", RPBA	PH6464	01-Feb-2006	COOLING TOWER MAKEUP	ROOFTOP ELEV MACH ROOM	
Hersey/Grinnell, FDC, 1 1/2", DCVA	85512	01-Jun-2008	Irrigation w/o Chemicals	MECH ROOM NW CORNER LAWN	
Febco, 825Y, 1", RPBA	W0525	01-Feb-2006	HEAT MAKEUP	MECH ROOM SE CORNER ABOVE CHILLER H&CHILL MAKEU	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FULLMER
Facility Address: 3 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 89
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825, 4", RPBA	B45876A	01-Jul-2007	DOMESTIC COLD WATER	RM 24 TUNNEL LOWER	
Febco, 805Y, 1", DCVA	A012099	01-Jan-2008	Irrigation w/o Chemicals	HALL WAY LAWN IRRIG BEHIND CHEM STOREROOM	
Wilkins, 375, 2 1/2", RPBA	300857	01-Jan-2008	LAB COLD WATER	B2 MAIN LCW TOP EAST WALL	
Febco, 850, 6", DCVA	9510121337	01-Jan-2008	Fire Sprinkler w/o Chemical Addition	RM 10M OUSIDE MECH ROOM SOUTH SIDE VIF FIREMAIN	
Hersey/Grinnell, FDCII, 4", DCVA	304053	01-Jan-2008	Fire Sprinkler w/o Chemical Addition	B2 SPRINKLER SYSTEM	
Watts, 800, 1/2", PVBA	26343	01-Jan-2006	VACUM PUMP	BASEMENT VACUM PUMP SYN. BLDG. B2	
Febco, 825, 3", RPBA	B45876A	01-Jan-2008	LAB COLD WATER	RM 24 LCW	
Febco, 825Y, 2", RPBA	A2330	01-Jan-2008	LAB COLD WATER	RM 24 LCW	
Febco, 825Y, 1", RPBA	AL7995	01-Jan-2008	VACUM PUMP	RM 24 NW WALL MECH ROOM	
Febco, 825Y, 2", RPBA	A2331	01-Jan-2008	LAB COLD WATER	RM 24 LCW 66-77	
Febco, 825, 3", RPBA	B45876C	01-Jul-2007	LAB COLD WATER	RM 24 LCW-60	
Febco, 825Y, 2", RPBA	A2332	01-Jan-2008	LAB COLD WATER	RM 24 LCW 62-63	
Febco, 825, 3", RPBA	45876D	01-Jan-2008	LAB COLD WATER	RM 24 LAB COLD WATER	
Febco, 825Y, 3/4", RPBA	BJ3907	01-Jan-2008	INDUSTRIAL WATER	B2 INDUSTRIAL WATER SYN. BLDG	
Febco, 825, 4", RPBA	B45876B	01-Jan-2008	DOMESTIC COLD WATER	MAIN DW UPPER IN TUNNEL	
Febco, 825Y, 1 1/4", RPBA	AG1858	01-Jan-2008	LAB COLD WATER	B2 BASEMENT E WALL	
Febco, 825, 3", RPBA	B45876B	01-Jan-2008	LAB COLD WATER	RM 24 LCW-75 OLD FULMER L C	
Wilkins, 375, 2 1/2", RPBA	221320	01-Jan-2008	LAB COLD WATER	B2 BASEMENT E WALL BOTTOM	
Febco, 825Y, 2", RPBA	A2329	01-Jan-2008	LAB COLD WATER	RM 24 OLD FULMER LCW	
Febco, 825Y, 3/4", RPBA	BD9370	01-Jan-2008	CHILLED WATER MAKEUP	BASEMENT MECH CHILLED WATER MAKEUP SE WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: FULMER SYNTHESIS
Facility Address: 3 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 91
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid

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Hersey/Grinnell, FRPII, 3/4", RPBA	39656	01-Jan-2008	HEAT MAKEUP	10M MECH ROOM SOUTH IN FRONT OF FULMER

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GANNON
Facility Address: 079A 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 93
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA		01-Feb-2008	Fire Sprinkler w/o Chemical Addition	RM 04 N WALL	
Watts, 009, 3/4", RPBA	48067	01-Feb-2008	HEAT MAKEUP	RM 4 MECH ROOM HWH MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GEN SVS REC & DELIVERY
Facility Address: 358A 701, PULLMAN

Facility Type: DRY STOREAGE
Hazard Level:
Facility ID: 95
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	AA6439	01-Aug-2002		FOR FIRE HYDRANT USE	
Febco, 805, 4", DCVA	5731	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	RM 2	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GENERAL SERVICES CHEM. STORES
Facility Address: 385C 700, PULLMAN

Facility Type: CHEMICAL STORES
Hazard Level: High
Facility ID: 96
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	A111309	01-Mar-2008	BIO. LAB COLD WATER	HAZARD WASTE PROCESSING SOUTH WALL 110A	
Febco, 805, 4", DCVA	0923	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	SPRINKLER	
Febco, 825Y, 1 1/2", RPBA	V8887	01-Mar-2008	CHEMICAL STOREAGE	RM 110 MAIN WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GOAT BARN
Facility Address: 199E 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 98
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 2", DCVA		01-Jun-2008	LIVESTOCK WATER	BUILDING 199E PIT SERVES BLDG 200	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GOLDSWORTHY
Facility Address: 079B 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 99
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA		01-Feb-2008	Fire Sprinkler w/o Chemical Addition	RM 4 W MECH ROOM CENTER	
Watts, 009, 3/4", RPBA	48078	01-Feb-2008	HEAT MAKEUP	RM 4 HWH MAKEUP	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GOLDSWORTHY
Facility Address: 79 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 100
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	32203	01-Feb-2008	HEAT MAKEUP	RM 80X HWH MAKEUP CENTER MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GR0UNDS PESTICIDE STORAGE
Facility Address: 66J 702, PULLMAN

Facility Type: CHEMICAL STOREAGE
Hazard Level: High
Facility ID: 294
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 3/4", RPBA	HO1079	01-Jun-2008	HOSE WATER	PESTICIDE STORAGE TANK FILLER HOSE UNDER SINK	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREEN HOUSE 109
Facility Address: 109 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 104
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	199312	01-Feb-2008	Fertilizer Injector	FERT PUMP WATER 1ST RM ON LEFT SEC 1	
Febco, 860U, 3/4", RPBA	H00521	01-Feb-2008	DEIONIZED WATER	DI TANKS N. END	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 109B USDA 151
Facility Address: 109B 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 301
Account No: 301
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 975XL, 3/4", RPBA	316095	01-May-2008	Irrigation with Chemicals	N.W. SREEN HOUSE PIT INSIDE	
Wilkins, 575, 3/4", RPBA	Z12414	01-Nov-2007	LAB COLD WATER	RM 6 E LAB COLDWATER	
Wilkins, 575, 3/4", RPBA	W70951	01-May-2008	LAB HOT WATER	RM 1 WEST LAB HOT WATER	
Wilkins, 575, 3/4", RPBA	W70955	01-May-2008	LAB HOT WATER	RM 1 WEST LAB HOT WATER	
Watts, 007M1 QT, 1", DCVA	205736	01-May-2008	LAB COLD WATER	POTTING SHED W.WALL	
Febco, 825Y, 3/4", RPBA	AU2370	01-May-2008	Irrigation with Chemicals	N.E. SREEN HOUSE	
Febco, 805Y, 1 1/2", DCVA	138021	01-May-2008	DOMESTIC COLD WATER	RM 3 MAIN CW MECH ROOM	
Wilkins, 575, 3/4", RPBA	W70941	01-May-2008	LAB COLD WATER	RM 6 E LAB COLD WATER	
Watts, 909, 1", RPBA	313995	01-May-2008	LAB COLD WATER	WEST GREENHOUSE LAB WATER	
Wilkins, 575, 3/4", RPBA	Z12419	01-Nov-2007	LAB COLD WATER	RM 1 WEST LAB COLD WATER	
Febco, 825Y, 3/4", RPBA	U6331	01-May-2008	Hot Water Tank	RM 3 HWH MAKEUP	
Wilkins, 575, 3/4", RPBA	Z16344	01-May-2008	LAB COLD WATER	RM 1 WEST LAB COLD WATER	
Wilkins, 975, 1", RPBA	064992	01-May-2008	Irrigation with Chemicals	EAST GREENHOUSE AG BLDG #151 NE CORNER	
Wilkins, 575, 3/4", RPBA	Z12412	01-Nov-2007	LAB HOT WATER	E LAB HOT WATER	

List of Installations
By Facility Name and Address

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Wilkins, 575, 3/4", RPBA	W70947	01-Nov-2007	LAB HOT WATER	RM 6 E LAB HOT WATER NW

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 111
Facility Address: 111 700

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 195
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	AK1282	01-Feb-2008	LAB COLD WATER	RM 6X LAB WATER BOTTOM	
Febco, 825Y, 1", RPBA	AJ1177	01-Feb-2008	LAB COLD WATER	RM 6X LAB WATER TOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 114
Facility Address: 114 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 106
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	62715	01-Feb-2008	LAB COLD WATER	GREENHOUSE WEST RM 9A	
Febco, 825Y, 1", RPBA	T7724	01-Feb-2008	LAB	RM 23 GREENHOUSE WATER AND CHEMICAL	
Febco, 825Y, 1", RPBA	U4477	01-Aug-2007	LAB	RM B36 BY BASEMENT STAIR DOOR #38 TOP	
Watts, 700, 3/4", DCVA	?????????	01-Feb-2006	DEIONIZED WATER	DISTILLER RM 12	
Febco, 825Y, 1 1/2", RPBA	W4629	01-Feb-2008	LAB	RM 44B MAIN FOR GREENHOUSE	
Febco, 825Y, 1", RPBA	BH6084	01-Feb-2008	Fertilizer Injector	FETILIZER NW CORNER	
Febco, 825Y, 3/4", RPBA	BG7024	01-Aug-2007	REFRIGERATION COOLING WATER	RM B7 UPPER REFRIG COMPRESSOR NORTH WALL	
Watts, 700, 3/4", DCVA	404212	01-Feb-2008	LAB COLD WATER	GREENHOUSE WATER EAST RM 7A	
Hersey/Grinnell, FDC, 1", DCVA	86620	01-Feb-2008	LAB COLD WATER	5D GREENHOUSE WATER	
Febco, 825Y, 1", RPBA	Z6715	01-Feb-2008	Fertilizer Injector	RM 34A CHEM WATER TO GREENHOUSE	
Febco, 825Y, 1", RPBA	W0334	01-Aug-2007	LAB	RM 2D MAIN TO BUILDING	
Febco, 805Y, 1", DCVA	V7616	01-Feb-2008	LAB COLD WATER	GREENHOUSE WATER EAST	
Febco, 825Y, 1", RPBA	B1880	01-Feb-2008	LAB	RM 26A GREENHOUSE WATER	
Watts, 709, 3/4", DCVA	72688	01-Feb-2008	CHILLED WATER MAKEUP	RM 28A GREENHOUSE WATER AND CHILLED WATER	
Febco, 825Y, 1", RPBA	BH2910	01-Feb-2008	LAB	RM B34F TURN COMP OFF, NO H2O ON FLOOR,SHUT DOOR	
Febco, 825Y, 1", RPBA	AH3665	01-Feb-2008	LAB	RM 22A GREENHOUSE WATER	
Febco, 825Y, 3/4", RPBA	BG0339	01-Aug-2007	REFRIGERATION COOLING WATER	RM B7 LOWER REFIG COMPRESSOR NORTH WALL	
Watts, 700, 3/4", DCVA	304062	01-Feb-2008	Autoclave	RM 9 STERILIZERS	
Watts, 700, 3/4", DCVA	304609	01-Feb-2008	DEIONIZED WATER	RM 4 DEIONIZED MAKEUP	
Febco, 825Y, 3/4", RPBA	266182	01-Feb-2008	DEIONIZED WATER	RESTROON BLDG. 30	
Watts, 700, 3/4", DCVA	404157	01-Feb-2008	LAB COLD WATER	RM 7A GREENHOUSE WATER WEST	
Febco, 805Y, 3/4", DCVA	V5394	01-Feb-2008	SWAMP COOLER	BASEMENT B5 MAKEUP SWAMP COOLERS	
Febco, 825Y, 1", RPBA	X5682	01-Feb-2008	LAB	RM B36 BOTTOM BY BASEMENT STAIR DOOR #38	
Watts, 700, 3/4", DCVA		15-Feb-2003		RM B 36 DI TANKS WEST END PAST B34F	
Febco, 825Y, 1", RPBA	BG4394	01-Feb-2008	LAB COLD WATER	RM 5C WEST ROOM	
Febco, 860UBV, 3/4", RPBA	H00105	01-Feb-2008	LAB COLD WATER	GREENHOUSE WATER RM 12A	

Watts, 700, 3/4", DCVA	404796	01-Feb-2007	LAB	RM 22B GREENHOUSE WATER
Febco, 825Y, 1", RPBA	V4825	01-Aug-2007	LAB COLD WATER	RM 3 D MAIN S WALL

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 114
Facility Address: 114 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 107
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	Z4643	01-Jun-2008	Irrigation w/o Chemicals	NORTH IN GRASS OF ALYMPIA AVE AND GRIMES WAY	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 114-1B USDA
Facility Address: 114- 1B 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 112
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 975, 1", RPBA	064985	01-Aug-2007	DOMESTIC COLD WATER	USDA RESEARCH RM 101 CLOSET SW CORNER OF BLDG	
Wilkins, 975, 1", RPBA	064988	01-Aug-2007	DOMESTIC COLD WATER	GRIMES WAY AND QUAD SERVICES RD RM 101 BOTTOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 118
Facility Address: 118 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 110
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	R6904	01-Feb-2008	LAB COLD WATER	DOUBLE GREENHOUSE NE OF CREAMERY	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GREENHOUSE 119
Facility Address: 119 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 111
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 1", RPBA	03802	01-Feb-2008	Fertilizer Injector	RM 2 WESTSIDE	
Febco, 860UBV, 2", RPBA	H00025	01-Feb-2008	DOMESTIC COLD WATER	GREENHOUSE 119 MECH. RM. TOP	
Febco, 825Y, 3/4", RPBA	BH8759	01-Feb-2007	HEAT MAKEUP	RM 2 ABOVE HEAT EXCHANGER	
Febco, 860UBV, 2", RPBA	A000004	01-Feb-2008	DOMESTIC COLD WATER	GREENHOUSE 119 MECH. RM. BOTTOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GRIMES WAY CENTRAL HEATING PLANT
Facility Address: 840 700, PULLMAN

Facility Type: BOILER PLANT
Hazard Level: Low
Facility ID: 287
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 6", DCVA	0308260814	01-Feb-2008	Fire Sprinkler w/o Chemical Addition	FIRE MAIN SOUTH SIDE	
Febco, 860, 3/4", RPBA	H00523	01-Feb-2008	INDUSTRIAL WATER	FUEL STORAGE AREA	
Febco, 825Y, 6", RPBA	F0305010928	01-Feb-2008	Boiler Feed Lines	BOILER FEED EAST MID LEVEL	

Febco, 850, 2", DCVA	H08445	01-Feb-2008	DOMESTIC COLD WATER	NORTH MAIN DOOR BOTTOM
Febco, 850, 2", DCVA	HO9894	01-Feb-2008	DOMESTIC COLD WATER	NORTH WALL MAIN DOOR TOP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GRIMES WAY CENTRAL STEAM PLANT
Facility Address: 840, PULLMAN, 701

Facility Type: BOILER PLANT
Hazard Level: Low
Facility ID: 289
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 1 1/2", DCVA	83656	01-Jun-2008	Irrigation w/o Chemicals	NORTH ENTRY JUMBO BOX	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: GROUNDS IRRIGATION SHOP
Facility Address: 66 701, PULLMAN

Facility Type: SHOP
Hazard Level: Low
Facility ID: 319
Account No: 319
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 1 1/2", DCVA	H01538	01-Jun-2008	Irrigation w/o Chemicals	OUTSIDE SHOP IN PIT - NEED LIFT TRUCK FOR LID	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HEALD
Facility Address: 082 700, PULLMAN

Facility Type: Laboratory
Hazard Level:
Facility ID: 114
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	AA9846	01-Feb-2008		B2 HWH AND CHILLED MAKEUP NE CORNER	
Febco, 860, 4", RPBA	F0404301434	01-Feb-2008	DOMESTIC COLD WATER	RM B2 BUILDING MAIN WATER	
Watts, 909, 3", RPBA	102582	01-Feb-2008		B2 BUILDING MAIN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HITCHCOCK RACETRACK
Facility Address: 169 703, PULLMAN

Facility Type: Livestock Facility
Hazard Level: Low
Facility ID: 116
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA	AF3476	01-Aug-2007	Irrigation w/o Chemicals	HITCHCOCK TRACK EAST PASTURE ON BACK CORNER OF	
Febco, 825Y, 2", RPBA	R7035	01-Aug-2007	LIVESTOCK WATER	547	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HOLLAND ANNEX
Facility Address: 62A 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 118
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805, 6", DCVA	2089	01-Dec-2007	Fire Sprinkler w/o Chemical Addition	P222 SPRINKLER SYSTEM	
Watts, 007QT, 2", DCVA	13651	01-Feb-2008	DOMESTIC COLD WATER	B17 TAKE STAIRWELL IN P220 TO B17 DW SOUTH	
Watts, 007QT, 2", DCVA	10950	01-Mar-2008	DOMESTIC COLD WATER	B17 TAKE STAIRWELL IN P220 TO B17 D.W. NORTH	
Watts, 009QT, 1", RPBA	27888	01-Mar-2008	HEAT MAKEUP	RM 222 E WALL HWH MAKEUP	

Febco, 805Y, 2", DCVA	AG5155	01-Feb-2008	Irrigation w/o Chemicals	B17 TAKE STAIRWELL IN P220 TO B17 IRRIGATION
Watts, 009QT, 1 1/2", RPBA	26481	01-Mar-2008	INDUSTRIAL WATER	P220 CUB SIDE W WALL PARKING WASH

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HOLLAND(OLD)
Facility Address: 62 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 292
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	188763	01-Mar-2008	INDUSTRIAL WATER	S. W. CORNER NEXT TO TUNNEL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HULBERT
Facility Address: 808 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 121
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	AG2253	01-Feb-2008	HEAT MAKEUP	RM 11 HWH AND MAKEUP LOWER LEVEL BEHIND AERCO H	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: HULBERT HALL
Facility Address: 808

Facility Type:
Hazard Level: Low
Facility ID: 122
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, #2, 6", DCVA	303451	01-Feb-2008	Fire Sprinkler w/o Chemical Addition	G10M SPRINKER SYSTEM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: I B C GREENHOUSE
Facility Address: 817 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 123
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1 1/2", RPBA		01-Feb-2008	LAB COLD WATER	MAIN WATER E OF MEATS LAB RED BRICK GREENHOUSE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: IBC GREENHOUSE
Facility Address: 817A 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 124
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	51293	01-Feb-2008	LAB COLD WATER	DIRECTLY ACROSS FROM MEAT LAB WEST END DCW	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: INCINERATOR
Facility Address: 60 700, PULLMAN

Facility Type: BIO. WASTE DISPOSAL
Hazard Level: High
Facility ID: 127
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	A168408	01-Mar-2008	INDUSTRIAL WATER	BURNER ROOM PROCESS WATER	

Febco, 825Y, 1 1/4", RPBA	A115433	01-Mar-2008	Irrigation w/o Chemicals	MECH IRRIGATION
Febco, 825Y, 2", RPBA	A154762	01-Mar-2008	DOMESTIC COLD WATER	BUILDING SUPPLY BOTTOM
Febco, 850, 4", DCVA	9903221410	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	FIRE SYSTEM
Febco, 825Y, 2", RPBA	A127572	01-Mar-2008	DOMESTIC COLD WATER	BUILDING SUPPLY TOP
Watts, 009QT, 1/2", RPBA	60617	01-Mar-2008	Chemical Feeder	WEST WALL CHEMICAL MAKEUP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: INFORMATION TECH
Facility Address: 812 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 128
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 700, 2", DCVA		01-Mar-2007	Irrigation w/o Chemicals	E MECH HIGH BY STEAM TUNNEL ENTRANCE LAWN	
Febco, 825Y, 1", RPBA	V6899	01-Mar-2008	GLYCOL SYSTEM	B100 BASEMENT EAST	
Watts, 700, 2", DCVA	801622	01-Mar-2008	Irrigation w/o Chemicals	W MECH HIGH NORTH WALL LAWN	
Febco, 825Y, 1", RPBA	BH6273	01-Mar-2008	COOLING TOWER MAKEUP	RM 2000M COOLING TOWER MAKEUP LOWER WEST WALL	
Febco, 825Y, 1", RPBA	V7015	01-Mar-2008	COOLING TOWER MAKEUP	2000M COOLING TOWER MAKEUP W WALL UPPER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ISOLATION BUILDING
Facility Address: 143C 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 315
Account No: 315
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 1", RPBA	H04432	01-Jul-2008	LIVESTOCK WATER	HOT BOX EAST SIDE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: JOHNSON HALL
Facility Address: 076 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 130
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 4", RPBA	209576	01-Mar-2008	DOMESTIC COLD WATER	B7 MAIN WATER EAST DOM.	
Hersey/Grinnell, FDC, 3/4", DCVA	81279	01-Mar-2008	REFRIGERATION COOLING WATER	RM 170 COMPRESSOR	
Watts, 909, 4", RPBA	209512	01-Mar-2008	DOMESTIC COLD WATER	B7 WEST MAIN DOM. WATER	
Hersey/Grinnell, FDC, 3/4", DCVA	81280	01-Mar-2008	REFRIGERATION COOLING WATER	RM 104A SW CORNER OF BUILDING REFRIG COMPRESSOR	
Watts, 009, 3", RPBA	18310	01-Mar-2008	LAB COLD WATER	EAST PENTHOUSE TOP	
Hersey/Grinnell, #2, 3", DCVA	84637	01-Mar-2008		B4 HOSE RACK	
Hersey/Grinnell, FDC, 3/4", DCVA	81290	01-Mar-2008	REFRIGERATION COOLING WATER	RM 21 LEFT COMPRESSOR	
Febco, 825Y, 1 1/4", RPBA	BF8312	01-Mar-2008	REFRIGERATION COOLING WATER	BASEMENT REFRIG COMPRESSORS WEST END BACK	
Febco, 825Y, 1 1/4", RPBA	BF8309	01-Mar-2008	REFRIGERATION COOLING WATER	BASEMENT WEST END REFIG COMPRESSORS	
Hersey/Grinnell, FDC, 3/4", DCVA	81281	01-Mar-2008	Sterilizer	RM 328 ON WALL E OF STERILIZER	
Febco, 825Y, 2", RPBA	AO48696	01-Mar-2008	LAB HOT WATER	RM 401 LAB H WATER TANK WEST	
Watts, 009, 2 1/2", RPBA	18776	01-Mar-2007	LAB COLD WATER	EAST PENTHOUSE BOTTOM	
Hersey/Grinnell, FDC, 3/4", DCVA	81291	01-Mar-2008	REFRIGERATION COOLING WATER	RM 21	

Febco, 825Y, 1 1/2", RPBA	BD0451	01-Mar-2008	LAB COLD WATER	WEST PENTHOUSE SOUTH WALL TOP
Hersey/Grinnell, FDC, 3/4", DCVA	81278	01-Mar-2005	REFRIGERATION COOLING WATER	RM 139 GROWTH CHAMBER COMPRESSOR
Crainline, A, 3", RPBA	265	19-Feb-2003		RM 402 LAB WATER EAST
Febco, 825Y, 1 1/2", RPBA	BD0428	01-Mar-2008	LAB COLD WATER	WEST PENTHOUSE SOUTH WALL BOTTOM
Hersey/Grinnell, FDC, 3/4", DCVA	81289	01-Mar-2008	REFRIGERATION COOLING WATER	RM 241 COMPRESSORS
Febco, 825YD, 2 1/2", RPBA	F0212111625	01-Mar-2008	LAB COLD WATER	WEST PENTHOUSE BOTTOM

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: JOHNSON HALL ANNEX
Facility Address: 76B 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 132
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	PC6896	01-Mar-2008	HEAT MAKEUP	ANNEX LOWER MECH ROOM HALLWAY CENTER BY CONVE	
Febco, 825Y, 3/4", RPBA	BD6191	01-Mar-2008	REFRIGERATION COOLING WATER	C100 ANNEX UPPER MECH ROOM W WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: JOHNSON TOWER
Facility Address: 94 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 134
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 2 1/2", DCVA	B16991	15-Feb-2003	Fire Sprinkler w/o Chemical Addition	B1 HOSE RACK LINE	0
Ames, 2000 SS, 6", DCVA	2BJ0750	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	LOWER MECH FIRE SPRINKLER NW CORNER	0
Febco, 825Y, 1", RPBA	Z7829	01-Mar-2008	CHILLED WATER MAKEUP	RM 900 CHILLED WATER MAKEUP	0
Febco, 825Y, 2", RPBA	T7597	01-Mar-2008	LAB COLD WATER	B7 LAB WATER TOP	0
Febco, 805Y, 2", DCVA	AF4613	01-Mar-2008	DOMESTIC COLD WATER	B1 DOM WATER PUMP EAST	0
Watts, 800, 1/2", PVBA	07007	01-Mar-2008	VACUM PUMP	B7 SW CORNER VACUUM PUMP	0
Febco, 825Y, 3/4", RPBA	AK9395	01-Mar-2008	HEAT MAKEUP	B7 HWH MAKEUP	0
Air Gap, AG, 2", AG		01-Mar-2008	TANK DRAIN	RM 900 TANK DRAIN	0
Febco, 825Y, 2", RPBA	T7560	01-Mar-2008	LAB COLD WATER	B7 LAB COLD WATER BOTTOM	0
Febco, 805Y, 2", DCVA	AF5193	01-Mar-2008	DOMESTIC COLD WATER	B1 DOM WATER PUMP WEST	0

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA

Facility Name: JR SURGERGY VET LARGE ANIMAL
Facility Address: 141G 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 135
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 6", RPBA	C7040	01-Jun-2008	LAB	SE PIT	
Watts, 909, 2", RPBA	167979	01-Jun-2008	LAB COLD WATER	TACK ROOM	
Febco, 660UBV, 2", RPBA	H00702	01-Jun-2008	LIVESTOCK WATER	MAIN DCW EAST HOT BOX	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
Time: *11:14 AM*

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: KIMBROUGH
Facility Address: 025 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 137
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	BG6974	01-Mar-2008	COOLING TOWER MAKEUP	BASEMENT MECH	
Watts, 909M1, 2", RPBA	328055	01-Mar-2008	DOMESTIC COLD WATER	B30 NW CORNER MIDDLE	
Watts, 909M1, 2", RPBA	328052	01-Mar-2008	DOMESTIC COLD WATER	B30 NORTHWEST CORNER TOP	
Febco, 850, 4", DCVA	9708181337	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	B30 NW WALL	
Watts, 909M1, 2", RPBA	328053	01-Mar-2008	DOMESTIC COLD WATER	B30 NORTHWEST CORNER BOTTOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: KNOTT DAIRY
Facility Address: 402 705, TULA FARM

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 138
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	U6368	01-Aug-2007	Chemical Feeder	MECH ROOM SANITIZER	
Febco, 825Y, 3/4", RPBA	A247028	01-Aug-2007	Boiler Feed Lines	KNOTT DAIRY BOILER MAKEUP	
Febco, 805Y, 2", DCVA	A6473	01-Aug-2007	DOMESTIC COLD WATER	PIT WEST DAIRY RESIDENCE BY ROAD	
Wilkins, 975XLU, 1", RPBA	1627137	01-Aug-2007	Chemical Feeder	RM 13 SANITIZER	
Febco, 805Y, 2", DCVA	L9392	01-Aug-2007	LIVESTOCK WATER	NE PIT 2 MAN JOB TO LIFT LID	
Watts, 909, 1", RPBA	114091	01-Aug-2007	LIVESTOCK WATER	NW CORNER BULL BARN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: KNOTT DAIRY
Facility Address: 402A 705, PULLMAN

Facility Type: Agricultural (farm/dairy)
Hazard Level:
Facility ID: 139
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 975XLU, 1", RPBA	2151099	01-Aug-2007		BASEMENT MECH. RM. DAIRY BARN	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: LAB ANIMAL RESEARCH
Facility Address: 811 701, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 140
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 3/4", DCVA	83103	01-Jun-2006	Water Softener	RM 111 WATER SOFTNER N WALL	
Hersey/Grinnell, FRPII, 2", RPBA	83779	01-Jun-2006	DOMESTIC COLD WATER	RM 105 MAIN WATER LOWER	
Febco, 805Y, 1", DCVA	U7386	01-Jun-2006	Dishwasher with Chemicals	RM 111 SOUTH WALL WASHER	
Hersey/Grinnell, FDC, 3/4", DCVA	81305	01-Mar-2005	Dishwasher with Chemicals	RM 111 NORTH WALL SMALL WASHER	
Hersey/Grinnell, FDC, 1", DCVA	81654	01-Mar-2004	CAGE WASHER	RM 111 CAGE WASHER	

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List of Installations
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Hersey/Grinnell, FRPII, 2", RPBA	83819	01-Mar-2008	DOMESTIC COLD WATER	RM 105 MAIN WATER UPPER
, , ,				
Rainbird, DCA, 2 1/2", DCVA	85075	01-Mar-2008	Irrigation w/o Chemicals	SOUTH LAWN PIT SPRINKLER
Watts, 009M3, 3/4", RPBA	14952	01-Jun-2008	CHILLED WATER MAKEUP	N. WALL CHILLER MAKE-UP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: LIGHTY STUDENT CENTER
Facility Address: 92A 700, PULLMAN

Facility Type: OFFICE BLDG.
Hazard Level: Low
Facility ID: 143
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 6", DCVA		01-Mar-2008	Fire Sprinkler w/o Chemical Addition	RM 100M NORTH WALL FIRE SYSTEM	
Febco, 825Y, 1", RPBA	Y3826	01-Mar-2008	HEAT MAKEUP	RM 100M MECH ROOM NORTH WALL HW HEAT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MAINT.MATERIALS STORAGE ADD.
Facility Address: 365A 701, PULLMAN

Facility Type: DRY STOREAGE
Hazard Level: Low
Facility ID: 298
Account No: 298
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850U, 1", DCVA	H01104	01-Jun-2008	HOSE WATER	VAULT N.E. CORNER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MARKLEY SERVICE 66B
Facility Address: 066B 701, PULLMAN

Facility Type: Car Wash
Hazard Level: High
Facility ID: 326
Account No: 326
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 2", RPBA	HOO709	01-Jun-2008	CAR WASH	CAR WASH WEST WALL	
Febco, 850U, 3/4", DCVA	H02828	01-Jun-2008	SHOP	TIR3 SHOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MARTIN STADIUM S. SIDE
Facility Address: 812A 702, PULLMAN

Facility Type: STADIUM
Hazard Level: High
Facility ID: 145
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860U, 3/4", RPBA	H00068	01-Jul-2007	Beverage Dispenser with CO2	UNDERCOUNTER CENTER SOUTHWEST CONCESSION	
Febco, 860, 1/2", RPBA	?	01-Jul-2007	SOAP DISPENSER	RM. 3119 WEST WALL SOAP DISPENSER	
Febco, 860U, 3/4", RPBA	H00031	01-Jul-2007	Beverage Dispenser with CO2	UNDERCOUNTER WESTEND SE.CONCESSION	
Febco, 860U, 3/4", RPBA	H00028	01-Jul-2007	Beverage Dispenser with CO2	UNDERCOUNTER FE SE.CONCESSION RM. 3100	
Febco, 860U, 3/4", RPBA	H00506	01-Jul-2005	Beverage Dispenser with CO2	RM. 3118 SW. CONCESSION	
Febco, 825Y, 3/4", RPBA	A247025	01-Jul-2007	Beverage Dispenser with CO2	BEHIND MENS RM. SE. PLAZA	

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MATERIAL STORAGE
Facility Address: 356 701, PULLMAN

Facility Type: DRY STOREAGE
Hazard Level: Low
Facility ID: 147
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 950, 6", DCVA	A04973	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	SW CORNER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MATH LEARNING CENTER
Facility Address: 16 700, PULLMAN

Facility Type: OFFICE BLDG.
Hazard Level: High
Facility ID: 162
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	AF9265	01-Sep-2007	HEAT MAKEUP	RM 101 HWH MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MATIN STADIUM
Facility Address: 702, PULLMAN

Facility Type: STADIUM
Hazard Level: High
Facility ID: 323
Account No: 323
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 3/4", RPBA	A04743	01-Jul-2007	Beverage Dispenser with CO2	SW. CONCESSION STAND	.
Febco, 850, 1 1/2", DCVA	A05460	01-Jul-2007	DOMESTIC COLD WATER	SO. SIDE UNDER STAD. MARTIN	.
Febco, 860, 3/4", RPBA	A04866	01-Jul-2007	Beverage Dispenser with CO2	N.E. CORNER, MARTIN STAD.	.
Febco, 860U, 3/4", RPBA	H00566	01-Jul-2007	Beverage Dispenser with CO2	HW SIDE NE. CONCESSION, MARTIN STAD.	.
Febco, 860U, 3/4", RPBA	H00587	01-Jul-2007	Beverage Dispenser with CO2	HW SIDE CENTER NORTH CONCESSION, MARTIN STAD.	.
Febco, 860, 3/4", RPBA	AD5347	01-Jul-2007	Beverage Dispenser with CO2	S.E. CORNER, MARTIN STAD.	.
Febco, 860U, 1/2", RPBA	H00076	01-Jul-2007	Beverage Dispenser with CO2	NW. CONCESSION STAND	.
Watts, 009M2QT, 2", RPBA	51557	01-Jul-2007	CHILLED WATER MAKEUP	TUNNEL MARTIN STAD.	.

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MCCLUSKEY
Facility Address: 085B 701, PULLMAN

Facility Type: FAC. OPS.
Hazard Level: High
Facility ID: 149
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	a247054	01-Jun-2008	HOSE WATER	CARPENTER SHOP	
Febco, 825Y, 1", RPBA	BH6235	01-Jun-2008	COOLING TOWER MAKEUP	RM B8 SW CORNER COOLING TOWER PAINT TANK	
Febco, 850, 1 1/2", DCVA	H04152	01-Jun-2008	SHOP	PIT , S.E. CORNER	
Febco, 860, 3/4", RPBA	H13662	01-Jun-2008	Ice Machine	ROOFING SHOP ICE MACHINE	
Watts, 009M2QT, 1 1/2", RPBA	83907	01-Jun-2008	HOSE WATER	WEST WALL OF SHOP	
Watts, 957, 3", RPBA	HF1286	01-Jun-2008	TANK FILL	FIRE HYDANT FILL	
Febco, 825Y, 1", RPBA	BH6225	01-Jun-2008	HEAT MAKEUP	LOWER MECH B8 SOUTH BOTTOM WEST WALL	
Febco, 860, 2", RPBA	H10386	01-Jun-2008	TEMP. WATER HOOK-UP	GENERAL CAMPUS TEMP. WATER HOOK UP	

Rainbird, 700, 2", DCVA	804288	01-Jun-2008	Irrigation w/o Chemicals	E LAWN SPRINKLER

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MCCOY
Facility Address: 44 700, PULLMAN

Facility Type: Veterinary Clinic
Hazard Level: High
Facility ID: 151
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 765, 1 1/2", PVBA	75547	01-Mar-2008	HOSE WATER	RM 171 HOSE RACK CENTER	
Febco, 765, 1 1/2", PVBA	75355	01-Mar-2008	HOSE WATER	RM 171 CLEANING HOSE RACK NORTH	
Febco, 850U, 3/4", DCVA	H02704	01-Mar-2008	Drinking Fountain	WEST BASEMENT NEXT TO TUNNEL	
Febco, 805, 2 1/2", DCVA	6035	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	RM 2 FIRE SPRINKLER	
Febco, 765, 1 1/2", PVBA	74749	01-Mar-2008	HOSE WATER	RM 171 HOSE RACK SOUTH	
Febco, 825, 3", RPBA	B31611B	01-Mar-2008	LAB	BASEMENT DOM CW SUPPLY LOWER	
Febco, 765, 1", PVBA	09901	01-Mar-2008	LAB COLD WATER	RM 215 WEST LAB COLD	
Febco, 765, 1/2", PVBA		01-Mar-2008	HOSE WATER	RM 178	
Febco, 765, 3/4", PVBA	26231	01-Mar-2009	LAB HOT WATER	RM 214 LAB SOUTH COLD	
Febco, 825Y, 1 1/4", RPBA	R5440	01-Mar-2008	Water Softener	RM 2 SOFT WATER #2	
Febco, 805, 3/4", DCVA	26349	01-Mar-2008	REFRIGERATION COOLING WATER	RM 5 REFRIG COMPRESSOR	
Febco, 765, 1", PVBA		01-Mar-2008	LAB HOT WATER	RM 215 LAB HOT EAST	
Febco, 765, 1/2", PVBA	30944	01-Mar-2007	HOSE WATER	178A	
Febco, 765, 1/2", PVBA	30951	01-Mar-2008	HOSE WATER	RM 178A HOSE	
Watts, 009-M2QT, 3/4", RPBA	181149	01-Mar-2008	INDUSTRIAL WATER	PACKAGING INSTRUMENT PROCESS RM. 238	
Febco, 825, 3", RPBA	B31611C	01-Mar-2008	LAB	BASEMENT DCW SUPPLY UPPER	
Febco, 860UBV, 3/4", RPBA	H00518	01-Mar-2008	LAB COLD WATER	RM 184 MAKEUP WATER	
Febco, 765, 3/4", PVBA	27285	01-Mar-2008	LAB HOT WATER	RM 214 LAB NORTH HOT WATER	
Febco, 825Y, 1 1/4", RPBA	P5403	01-Mar-2008	Water Softener	RM 2 NORTH SOFT WATER #1	
Watts, 009-M2QT, 3/4", RPBA	172519	01-Mar-2008	INDUSTRIAL WATER	PACKAGING INSTRUMENT PROCESS RM.238	
Febco, 765, 1/2", PVBA	30090	01-Mar-2008	HOSE WATER	RM 176 HOSE RACK SURGICAL ROOM GOWNS REQUIRED	
Febco, 825Y, 3/4", RPBA	R3334	01-Mar-2008	Hot Water Tank	RM 2 HW MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MCCROSKEY
Facility Address: 19 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 153
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009QT, 1/2", RPBA	156996	01-Mar-2006	Ice Machine	ICE MACHINE	
Febco, 806YD, 4", DCVA	10482	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	RM 23 FIRE SPRINKLER WEST WALL	
Watts, 909M1QT, 2", RPBA	366828	01-Mar-2008	DOMESTIC COLD WATER	MECH. RM. BASEMENT EAST	
Watts, 909M1QT, 2", RPBA	366834	01-Mar-2008	DOMESTIC COLD WATER	MECH. RM. BASEMENT EAST	
Watts, 009QT, 1/2", RPBA	149198	01-Mar-2008	HEAT MAKEUP	NE BASEMENT	

List of Installations
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MCEACHERN GRAD. DORM
Facility Address: 805 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 102
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	BA8539	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #6 CENTER BUILDING N. MIDDLE	
Febco, 805Y, 2", DCVA	AL7058	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #7 CENTER BUILDING S. MIDDLE	
Febco, 805Y, 2", DCVA	BA8314	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #9 FRONT BUILDING. NORTH	
Watts, 009QT, 1 1/4", RPBA	21518	01-Oct-2007	COOLING TOWER MAKEUP	MECH ROOM EAST WALL COOLING TOWER	
Febco, 805Y, 2", DCVA	BA8531	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	CENTER BLDG. S. #8	
Febco, 850UBV, 1 1/2", DCVA	H00257	01-Oct-2006	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #4 E BUILDING BY PARKING LOT D6	
Febco, 850UBV, 2", DCVA	H00322	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #5 N CENTER BUILDING D9	
Febco, 850UBV, 1 1/2", DCVA	H00224	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #2 SE CENTER BUILDING	
Febco, 850UBV, 2", DCVA	H00330	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #1 UPPER UNITS D3	
Febco, 805Y, 2", DCVA	F2415	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #10 CENTER BUILDING S #10	
Watts, 009, 3/4", RPBA	38091	01-Oct-2007	HEAT MAKEUP	MECH ROOM HWH MAKEUP	
Febco, 805YD, 4", DCVA	9409020630	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	PIT SW CORNER SIDEWALK	
Febco, 805YD, 4", DCVA	9501250725	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	MECH ROOM BASEMENT CENTER FIRE SYSTEM	
Febco, 850UBV, 1 1/2", DCVA	H00232	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	OUTSIDE CHASE #3 NE UPPER BUILDING D10	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MEATS LAB
Facility Address: 98 700, PULLMAN

Facility Type: Food Processing Plant
Hazard Level: High
Facility ID: 155
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/2", RPBA	B12574	01-Mar-2008	DOMESTIC COLD WATER	MECH ROOM BOTTOM MAIN CW	
Febco, 805Y, 2", DCVA	X4941	01-Jun-2008	Irrigation w/o Chemicals	PIT NW	
Febco, 825Y, 1", RPBA	L6083	01-Mar-2008	COOLING TOWER MAKEUP	RM 109 MECH TOPSIDE COOLING TOWER MAKEUP	
Febco, 825Y, 1 1/2", RPBA	B12635	01-Mar-2008	DOMESTIC COLD WATER	MECH MAIN CW TOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MORRILL
Facility Address: 24 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 158
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, 6CM, 2", RPBA	71799	01-Mar-2008	LAB COLD WATER	RM 20A LAB CW BOTTOM	
Hersey/Grinnell, 6CM, 2", RPBA	70145	01-Mar-2008	LAB COLD WATER	RM 20A LAB COLD WATER TOP	
Febco, 825Y, 1", RPBA	W0325	01-Mar-2008	INDUSTRIAL WATER	20A INDUSTRIAL COLD WATER	

List of Installations
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MOTOR POOL
Facility Address: 066C 701, PULLMAN

Facility Type: MOTOR POOL
Hazard Level: High
Facility ID: 160
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BD8129	01-Jun-2006	TANK FILL	SWEEPER PORTABLE UNIT	
Febco, 805, 4", DCVA	B10060	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	TIME ROOM SPRINKLER SYSTEM	
Febco, 825Y, 1", RPBA	BB5120	01-Jun-2004	TANK FILL	HEAVY EQUIPMENT PORTABLE UNI	
Febco, 825Y, 3/4", RPBA	BG6622	01-Jun-2008	HEAT MAKEUP	GARAGE MECH HOT WATER HEAT MAKEUP	
Febco, 850U, 2", DCVA	H01202	01-Jun-2008	SHOP	SHOP N.E.WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MOTOR POOL GENERAL CAMPUS
Facility Address: 700 701

Facility Type:
Hazard Level: High
Facility ID: 161
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 2", RPBA	H12131	01-Jun-2008	TANK FILL	HEAVY EQUIPMENT	
Febco, 860, 2", RPBA	H11860	01-Jun-2008	TANK FILL	HEAVY EQUIPMENT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MURROW EAST
Facility Address: 33E 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 163
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	BH2970	01-Mar-2008	HEAT MAKEUP	RM 117C HW HEAT MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MURROW HALL ADDITION
Facility Address: 0033A 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 291
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 1 1/2", RPBA	H02117	01-Mar-2008	DOMESTIC COLD WATER	BASEMENT MECH. RM.	
Febco, 860U, 3/4", RPBA	H06810	01-Mar-2008	HEAT MAKEUP	BASEMENT MECH. RM.	
Febco, 850, 3", DCVA	F0208051600	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH.RM.	
Febco, 860U, 1 1/2", RPBA	H02103	01-Mar-2007	DOMESTIC COLD WATER	BASEMENT MECH. RM.	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: MURROW WEST
Facility Address: 33W 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 164
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1", RPBA		01-Mar-2008	HEAT MAKEUP	RM 82 NORTH HOT WATER HEAT	

Febco, 825Y, 3/4", RPBA	V9425	01-Mar-2008	CHILLED WATER MAKEUP	RM 82 CHILLED WATER MAKEUP W WALL

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: NEIL
Facility Address: 070 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 165
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 6", DCVA	B7188	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	8W FIRE SPRINKLER	
Febco, 825Y, 1", RPBA	V5252	01-Apr-2008	HEAT MAKEUP	RM 20 LOWER MECH ROOM BEHIND AIR HANDLER N WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: NEUROLOGIC SCIENCE CENTER
Facility Address: 047 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 295
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850U, 1/2", DCVA	H00007	01-Apr-2007	Drinking Fountain	WEST WALL RM.20	
Febco, 825Y, 1 1/4", RPBA	H01310	01-Apr-2008	DOMESTIC COLD WATER	RM. 20 WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: NUCLEAR RADIATION CENTER
Facility Address: 74 700, PULLMAN

Facility Type: Radioactive Plant
Hazard Level:
Facility ID: 170
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	T7695	15-May-2003		3RD FLOOR EXIT NW CORNER OF BUILDING	
Febco, 825Y, 1", RPBA	BB5160	01-Mar-2008	Boiler Feed Lines	LOWER MECH BOILER ROOM	
Febco, 825Y, 3/4", RPBA	A235600	01-Mar-2008	POOL MAKEUP	PUMP ROOM	
Febco, 825Y, 3/4", RPBA	AF6175	01-Mar-2008	Boiler Feed Lines	LOWER MECH BOILER MAKEUP	
Febco, 860UBV, 1 1/2", RPBA	H00269	01-Mar-2008	RADIOACTIVE PLANT	BASEMENT MAIN DW LOWER	
Watts, 909, 1 1/2", RPBA	???????	01-Mar-2008	RADIOACTIVE PLANT	BASEMENT MAIN DW UPPER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: NURSING CENTER
Facility Address: SPOKANE 707, SPOKANE

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 171
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 774DCDA, 8", DCDA	1033480901	15-May-2003	Fire Sprinkler w/o Chemical Addition	FIRE MAIN VAULT	
Febco, 825Y, 1", RPBA	AA5350	05-Jun-2002	COOLING TOWER MAKEUP	BASEMENT MECH ROOM NEED 8380 ELEV KEY	
Watts, 007M2, 1", DCVA	05526	15-May-2003	Fire Sprinkler w/o Chemical Addition	FIRE MAIN VAULT	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ORTON HALL
Facility Address: 087 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 174
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009M3QT, 3/4", RPBA	84828	01-Apr-2008	HEAT MAKEUP	RM 1302 HOT WATER HEAT	
Febco, 805YD, 4", DCVA	15559	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 165 MECH ROOM FIRE SPRINKLER	
Watts, 009 RPZ, 3/4", RPBA	44776	01-Apr-2008	HEAT MAKEUP	LOWER MECH ROOM HWH MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: OTHELLO
Facility Address: 2305 710, OTHELLO

Facility Type: Agricultural (farm/dairy)
Hazard Level:
Facility ID: 176
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1", RPBA	2915614	21-May-2002		OUTSIDE HOSE	
Air Gap, AG, 2", AG		21-May-2002		OUTSIDE HOSE BIBB	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: OWEN LIBRARY
Facility Address: 810 700, PULLMAN

Facility Type: LIBRARY
Hazard Level: High
Facility ID: 177
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, 12, 1", RPBA	14680	01-Apr-2008	HEAT MAKEUP	PENTHOUSE HW MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PERHAM
Facility Address: 81B 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 178
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA		01-Apr-2008	Fire Sprinkler w/o Chemical Addition	SOUTH WALL FIRE	
Watts, 009, 3/4", RPBA	41117	01-Apr-2008	HEAT MAKEUP	RM 13 HWH MAKEUP NORTH BUILDING	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PHYSICAL EDUCATION
Facility Address: 96 700, PULLMAN

Facility Type: GYM
Hazard Level: High
Facility ID: 179
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 2", RPBA	81400	01-Apr-2004	Pool/Spa	B16	
Watts, 909, 2", RPBA	81366	01-Apr-2008	Pool/Spa	B16 LAWN AND POOL MAKEUP UPPER	
Febco, 825Y, 1", RPBA	M0865	01-Apr-2008	COOLING TOWER MAKEUP	RM 193 SW PENTHOUSE	
Watts, 909, 3/4", RPBA	11727	01-Apr-2008	HEAT MAKEUP	B16 CONDENSER HW MAKEUP CENTER	
Febco, 825Y, 1", RPBA	BD1374	01-Apr-2008	CHILLED WATER MAKEUP	RM 193 CHILLED WATER MAKEUP PENTHOUSE CENTER	

List of Installations
By Facility Name and Address

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Air Gap, AG, 2", AG		01-Apr-2008	TANK DRAIN	B18A TANK MAKEUP
Febco, 850, 6", DCVA	F0208011655	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM.16 WEST WALL

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PLANT BIO-SCIENCE
Facility Address: 826 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 316

Account No: 316
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 4", RPBA	F050706081	01-Mar-2008	DOMESTIC COLD WATER	BASE. MECH. RM.B16 DOM. COLD WATER	
Febco, 805YB, 3/4", DCVA	H004359	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	BASE. MECH RM.	
Febco, 856, 6", DCDA	F0312061001	01-Mar-2008	Fire Sprinkler w/o Chemical Addition	BASE. MECH. RM.	
Febco, 860, 2", RPBA	08210	01-Mar-2008	LAB COLD WATER	BASE. MECH. RM.	
Febco, 860, 1 1/4", RPBA	A01258	01-Mar-2008	HEAT MAKEUP	PENTHOUSE	
Febco, 860, 2", RPBA	H09422	01-Mar-2008	DOMESTIC COLD WATER	MAIM DOM. WATER RM. B16	
Febco, 860, 2", RPBA	H08224	01-Mar-2007	LAB COLD WATER	LAB COLD WATER WEST RM. B16	
Febco, 860, 1 1/4", RPBA	H00116	01-Mar-2008	DEIONIZED WATER	BASE. MECH. RM.	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PLANT GROWTH CENTER
Facility Address: 122 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 181

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 800, 1/2", PVBA	09014	01-Apr-2008	HOSE WATER	RM G9 STORAGE BY ROLL UP DOOR	
Febco, 825Y, 2", RPBA	A006738	01-Apr-2008	LAB COLD WATER	1ST FLOOR MECH NON-POTABLE WATER TOP	
Febco, 825Y, 2", RPBA	A010757	01-Apr-2008	LAB COLD WATER	1ST FLOOR MECH NON-POTABLE WATER BOTTOM	
Febco, 805Y, 2", DCVA	021736	01-Apr-2008	DOMESTIC COLD WATER	1ST FLOOR MECH COM CW BOTTOM	
Febco, 805Y, 2", DCVA	A010110	01-Apr-2008	DOMESTIC COLD WATER	1ST FLOOR MECH DOM CW TOP	
Watts, 800, 1/2", PVBA	08346	01-Apr-2008	LAB	GROWTH CHAMBERS 1ST FLOOR WEST END	
Watts, 800, 1/2", PVBA	08738	01-Apr-2008	TRAP PRIMERS	1ST FLOOR MECH TRAP PRIMERS	
Watts, 800, 1/2", PVBA		01-Apr-2008	TRAP PRIMERS	UPSTAIRS RM 102 JANITOR ROOM	
Ames, 2000 SS, 4", DCVA	2BM0435	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	1ST FLOOR MECH FIRE SPRINKLER	
Watts, 800, 1/2", PVBA	08767	01-Apr-2008	TRAP PRIMERS	1ST FLOOR MECH SE WALL	
Febco, 825Y, 2", RPBA	A044737	01-Apr-2008	Fertilizer Injector	GROWTH CHAMBERS 1ST FLOOR EAST FERT. SYSTEM	
Watts, 800, 1/2", PVBA	09026	01-Apr-2008	TRAP PRIMERS	GROWTH CHAMBER BY FERTILIZER PUMP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PONY BARN
Facility Address: 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 182

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 709, 2", DCVA	91452	01-Jun-2008	LIVESTOCK WATER	BLDG 165D VET PIT BY FIRE HYDRANT OLD DAIRY RD	
Hersey/Grinnell, FDC, 3/4", DCVA	8125	01-Jun-2005	LIVESTOCK WATER	165B PIT TANKS BEHIND PONY BARN	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER
Facility Address: HOPS BLDG 708, PROSSER

Facility Type: RESEARCH STATION
Hazard Level:
Facility ID: 186
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	A038270	18-Sep-2002		UNDER NORTH TABLE IN GREENHOUSE	
Watts, 909, 1", RPBA	124143	17-Sep-2002		MECH	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER AUTO SHOP
Facility Address: PROSSER 2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 187
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BK5091	17-Sep-2002		RM 48	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER BOILER PLANT
Facility Address: PROSSER 2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 188
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009M2QT, 1", RPBA	142211	18-Sep-2002		UPPER MECH BOILER MAKEUP	
Watts, 009M2QT, 1", RPBA	140166	17-Sep-2002		LOWER MECH CHILLED WATER MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER HAMILTON
Facility Address: PROSSER2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 189
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009QT, 2", RPBA	07860	18-Sep-2002		GREENHOUSE SE CORNER BOTTOM RT KIT	
Watts, 009QT, 1", RPBA	23350	18-Sep-2002		JANITOR ROOM BETWEEN BATHROOM AND STORAGE HW	
Febco, 825Y, 1", RPBA	AG2501	18-Sep-2002		ROOM BETWEEN BATHROOM AND STORAGE LAB COLD W	
Watts, 009QT, 2", RPBA	14178	18-Sep-2002		GREENHOUSE SE CORNER TOP TAKES RT KIT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER HOPS BUILDING
Facility Address: PROSSER 2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 190
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BK0546	17-Sep-2002		NW OF WTER TANK PUMP HOUSE	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER PUMP HOUSE
Facility Address: PROSSER 2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 191

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AB7526	17-Sep-2002		NORTH PIT FEEDS USDA	
Febco, 805Y, 2", DCVA	AB7529	17-Sep-2002		SOUTH PIT FEED USDA	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: PROSSER WSU
Facility Address: PROSSER 2000 708, PROSSER

Facility Type:
Hazard Level:
Facility ID: 192

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Air Gap, AG, 2", AG		21-May-2002		TANK FILL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: RECYCLE
Facility Address: 357 701, PULLMAN

Facility Type: DRY STOREAGE
Hazard Level: Low
Facility ID: 193

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BI1961	01-Jun-2008	DOMESTIC COLD WATER	LOADING DOCK SE CORNER	
Wilkins, 950, 4", DCVA	B09569	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	LOADING DOCK SE CORNER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: REGENTS
Facility Address: 065 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 198

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 4", DCVA	9505120809	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 4 INSIDE WEST LOADING DOCK BLDG.	
Febco, 850, 4", DCVA	9505111423	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	LOWER MECH SW FIRE BLDG. C	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: REGENTS
Facility Address: 65 702, PULLMAN

Facility Type: KITCHEN
Hazard Level: Low
Facility ID: 196

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	X3055	01-Jul-2008	Irrigation w/o Chemicals	INSIDE RM 65B MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: REGENTS
Facility Address: 65A 700, PULLMAN

Facility Type: KITCHEN
Hazard Level: Low
Facility ID: 197

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid

Febco, 860, 3/4", RPBA	HOO521	01-Apr-2008	Ice Machine	BASEMNT STORE RM. N. WALL ICE MACH.
Febco, 860, 1/2", RPBA	H00701	01-Apr-2008	Beverage Dispenser with CO2	N. KITCHEN POP MACH.
Febco, 860, 3/4", RPBA	H11596	01-Apr-2008	TRAP PRIMERS	N.KITCHEN TRAP PRIMER
Conbraco, SVB, 3/8", SVBA	U0535	01-Apr-2008	HOSE WATER	WEST HOSE REEL DISHWASHER RM.
Febco, 850, 4", DCVA	F0406161151	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	SOFTNER RM.
Febco, 860, 2", RPBA	H00344	01-Apr-2008	DOMESTIC COLD WATER	S. MOP RM. KITCHEN TOP
Febco, 860, 1 1/2", RPBA	H03643	01-Apr-2008	DOMESTIC COLD WATER	BASE. STORE RM. E. WALL COLD WATER BOTTOM
Wilkins, 975XL, 1 1/2", RPBA	2111995	01-Apr-2008	DOMESTIC HOT WATER	BASE. SOTRE RM. EAST WALL
Wilkins, 975XL, 1 1/2", RPBA	2091233	01-Apr-2008	DOMESTIC HOT WATER	S. MOP RM. KITCHEN BOTTOM
Watts, 009 RPZ, 3/4", RPBA	53071	01-Apr-2008	HEAT MAKEUP	C WING SOUTH MECH ROOM LOWER ENTRANCE HWH MAK
Febco, 860, 3/4", RPBA	H09403	01-Apr-2008	REFRIGERATION COOLING WATER	BASE. STORE RM. REF. COMPRESSORS
Febco, 860, 1/2", RPBA	H00728	01-Apr-2008	Beverage Dispenser with CO2	KITCHEN N. POP & ICE MACH.
Conbraco, SVB, 3/8", SVBA	UC764	01-Apr-2008	HOSE WATER	HOSE REEL POT COOKERS
Febco, 860, 1/2", RPBA	H00834	01-Apr-2008	Beverage Dispenser w/o CO2	KITCHEN NW. POP & ICE MACH.
Conbraco, SVB, 3/8", SVBA	UL955	01-Apr-2008	HOSE WATER	EAST HOSE REEL DISHWASHER RM.
Watts, 009 RPZ, 3/4", RPBA	33120	01-Apr-2007	SOAP DISPENSER	DINING LAUNDRY ROOM SOAP DISPENSER
Febco, 850UBV, 1 1/2", DCVA	H00268	01-Apr-2006	DOMESTIC COLD WATER	KITCHEN EAST RM G 25
Febco, 805Y, 2", DCVA	AB2192	01-Apr-2006	DOMESTIC COLD WATER	KITCHEN WEST RM 625
Febco, 805Y, 2", DCVA	U4583	01-Apr-2008	Hot Water Tank	DINING RM 602 HOT WATER TANK

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: RESEARCH TECH PARK (WOOD TECH)
Facility Address: 820 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 199
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	BA0448	01-Apr-2008	Boiler Feed Lines	HW MAKEUP BOILER ROOM WEST WALL	
Febco, 805Y, 1", DCVA	K6208	01-Apr-2008	Irrigation w/o Chemicals	LARGE WOOD SHOP	
Febco, 825Y, 1", RPBA	L5774	01-Apr-2008	Hot Water Tank	SOUTH WOOD LAB HW HEATER MAKEUP SOUTH WALL	
Febco, 825Y, 2", RPBA	218617	01-Apr-2008	INDUSTRIAL WATER	WOOD PRESS	
Febco, 825Y, 3/4", RPBA	A219919	01-Apr-2008	LAB HOT WATER	BALCONY HW	
Febco, 825 YAR, 3/4", RPBA	RH2987	01-Mar-2008	Boiler Feed Lines	BOILER ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ROGERS
Facility Address: 083 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 200
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	41127	01-May-2008	HEAT MAKEUP	RM 163 HWH MAKEUP L MECH ROOM	
Watts, 009 RPZ, 3/4", RPBA	38972	01-Apr-2008	HEAT MAKEUP	RM 1300 HWH MAKEUP	
Febco, 805YD, 4", DCVA	B13023	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH RM UNDER HW TANKS	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ROGERS FIELD
Facility Address: 10 702, PULLMAN

Facility Type: PRACTICE FAC.
Hazard Level: Low
Facility ID: 129
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Orion, BDC, 4", DCVA	21787	02-Jul-2003		NORTH PIT	2 0

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: ROYAL SLOPE
Facility Address: 2200 708, ROYAL SLOPE

Facility Type: RESEARCH STATION
Hazard Level:
Facility ID: 201
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1", RPBA	291496	21-May-2002		OUTSIDE HOSE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: S.R.C.
Facility Address: 819 700, PULLMAN

Facility Type: GYM
Hazard Level: Low
Facility ID: 203
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 950, 2 1/2", DCVA	A06844	01-Apr-2008	DOMESTIC COLD WATER	S0. MECH. RM.	
Wilkins, 975, 3", RPBA	B28603	01-Apr-2008	POOL MAKEUP	SO. MECH. RM.	
Wilkins, 950, 2 1/2", DCVA	A06846	01-Apr-2008	DOMESTIC COLD WATER	S0. MECH. RM.	
Wilkins, 975XL, 1 1/2", RPBA	816906	01-Apr-2008	HEAT MAKEUP	S0. MECH. RM.	
Watts, 009QT, 1/2", RPBA	151382	01-Apr-2005	Beverage Dispenser w/o CO2	BELOW LATT'E MACHINE RM141	
Febco, 850, 6", DCVA	908271255	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	SO. MECH. RM N. WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SAFETY
Facility Address: 084 700, PULLMAN

Facility Type: ADMINASTRATION BLDG.
Hazard Level: High
Facility ID: 204
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	BG6978	01-Apr-2008	HEAT MAKEUP	RM 22 HW HEAT MAKEUP WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SCIENCE HALL
Facility Address: 032 700, PULLMAN

Facility Type: Laboratory
Hazard Level: Low
Facility ID: 205
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Cla-Val, DC, 4", DCVA	CR111	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	B12 SPRINKLER SYSTEM	
Febco, 825YD, 2 1/2", RPBA	F0209271634	01-Apr-2008	LAB COLD WATER	B12 2ND FROM BOTTOM	
Febco, 825Y, 1", RPBA	BD1281	01-Apr-2008	HEAT MAKEUP	6TH MECH HW HEAT WEST WALL BOTTOM	
Febco, 825YD, 2 1/2", RPBA	F0209271635	01-Apr-2007	DOMESTIC COLD WATER	B12 TOP	

Febco, 765, 1", PVBA	AA8294	01-Apr-2008	VACUM PUMP	RM 600 VACUUM PUMP N WALL
Febco, 825Y, 1", RPBA	A237942	01-Apr-2008	HEAT MAKEUP	HWH MAKEUP 6TH FLR MECH ABOVE HWP 3&4
Febco, 825YD, 2 1/2", RPBA	F0209271631	01-Apr-2008	DOMESTIC COLD WATER	B12 2ND FROM TOP
Febco, 805Y, 3/4", DCVA	U3314	01-Apr-2008	Air Compressor	RM 141 AIR COMPRESSOR SMALL BLDG OUT E DOOR
Watts, 009QT, 1", RPBA	18846	01-Apr-2008	HEAT RECLAIM	B12
Rainbird, DCA200, 2", DCVA	80687	01-Apr-2008	Irrigation w/o Chemicals	B12 LOWER MECH ROOM
Watts, 009M2QT, 1 1/2", RPBA	67990	01-Apr-2007		RM. B 12
Febco, 805Y, 3/4", DCVA	U3263	01-Apr-2008	Air Compressor	RM 600 AIR COMPRESSOR
Watts, 909, 1", RPBA	360838	01-Apr-2008	LAB COLD WATER	6TH MECH WS 7TH FLOOR GREENHOUSE
Febco, 825YD, 2 1/2", RPBA	F0209271636	01-Apr-2008	LAB COLD WATER	B12 BOTTOM
Cla-Val, RP1, 2 1/2", RPBA	CP145	25-Apr-2003	DOMESTIC COLD WATER	B12 DCW 2ND FROM TOP
Febco, 765, 3/4", PVBA	AA3528	01-Apr-2007	VACUM PUMP	RM 600 VACUUM PUMP
Cla-Val, RP1, 2 1/2", RPBA	CP143	24-Apr-2003	LAB COLD WATER	B12 LCW BOTTOM
Cla-Val, RP1, 2 1/2", RPBA	CP144	24-Apr-2003	LAB COLD WATER	RM B12 LCW 2ND FROM BOTTOM
Febco, 825Y, 1", RPBA	AE6903	01-Apr-2008	COOLING TOWER MAKEUP	RM 600 WEST WALL TOP
Cla-Val, RP1, 2 1/2", RPBA	CP146	24-Apr-2003	DOMESTIC COLD WATER	B12 DCW TOP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SCOTT (COMAN)
Facility Address: 072 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 206
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 3/4", RPBA	H00156	01-Apr-2005	HEAT MAKEUP	G2 CENTER MECH ROOM HWH	
Febco, 850, 4", DCVA	9505111424	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	MECH	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SEED PLANT BLDG 115
Facility Address: 115 701, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 207
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AJ2767	01-Jun-2008	Irrigation w/o Chemicals	PIT NORTH OF SEED PLANT	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SEWER PUMP BLDG 167
Facility Address: 167 701, PULLMAN

Facility Type: Sewage Pump/Lift Station
Hazard Level: High
Facility ID: 208
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860U, 1/2", RPBA	H00007	01-Jun-2008	Sewage Equipment	MECH. RM.	
Watts, 909, 3/4", RPBA	94189	01-Jun-2007	Sewage Equipment	GRIMES WY AND AIRPORT PIT	
Febco, 860U, 1/2", RPBA	H0097	01-Jun-2008	Sewage Equipment	MECH. RM.	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SLQAN
Facility Address: 078 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 210
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 3/4", DCVA	81282	01-Apr-2008	LAB COLD WATER	RM 18 WEST WALL LAB WATER	
Watts, 709, 3/4", DCVA	80219	01-Jul-2008	Irrigation w/o Chemicals	INSIDE NEED BLDG KEY LAWN SRINKLER RM. 34 SLOAN	
Watts, 700, 3/4", DCVA	406364	01-Apr-2008	Water Softener	B6 WEST WALL SOFT WATER AND FISH TANK	
Watts, 700, 3/4", DCVA	308269	01-Apr-2008	WATER STILL	RM 400 HEAD OF STAIRS WEST WALL	
Watts, 909, 2", RPBA	81397	01-Apr-2008	DOMESTIC COLD WATER	B7 MAIN DW LOWER	
Febco, 825Y, 3/4", RPBA	BG7021	01-Apr-2008	REFRIGERATION COOLING WATER	RM 157	
Kennedy, B2, 6", DCVA	E19735 E19192	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	SB3 FIRE SPRINKLER SYSTEM	
Watts, 909, 1", RPBA	11392	01-Oct-2007	Hot Water Tank	B7 HW MAKEUP	
Watts, 909, 2", RPBA	81898	01-Oct-2007	DOMESTIC COLD WATER	B7 MAIN DW UPPER	
Febco, 805Y, 1", DCVA	A152539	01-Apr-2008	DEIONIZED WATER	RM. 310 D. I. WATER	
Watts, 909, 3/4", RPBA	411261	01-Apr-2008	LAB COLD WATER	PENTHOUSE MECH UPSTAIRS WEST WALL	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SMITH AG
Facility Address: 054 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 212
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009M2QT, 1", RPBA	108459	01-Apr-2008	LAB COLD WATER	RM 112 MAIN FLOOR MECH ROOM	
Watts, 009M2QT, 3/4", RPBA	192714	01-Apr-2008	LAB HOT WATER	RM 112 MECH ROOM MAIN FLOOR UPPER	
Hersey/Grinnell, DDCII, 4", DCVA	300392	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 114 SERVES VIF	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SMITH AG.
Facility Address: 702, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 297
Account No: 297
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Wilkins, 950XL, 2", DCVA	785376	01-Jun-2008	Irrigation w/o Chemicals	NW CORNER SMITH AG.	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SMITH GYM
Facility Address: 012 700, PULLMAN

Facility Type: GYM
Hazard Level: High
Facility ID: 214
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	AF0498	01-Apr-2008	POOL MAKEUP	B1 POOL MAKUP NORTH WALL	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SMOOT HILL
Facility Address: 412 706, ALBION

Facility Type: RESEARCH STATION
Hazard Level: High
Facility ID: 216
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Air Gap, AG, 1", AG		01-Aug-2007	CHEMICAL MIX	NE CORNER OF BLDG. CONNECTED TO FROST FREE HYD.	
Hersey/Grinnell, FDC, 1", DCVA		01-Aug-2007	HOSE WATER	SMOOT HILL PIT UNDER TREE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SPILLMAN FARM
Facility Address: 401C 711, SPILLMAN FARM

Facility Type: Agricultural (farm/dairy)
Hazard Level: High
Facility ID: 218
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/2", RPBA	B02117	01-Jul-2007	DOMESTIC COLD WATER	PUMP HOUSE	
Watts, 909, 2", RPBA	80164	01-Aug-2007	Irrigation with Chemicals	PUMP HOUSE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEFFEN CENTER
Facility Address: 180A 700, PULLMAN

Facility Type: GREENHOUSE LAB
Hazard Level: High
Facility ID: 221
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BE4183	01-Apr-2008	LAB COLD WATER	EAST GREENHOUSE BOTTOM	
Febco, 825Y, 2", RPBA	BJ6215	01-Apr-2008	LAB COLD WATER	EAST GREENHOUSE TOP	
Hersey/Grinnell, FDC, 3/4", DCVA	81258	01-Apr-2008	LAB COLD WATER	FIRST GREENHOUSE RM 122	
Watts, 009M2, 3/4", RPBA	129871	01-Apr-2008	Boiler Feed Lines	BOILER MAKEUP WATER MECH ROOM	
Hersey/Grinnell, FDC, 3/4", DCVA	81259	01-Apr-2008	LAB COLD WATER	RM 124 GREENHOUSE CW	
Hersey/Grinnell, FDC, 1", DCVA	81633	01-Apr-2008	DOMESTIC COLD WATER	RM 107 MAIN DCW SHOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEFFEN CENTER FARM
Facility Address: 180 701, PULLMAN

Facility Type: Agricultural (farm/dairy)
Hazard Level: High
Facility ID: 322
Account No: 322
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 2", RPBA	H00446	01-Jun-2008	Irrigation w/o Chemicals	TOP OF HILL ABOVE BEAVER POND	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEPHENSON DINING
Facility Address: 093C 700, PULLMAN

Facility Type: KITCHEN
Hazard Level: High
Facility ID: 223
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 1 1/2", RPBA	H00215	01-Apr-2008	DOMESTIC HOT WATER	BASEMENT MECH. RM. HOT WATER WEST	
Watts, 009QT, 3/4", RPBA	53076	01-Oct-2007	HEAT MAKEUP	LOWER MECH EAST WALL	

Febco, 860UBV, 1 1/2", RPBA	H00199	01-Apr-2008	DOMESTIC HOT WATER	BASE..MECH .HOT WATER EAST
Febco, 860, 1/2", RPBA	H02763	01-Apr-2008	Ice Machine	RM. 116 ICE MACHINE
Watts, 009RPZ, 3/4", RPBA	44490	01-Oct-2004	SOAP DISPENSER	RM 13 HALLWAY MEN'S ROOM SOAP DISPENSER
Febco, 860, 1/2", RPBA	h02680	01-Apr-2008	GARBAGE DISPOSAL	N. WALL GARBAGE DISPOSAL
Febco, 860, 1/2", RPBA	H02736	01-Apr-2008	Ice Machine	KITCHEN ICE MACH.
Febco, 765, 3/4", PVBA	000000	01-Apr-2008	GARBAGE CAN WASHER	RM. 116 CAN WASHER

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEPHENSON EAST
Facility Address: 093E 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 225
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805, 2 1/2", DCVA	15174	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 112 FIRE SPRINKLER	
Watts, 009RPZ, 3/4", RPBA	48066	01-Oct-2007	HEAT MAKEUP	RM 112 HWH MAKUP LOWER MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEPHENSON NORTH
Facility Address: 093N 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 224
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009RPZ, 3/4", RPBA	48079	01-Apr-2008	HEAT MAKEUP	RM 112 HWH MAKEUP	
Wilkins, 550, 2 1/2", DCVA	W102706	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 112 SPRINKLER SYSTEM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEPHENSON SOUTH
Facility Address: 093S 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 226
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805, 2 1/2", DCVA	15173	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 112 FIRE SPRINKLER	
Watts, 009RPZ, 3/4", RPBA	46596	01-Apr-2008	HEAT MAKEUP	RM 112 HWH	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STEVENS HALL
Facility Address: 034 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 229
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 806YD, 3", DCVA	9482	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	KITCHEN FIRE SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STIMSON
Facility Address: 035 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 230
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid

Febco, 805Y, 1 1/2", DCVA	H3709	01-Apr-2008	DOMESTIC COLD WATER	RM 33 MAIN CW UPPER
Ames, 2000 SS, 4", DCVA	0711B3	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	RM 33 FIRE LINE
Febco, 805Y, 1 1/2", DCVA	D3369	01-Apr-2008	DOMESTIC COLD WATER	RM 33 MAIN CW LOWER
Watts, 009QT, 3/4", RPBA	53087	01-Apr-2008	HEAT MAKEUP	RM 34 HWH MAKEUP

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STOCK JUDGING PAVILON
Facility Address: 150 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: Low
Facility ID: 231
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA	158868	01-Jun-2008	Irrigation w/o Chemicals	SW WING IRRIGATION WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STREIT
Facility Address: 81A 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 232
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA		01-Apr-2008	Fire Sprinkler w/o Chemical Addition	SOUTH WALL IN SOUTH BUILDING	
Watts, 009 RPZ, 3/4", RPBA	52466	01-Oct-2007	HEAT MAKEUP	RM 13 HWH MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: STREIT PERHAM HALL
Facility Address: 81C 700, PULLMAN

Facility Type: DORM
Hazard Level: High
Facility ID: 234
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	K2961	01-Apr-2008	HEAT MAKEUP	RM. 82	
Febco, 825Y, 1 1/4", RPBA	K4857	01-Apr-2008	REFRIGERATION COOLING WATER	RM 82	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SURPLUS STORES
Facility Address: 358B 701, PULLMAN

Facility Type: DRY STOREAGE
Hazard Level: Low
Facility ID: 235
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 4", DCVA		01-Jun-2008	Fire Sprinkler w/o Chemical Addition	S WALL SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SWINE BARN (OLD)
Facility Address: 142E 701, PULLMAN

Facility Type: CHEMICAL STOREAGE
Hazard Level: High
Facility ID: 236
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	BJ3784	01-Jun-2005	CHEMICAL STOREAGE	HAZARD WASTE COLD ROOM	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: SWINE CENTER
Facility Address: 405 705, TULA FARM

Facility Type: Livestock Facility
Hazard Level: Low
Facility ID: 237
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA	V7612	01-Aug-2007	DOMESTIC COLD WATER	NEW CORNER OUTSIDE OF TRAILER HWH PANEL	
Watts, 909, 1", RPBA	58017	01-Aug-2007	HOSE WATER	RM 126 SHOP	
Febco, 825Y, 1", RPBA	A105146	01-Aug-2007	LIVESTOCK WATER	UPSTAIRS MECH ROOM 202 SWINE WATERER	
Febco, 825Y, 1", RPBA	BH8770	01-Jun-2007	COOLING TOWER MAKEUP	RM 202 UPPER MECH SWAMP COOLERS	
Febco, 825Y, 2", RPBA	T7450	01-Aug-2007	DOMESTIC COLD WATER	RM 202 UPSTAIRS MECH ROOM SHUT OFF PANEL1 BRK26	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: THOMPSON
Facility Address: 001 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 242
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	182152	01-Apr-2008	HEAT MAKEUP	RM 12B CENTER MECH ROOM	
Febco, 805Y, 2", DCVA	147397	01-Apr-2008	DOMESTIC COLD WATER	12B CENTER MECH ROOM	
Febco, 805Y, 2", DCVA	131831	01-Apr-2008	DOMESTIC COLD WATER	RM 12B CENTER MECH ROOM	
Febco, 850, 6", DCVA	9908201320	01-May-2008	Fire Sprinkler w/o Chemical Addition	RM 12B SOUTH WALL FIRE LINE	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: TODD
Facility Address: 55 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: High
Facility ID: 244
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009QT, 1", RPBA	28988	01-Apr-2008	HEAT MAKEUP	LOWER MECH ROOM NE CORNER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: TODD ANNEX
Facility Address: 55A 700, PULLMAN

Facility Type: CLASS ROOM FAC.
Hazard Level: Low
Facility ID: 245
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, #2, 6", DCVA	8017896	01-Apr-2008	Fire Sprinkler w/o Chemical Addition	BASEMENT MECH FIRE SPRINKLER SOUTH WALL	
Watts, 909, 1", RPBA	231100	01-Apr-2008	HEAT MAKEUP	BASEMENT MECH N WALL HOT WATER HEAT MAKEUP	
Watts, 909, 1 1/2", RPBA	200120	01-Apr-2008	DOMESTIC COLD WATER	BASEMENT MECH UPPER MAIN COLD WATER	
Febco, 860U, 1/2", RPBA	HOO99	01-Apr-2008	Beverage Dispenser w/o CO2	RM. 374 SE CORNER	
Watts, 909, 2", RPBA	185320	01-Apr-2008	DOMESTIC COLD WATER	BASEMENT MECH LOWER COLDWATER	
Febco, 825Y, 1", RPBA	V9467	01-Apr-2008	Dishwasher with Chemicals	270F DISHWASHER	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: TROY
Facility Address: 036 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 247
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	U5124	01-Apr-2008	HEAT MAKEUP	RM 12 MAKEUP HOTWATER HEAT	
Watts, 709, 2", DCVA	104196	01-Apr-2008	HOSE WATER	RM 6 MECH ROOM MAKEUP AND HOSE BIB	
Watts, 909, 1 1/2", RPBA	108700	01-Apr-2008	LAB COLD WATER	RM 6 LAB WATER LOWER	
Watts, 709, 3/4", DCVA	98371	01-Apr-2008	Water Softener	RM 3 S WALL FEEDS SOFTNER	
Watts, 909, 1 1/2", RPBA	127839	01-Apr-2008	LAB COLD WATER	RM 6 LAB WATER COLD UPPER	
Watts, 909, 3/4", RPBA	87655	01-Apr-2008	LAB HOT WATER	RM 12 LAB HOT WATER MAKEUP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: TUKEY HORTICULTURE
Facility Address: 121 701, PULLMAN

Facility Type: Agricultural (farm/dairy)
Hazard Level: High
Facility ID: 248
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Air Gap, AG, 2", AG	36243	01-Jun-2008	TANK FILL	LOWER LOT	
Air Gap, AG, 2", AG	36243	01-Jun-2008	TANK FILL	UPPER LOT	
Watts, 709, 2", DCVA	80248	01-Apr-2008	FARM SHOP	RM 108 MAIN DCW BACKROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA
Facility Address: 197J 701, PULLMAN

Facility Type: SHOP
Hazard Level: High
Facility ID: 65
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 1", DCVA	81632	01-May-2005	LIVESTOCK WATER	MINK PENS MECH SHOP AREA	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA
Facility Address: 197M 701, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 251
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 3/4", DCVA	81292	01-Jun-2005	Sterilizer	USDA BLDG #117 STERILIZER PUFFET CHEM LAB	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA ALBION
Facility Address: 706, ALBION, USDA

Facility Type: RESEARCH STATION
Hazard Level: High
Facility ID: 252
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/4", RPBA	AA5311	01-Aug-2007	LAB COLD WATER	ALBION USDA BLUE TOWER BUILDING NW WALL INSIDE LA	
Febco, 860, 3/4", RPBA	H15321	01-Aug-2007	HOSE WATER	ALBION USDA N WALL INSIDE GREENHOUSE	

List of Installations
By Facility Name and Address

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Watts, 909, 1", RPBA	225171	01-Aug-2007	LAB COLD WATER	ALBION USDA LAB WATER AND HOSE BIBB CHEMICAL BU
Hersey/Grinnell, FDC, 1", DCVA	81293	01-Aug-2007	HOSE WATER	ALBION SHOP WEST WALL

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA BLDG 112
Facility Address: 197C 701, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 253
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 1", RPBA	289782	01-Jun-2008	DOMESTIC COLD WATER	USDA BLDG #112 MAIN WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA BLDG 113
Facility Address: 197D 701, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 254
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FDC, 3/4", DCVA	81296	01-Jun-2005	REFRIGERATION COOLING WATER	USDA BLDG #113 MECH ROOM	
Hersey/Grinnell, FDC, 1 1/2", DCVA	83597	01-Jun-2005	LAB COLD WATER	USDA BLDG #113 MECH ROOM WATER CONDITIONER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA ISOLATION
Facility Address: 198 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 321
Account No: 321
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	H07591	01-Jun-2008	LIVESTOCK WATER	OUTSIDE BLDG. 119-7	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA PLANT INTRO
Facility Address: 196C 701, PULLMAN

Facility Type: Agricultural (farm/dairy)
Hazard Level: High
Facility ID: 255
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 3/4", RPBA	185515	01-Jun-2008	CHEMICAL STOREAGE	SO.WALL HOSE BIBB	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: USDA114
Facility Address: 197E 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 249
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	A218136	01-Jun-2005	LIVESTOCK WATER	USDA BLDG #114 MAIN WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: VET BLDG 160A
Facility Address: 160A 701, PULLMAN

Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 257
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid

Febco, 860UBV, 2", RPBA	HOO708	01-Jun-2008	LIVESTOCK WATER	MAIN DCW VET LG ANIMAL BARN PUMP HOUSE COUNTY R

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: VET FARM SHOP BLDG 166A
Facility Address: 166A 701, PULLMAN
Facility Type: Agricultural (farm/dairy)
Hazard Level: High
Facility ID: 258
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 3/4", RPBA	192265	01-Jun-2008	LIVESTOCK WATER	VET FARM SHOP AND DOG RUNS SOUTH	
Watts, 909, 3/4", RPBA	194449	01-Jun-2008	LIVESTOCK WATER	VET SHOP AND DOG RUNS PIT NORTH	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: VET MAINT SHOP BLDG 166
Facility Address: 166 701, PULLMAN
Facility Type: MOTOR POOL
Hazard Level: High
Facility ID: 261
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/2", RPBA	AG7969	01-Jun-2008	FARM SHOP	SHOP UNDER STAIRS	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: VET QUARANTINE
Facility Address: 199G 701, PULLMAN
Facility Type: Livestock Facility
Hazard Level: High
Facility ID: 262
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 3/4", RPBA	10932	01-Jun-2008	LIVESTOCK WATER	RM 15 MAIN WATER MECH ROOM	
Febco, 825Y, 1", RPBA	AB1338	01-Jun-2008	LIVESTOCK WATER	RM 15 MAIN WATER MECH ROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: VET STORAGE
Facility Address: 068 700, PULLMAN
Facility Type: DRY STOREAGE
Hazard Level: High
Facility ID: 263
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1 1/4", RPBA	V1343	18-May-2006	REFRIGERATION COOLING WATER	RM 3A HWH COOLING TOWER AND REFRIG COMPRESSOR	
Febco, 805Y, 2", DCVA	J8255	20-May-2006	DOMESTIC COLD WATER	RM 1B MAIN DW QUONSET BEHIND WEGNER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: VET TEACHING
Facility Address: 818 700, PULLMAN
Facility Type: VET TEACHING HOSPITAL
Hazard Level: High
Facility ID: 264
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825YD, 3", RPBA	9407281514	01-May-2008	LAB COLD WATER	RM 22 BASEMENT MECH WEST WALL LAB CW TOP	
Watts, 800M4QT, 3/4", PVBA	07037	01-May-2008	VACUM PUMP	RM 22 BASEMENT MECH VACUUM PUMP	
Febco, 825Y, 1 1/2", RPBA	BC2319	01-May-2008	INDUSTRIAL WATER	RM 22 BASEMENT MECH WEST WALL IND H20 TO PENTHOU	
Watts, 800, 1/2", PVBA	???	01-May-2008	EYE WASH	RM 1402 SINK EYEWASH	
Febco, 825Y, 1 1/2", RPBA	BC2548	01-May-2007	INDUSTRIAL WATER	BASEMENT MECH WEST WALL IND WATER TO PENTHOUSE	

Febco, 805Y, 3/4", DCVA	Y7669	01-May-2008	Irrigation w/o Chemicals	CHASE BETWEEN RESTROOMS 1700
Watts, 800, 1/2", PVBA	M523027	01-May-2008	EYE WASH	RM 1201 BARN AREA WEST WALL EYEWASH
Febco, 825YD, 3", RPBA	9407281512	01-May-2008	LAB COLD WATER	RM 22 BASEMENT MECH WEST WALL LAB CW BOTTOM
Febco, 825YD, 3", RPBA	16631	01-May-2008	DOMESTIC COLD WATER	BASEMENT MECH NORTH WALL MAIN CW
Watts, 800, 1/2", PVBA	????	01-May-2008	EYE WASH	RM 1701D PHARMACY WEST SINK EYEWASH
Watts, 800, 1/2", PVBA	?????	01-May-2008	EYE WASH	RM 1646B LAUNDRY ROOM NORTH SINK/EYEWASH
Watts, 800 CM, 1/2", PVBA	M518193	01-May-2008	EYE WASH	RM 45 EYEWASH EAST SINK
Febco, 805Y, 1 1/2", DCVA	AJ6771	01-May-2008	Hot Water Tank	BASEMENT MECH DOM HW MAKEUP BOTTOM
Febco, 825Y, 1", RPBA	BB5182	01-May-2008	Boiler Feed Lines	RM 13B BEHIND BOILER BOILER MAKEUP
Watts, 800, 1/2", PVBA	M517656	01-May-2008	EYE WASH	RM 47 EYEWASH SOUTH WALL
Watts, 800 CM, 1/2", PVBA	M512680	01-May-2008	EYE WASH	RM 045 EYEWASH SOUTH WALL
Ames, 2000 SS, 6", DCVA	2BJ0574	01-May-2008	Fire Sprinkler w/o Chemical Addition	RM 22 BASEMENT MECH NORTH WALL FIRE
Febco, 805Y, 1 1/2", DCVA	AK3022	01-May-2008	Hot Water Tank	BASEMENT MECH ROOM COM HW MAKEUP TOP
Watts, 800, 1/2", PVBA	M523034	01-May-2008	EYE WASH	RM 1111 SHUTOFF ACCROSS FROM RM 1211 IN HALL
Watts, 800, 1/2", PVBA	?	01-May-2008	EYE WASH	RM 1303G LARGE ANIMAL XRAY SINK/EYEWASH
Febco, 825YD, 3", RPBA	20234	01-May-2008	DOMESTIC COLD WATER	RM 22 BASEMENT MECH NORTH WALL MAIN CW
Watts, 800, 1/2", PVBA	M523044	01-May-2008		RM 1701 PHARMACY EAST WALL EYEWASH AT SINK
Watts, 800, 1/2", PVBA	??	01-May-2008	EYE WASH	RM 1303E LARGE ANIMAL AREA XRAY SINK
Watts, 800, 1/2", PVBA	H 523029	01-May-2008	EYE WASH	RM 1221 BARN AREA SINK/EYEWASH
Watts, 800, 1/2", PVBA	M523045	01-May-2008	EYE WASH	RM 1203 BARN AREA EAST WALL EYEWASH

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: VETERINARY MEDIDINE RESEARH BARN
Facility Address: 120L 700, PULLMAN

Facility Type: Veterinary Clinic
Hazard Level: High
Facility ID: 318

Account No: 318
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860UBV, 3/4", RPBA	H00589	01-May-2008	LIVESTOCK WATER	RM. 109 SOUTH WALL	
Febco, 850UBV, 2", DCVA	H00805	01-May-2008	DOMESTIC COLD WATER	RM.109 SO. WALL BACK BOTTOM	
Febco, 850UBV, 2", DCVA	H00795	01-May-2008	DOMESTIC COLD WATER	RM. 109 SO. WALL FRONT BOTTOM	
Febco, 860UBV, 2", RPBA	H00584	01-May-2008	LIVESTOCK WATER	RM. 109 SO. WALL BACK TOP	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WALLER
Facility Address: 039 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 267

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805YD, 4", DCVA	B17606	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	RM 13	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WASHINGTON BUILDING
Facility Address: 015 700, PULLMAN

Facility Type: Hospital
Hazard Level: Low
Facility ID: 115
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 2", DCVA	267153	01-Mar-2008	Irrigation w/o Chemicals	ENTER THRU MATERIAL ROOM A BY ELEVATOR IN TUNNEL	
Febco, 835B, 1", RPBA	A205719	01-Mar-2008		MAKEUP WATER FOR COOLING TOWER	
Ames, 2000 SS, 6", DCVA		01-Mar-2008	Fire Sprinkler w/o Chemical Addition	O2 ROOM CRAWL SPACE	
Febco, 825, 2 1/2", RPBA	B26088A	01-Mar-2008	DOMESTIC COLD WATER	UPPER MAIN CW	
Febco, 860UBV, 2", RPBA	H00355	01-Mar-2008	DOMESTIC COLD WATER	MECH MAIN CW LOWER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WEBSTER
Facility Address: 801 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 268
Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	AA7779	01-Nov-2007	LAB COLD WATER	RM 1300 SOUTH LABWATER 4TH - 13TH FLOOR	
Febco, 825Y, 1 1/2", RPBA	A008943	01-May-2008	ACID WASHDOWN	PENTHOUSE ACID WASH DOWN NE MECH ROOM	
Febco, 825Y, 3/4", RPBA	BC2922	01-May-2008	HEAT RECLAIM	RM 12 UNDER SUN DECK EAST MECH ROOM LOWER	
Febco, 825Y, 2", RPBA	BD2232	01-May-2008	COOLING TOWER MAKEUP	MECH PENTHOUSE EASTSIDE	
Febco, 850, 6", DCVA	0108201	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	RM. 12 EAST MECH. RM.	
Febco, 805, 6", DCVA	9403161057	01-May-2008	Fire Sprinkler w/o Chemical Addition	B18A SW CORNER FIRE SYSTEM	
Febco, 825Y, 2", RPBA	AA7968	01-May-2008	LAB COLD WATER	B18B MAIN LAB WATER B-3 UPPER	
Febco, 825Y, 2", RPBA	R6984	01-May-2007	LAB COLD WATER	B18B LAWN AND LAB WATER B-3RD FLOOR	
Febco, 825Y, 2", RPBA	BD2262	01-May-2008	COOLING TOWER MAKEUP	PENTHOUSE MECH EASTSIDE	
Febco, 825Y, 2", RPBA	AA7714	01-Nov-2007	LAB COLD WATER	RM 1300 NORTH LAB WATER 4TH -13TH FLOOR	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WEBSTER SHOCK PHYSICS
Facility Address: 801A 700, PULLMAN

Facility Type: Laboratory
Hazard Level: High
Facility ID: 303
Account No: 303
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 860, 3/4", RPBA	01866	01-Jun-2008	HEAT MAKEUP	RM. B2 SOUTH WALL	
Febco, 860, 3/4", RPBA	H06802	01-Jun-2008	HEAT MAKEUP	RM. G33 EAST WALL	
Febco, 850, 3", DCVA	0111151105	01-Jun-2008	DOMESTIC COLD WATER	RM. 2 BOTTOM	
Febco, 850, 3", DCVA	0111151114	01-Jun-2008	DOMESTIC COLD WATER	RM. B2 TOP	
Febco, 850, 2", DCVA	H04112	01-Jun-2008	HOSE WATER	RM. B2 NORTH WALL	
Febco, 860, 3", RPBA	0111131227	01-Jun-2008	LAB COLD WATER	RM. B2 TOP	
Febco, 860, 3", RPBA	0108081358	01-Jun-2008	LAB COLD WATER	RM. B2 BOTTOM	
Febco, 860, 3/4", RPBA	H05839	01-Jun-2008	TRAP PRIMERS	RM. G33 EAST WALL	
Febco, 850, 4", DCVA	0109170649	01-Jun-2008	Fire Sprinkler w/o Chemical Addition	RM. 2 FIRE SYSTOM	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WEGNER
Facility Address: 045 700, PULLMAN

Facility Type: Laboratory
Hazard Level:
Facility ID: 269

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Air Gap, AG, 2", AG		03-Jun-2003		STEMITT ORCHARD PLOT FILL STATION	
Febco, 825Y, 1 1/4", RPBA	BF8460	01-May-2008	CHILLED WATER MAKEUP	PENTHOUSE BACK IN CUBBY NE CORNER CHILLER MAKEU	
Wilkins, 975XLU, 1", RPBA	2170285XLU	01-May-2008	ACID WASHDOWN	RM 400 S PENTHOUSE HIGH BY SF1 SUPPLY FAN	
Watts, 009, 3/4", RPBA	64658	03-Jun-2003		COLUMBIA WELL HOUSE	
Febco, 825Y, 1", RPBA	H12463	01-May-2008	AUTO CLAVE	RM. G19G	
Febco, 825, 3", RPBA	C7611	01-May-2008	LAB COLD WATER	G 59 LAB WATER LOWER	
Febco, 825Y, 1", RPBA	BA1597	03-Jun-2003		WESTERN AVE WHITE HOT BOX	
Febco, 825Y, 1 1/4", RPBA	BF8426	01-May-2008	CHILLED WATER MAKEUP	PENTHOUSE CUBBY HOLE NE CORNER	
Watts, 909, 2", RPBA	241834	04-Jun-2003		MAIN COLDWATER LOWER MECH TOP	
Air Gap, AG, 2", AG		03-Jun-2003		COLUMBIA VIEW PLOTS FILL STATION	
Wilkins, 975XL, 1", RPBA	XLUW230113	01-May-2008	CAGE WASHER	G19 H E WALL BOTTOM	
Febco, 805Y, 1", DCVA		03-Jun-2003		PIT BY MAIL BOX ADRESS 1905 SPRINGWATER RD	
Watts, 909M1QT, 2", RPBA	234553	01-May-2008	LAB COLD WATER	G 59 LAB WATER UPPER	
Febco, 825Y, 1", RPBA	BA1585	03-Jun-2003		OUTSIDE WESTERN AVE WHITE HOT BOX	
Febco, 805, 4", DCVA	5854	01-May-2008	DOMESTIC COLD WATER	RM G 59 BUILDING DCW	
Febco, 835B, 1", RPBA	13216	01-May-2006	GUTTER CLEANER	G35C GUTTER CLEANER	
Febco, 825Y, 2", RPBA	BA5741	01-May-2008	CAGE WASHER	G 19 H E WALL TOP	
Air Gap, AG, 2", AG		03-Jun-2003		NEAR BLDG 54 FILL STATION	
Viking, E1 6, 6", DCVA	1406	01-May-2008	Fire Sprinkler w/o Chemical Addition	G59 FIRE SPRINKLER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WENATCHEE
Facility Address: 3000 709, WENATCHEE

Facility Type: RESEARCH STATION
Hazard Level:
Facility ID: 270

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 909, 2", RPBA	242841	04-Jun-2003		MAIN COLD WATER LOWER MECH. RM.	
Febco, 805Y, 1", DCVA		04-Jun-2003		RM 30 SW CEILING CW TO RM 150	
Febco, 805Y, 1", DCVA	BF8416	04-Jun-2003		MECH E WALL BEHIND GROWTH CHAMBERS	
Febco, 805Y, 1", DCVA		04-Jun-2003		RM 30 HW TO RM 150	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WENATCHEE 1100
Facility Address: 3000 709, WENATCHEE

Facility Type: RESEARCH STATION
Hazard Level:
Facility ID: 272

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	A219901	04-Jun-2003		TOP OF SPRINGWATER STREET PRESSURE WASHER	

List of Installations
By Facility Name and Address

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Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE AUTO SHOP
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 273
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	AM5797	04-Jun-2003		GREEN ROOF BLDG ON SPRINGWATER ST	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE BUILDING 50
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 274
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	BH6063	04-Jun-2003		MAIN CW	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE BUILDING 54
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 275
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA		03-Jun-2003		W END SPRINGWATER RD AT HOUSE BY GAS PUMPS	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE HOUSE
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 276
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 1", DCVA	Q5032	04-Jun-2003		LOWER MECH OVEN E WALL ABOVE AIR COMPRESSOR	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE USDA
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 277
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 2", RPBA	BC9234	04-Jun-2003		BASEMENT NE CORNER	
Febco, 825Y, 2", RPBA	BC9078	04-Jun-2003		BASEMENT NE CORNER	
Febco, 860, 1", RPBA	A12199	04-Jun-2003		BASEMENT MECH. RM.	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150 PULLMAN, WA
Facility Name: WENATCHEE USDA 1104
Facility Address: 3000 709, WENATCHEE
Facility Type: RESEARCH STATION
Hazard Level:
Account No:
Facility ID: 278
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Hersey/Grinnell, FRPII, 2", RPBA	83665	17-Aug-2002		RM 23 LOWER BUILDING WATER	

List of Installations
By Facility Name and Address

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Hersey/Grinnell, FRPII, , RPBA	14793	17-Aug-2002	MECH N END HWH MAKEUP	
Hersey/Grinnell, FRPII, 2", RPBA	83662	17-Aug-2002	RM 23 UPPER BUILDING WATER	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WHITE
Facility Address: 014 700, PULLMAN

Facility Type: DORM
Hazard Level: Low
Facility ID: 279

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	A162954	01-May-2008	DOMESTIC COLD WATER	BASEMENT MECH. RM.	
Febco, 850, 6", DCVA	0011011332	01-May-2008	Fire Sprinkler w/o Chemical Addition	RM. 40A	
Febco, 825Y, 3/4", RPBA	A247073	01-May-2008	COOLING TOWER MAKEUP	PENTHOUSE THROUGH JAN. CLOSET	
Febco, 825Y, 3/4", RPBA	A247056	01-May-2008	HEAT MAKEUP	MECH.RM. BASEMENT	
Febco, 805Y, 2", DCVA	A162963	01-May-2008	DOMESTIC COLD WATER	BASEMENT MECH. RM.	

Customer Name: WHITMAN CO.
Mailing Address: PO BOX 430
COLFAX, WA 99111

Facility Name: WHITMAN CO. SHOP
Facility Address: 705, TULA FARM

Facility Type: MOTOR POOL
Hazard Level: Low
Facility ID: 312

Account No: 312
Customer ID 4

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 2", RPBA	14941	01-May-2007	DOMESTIC COLD WATER	BATHROOM	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WILMER DAVIS DINING CENTER
Facility Address: 30 700, PULLMAN

Facility Type: KITCHEN
Hazard Level: High
Facility ID: 282

Account No:
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Watts, 009, 3/4", RPBA	41018	01-Dec-2004	SOAP DISPENSER	OLD BAKERY SOAP DISPENSER	
Febco, 825Y, 3/4", RPBA	H18557	01-May-2008	DOMESTIC HOT WATER	RM 0001 SW CORNER 115H #80 DHW	
Febco, 805YD, 4", DCVA	B17883	01-Dec-2007	Fire Sprinkler w/o Chemical Addition	FIRE SPRINKLER	
Febco, 860, 2 1/2", RPBA	F030508123	01-May-2008	DOMESTIC COLD WATER	MECH RM BOTTOM DCW	
Febco, 825Y, 3/4", RPBA	H18927	01-May-2008	DOMESTIC HOT WATER	RM. 0001 #83 20H S W CORNER DHW	
Febco, 825Y, 3/4", RPBA	H18924	01-May-2008	DOMESTIC HOT WATER	RM 0001 SW CORNER 22H #82 DHW	
Febco, 825Y, 3/4", RPBA	H18928	01-May-2008	HEAT MAKEUP	MECH RM E WALL HWH	
Febco, 825Y, 3/4", RPBA	H18885	01-May-2008	DOMESTIC HOT WATER	S W RM0001 153 #84	
Febco, 860, 2 1/2", RPBA	F0303041018	01-May-2008	DOMESTIC COLD WATER	MECH RM TOP DCW	
Febco, 825Y, 3/4", RPBA	H18925	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 177C #77 DCW	
Febco, 825Y, 3/4", RPBA	H18896	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 177C #71	
Febco, 825Y, 3/4", RPBA	H18929	01-May-2008	DOMESTIC HOT WATER	RM 0001 SW C0ORNER POT WASHER #76 DHW	
Febco, 825Y, 3/4", RPBA	H18905	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 66C #75 DCW	
Febco, 825Y, 3/4", RPBA	HI8936	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER #74 DCW	
Febco, 825Y, 3/4", RPBA	H18923	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 55C #73 DCW	
Febco, 825Y, 3/4", RPBA	H18432		DOMESTIC HOT WATER	RM 0001 SW CORNER 123H #81 DHW	

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By Facility Name and Address

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Febco, 825Y, 3/4", RPBA	H18168	01-May-2008	Beverage Dispenser w/o CO2	RM 0001 SW CORNER 190C #72
Febco, 825Y, 3/4", RPBA	H18934	01-May-2008	Water Softener	RM 0001 SW CORNER S18 #63 SCW
Febco, 825Y, 3/4", RPBA	H18101	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 50C #70 DCW
Febco, 825Y, 3/4", RPBA	H18898	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 21C #69 DCW
Febco, 825Y, 3/4", RPBA	H18938	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 173C #68 DCW
Febco, 825Y, 3/4", RPBA	H18700	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 172C #67 DCW
Febco, 825Y, 3/4", RPBA	H18895	01-May-2007	DOMESTIC COLD WATER	RM 0001 SW CORNER 214C #66 DCW
Febco, 825Y, 3/4", RPBA	H18940	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW C0RNER 20C #65 DCW
Febco, 825Y, 3/4", RPBA	H18926	01-May-2008	Water Softener	RM 0001 CORNER MAW1L #64 SCW
Febco, 825Y, 3/4", RPBA	H18689	01-May-2008	DOMESTIC COLD WATER	RM 0001 SW CORNER 16C #78 DCW
Febco, 825Y, 3/4", RPBA	H18935	01-May-2008	DOMESTIC COLD WATER	RM OOO1 SW CORNER 17C #79 DCW

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: WILSON HALL
Facility Address: 040 700, PULLMAN

Facility Type: ADMINASTRATION BLDG.
Hazard Level: High
Account No: 304
Facility ID: 304
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 825Y, 1", RPBA	S6960	01-Jun-2008	HEAT MAKEUP	RM 401A ATTIC WEST MAKEUP FOR HWH	
Febco, 825Y, 3/4", RPBA	BA0517	01-Jun-2008	HEAT MAKEUP	RM 1BA ON GROUND FLOOR EAST OF ELEV UP STEPS RM1	

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: YAKIMA VILLAGE
Facility Address: 680 700, PULLMAN

Facility Type: FAMILY HOUSEING
Hazard Level: Low
Account No:
Facility ID: 284
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 805Y, 2", DCVA	AM5840	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING H	
Febco, 805Y, 2", DCVA	AM5764	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING P	
Febco, 805Y, 2", DCVA	AM5234	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING M	
Febco, 805Y, 2", DCVA	AM5841	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING E	
Febco, 805Y, 2", DCVA	AM5827	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING K	
Febco, 805Y, 2", DCVA	AM5832	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING G	
Febco, 805Y, 2", DCVA	AM8086	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING Q	
Febco, 805Y, 2", DCVA	AL7296	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING A	
Febco, 805Y, 2", DCVA	AL7285	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING B	
Febco, 805Y, 2", DCVA	AM5808	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING D	
Febco, 805Y, 2", DCVA	AM5826	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING F	
Febco, 805Y, 2", DCVA	AK5915	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING C	
Febco, 805Y, 2", DCVA	AM5842	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING J	
Febco, 805Y, 2", DCVA	AL7295	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING N	
Febco, 805Y, 2", DCVA	AM6288	01-Oct-2007	Fire Sprinkler w/o Chemical Addition	BUILDING L LAUNDRY ROOM	

List of Installations
By Facility Name and Address

Printed on: *12-Jul-2007*
Time: *11:14 AM*

Customer Name: Washington State University
Mailing Address: FAC OPS 1150
PULLMAN, WA

Facility Name: YARD MORRILL
Facility Address: 000 702, PULLMAN

Facility Type: LAWN IRIGATION
Hazard Level: Low
Facility ID: 296
Account No: 296
Customer ID 1

Make, Model, Size, Type	Serial No	Test Due	Type of Hazard	Device Location	Page And Grid
Febco, 850, 2", DCVA	HOO325	01-Jul-2008	Irrigation w/o Chemicals	WEST LAWN NEXT TO 266431 IRRIGATION LID	

APPENDIX G

Item 8 - Drinking Water Complaint Form

Drinking Water Complaint Form

Date:

Time:

Location:

Contact:

Problem:

Results of Investigation:

Complaint form

APPENDIX G

Item 9 – Recorded Water System Complaints

Drinking Water Complaint Form

Date: 2/4/08

Time: 9:00 AM

Location: Rogers Hall

Contact: Ben M (Hall director)

Problem: Woman on 3rd floor complaining that the water is making her sick.

Results of Investigation: 2/6/08 – Met with the hall director and we discussed the WSU water system, iron in the water, problem history. The free chlorine in the 3rd floor kitchen sink was 0.04 ppm. Iron was 0.7 ppm. A bacteriological sample was taken and submitted to Anatek. I asked the hall director to have any students with further concerns to contact me by phone or if a number of students are concerned that I would be willing to come to the hall and do a presentation and answer questions.

Bacteriological sample was negative for coliforms

Complaint form

Drinking Water Complaint Form

Date: 2/9/09

Time: morning

Location: Wegner Hall

Contact: Becky Martin

Problem: colored water from tap

Results of Investigation: Rusty water. Discussed why water becomes colored and did an iron test. They will flush the water in the future.

Complaint form

Drinking Water Complaint Form

Date: March 6, 2008

Time: 9 AM

Location: Lighty, RM 160

Contact: Michelle Ely

Problem: brown water

Results of Investigation: Flush lines and flush them on a regular basis. The cross connection guys are going to check if a “hot shot” is properly connected (it may be connected to the hot water supply. Michelle will call back if problem continues.

Complaint form

Drinking Water Complaint Form

Date: 3/18/08

Time: 2:45 PM

Location: ADBF and Bustad, 1st floor drinking fountains

Contact: Terri Druffel

Problem: funny odor

Results of Investigation: Funny odor in 1st floor drinking fountain in Bustad. The odor was much worse on 3/17/08. FacOps was going to flush the unit for about 15 minutes. Water in the fountain probably became stagnant over spring break.

Complaint form

Drinking Water Complaint Form

Date: 1/23/09

Time: 10 AM

Location: Van Doren

Contact:

Problem:

Results of Investigation: water line break put lots of rust into the water system. Water fountain flushed until clear.

Good morning, gentlemen:

The water coming from the drinking fountain on our main floor is discolored (light yellow/brown tint). A sample collection of the water is available. I ran the fountain continually for a few moments, and the water appears to be lighter colored. However, Dean Oaks would like the fountain/water supply tested to ensure its safety, especially in light of the recent line break and repair.

Thank you for your assistance.

Deanna Hamilton
Washington State University
Center for Distance and Professional Education
Van Doren Hall - 106
P.O. Box 64520
Pullman WA 99164-5210
Ph: (509) 335-5454
Fax: (509) 335-9104
email: dhamilton2@wsu.edu

Complaint form

Drinking Water Complaint Form

Date: Custodian called on 02-17-09, Student called on 02-18-09. Went to inspect water on 02-18-09

Time: Unknown time calls came in on either day but went to inspect water on 02-18-09 at 2:45

Location: McEachern East 43

Contact: Wayne Loney

Problem: Student stated that that he came home after President Day holiday and turned on his water and a "bunch of stuff came out of his sink's faucet. He also stated that he had put water in his humidifier and ended up with a brownish slime in his humidifier. Student stated that it hasn't happen since that Monday 02-16-09.

Results of Investigation:

Iron testing in water. Iron was less than 0.5. Told student that since pipes were old, when students were gone and then came back there might be more particles in the water. Informed student to let water run for a few seconds before using water for brushing teeth or drinking. Informed student not to use hot water to drink. Informed student to use cold water in humidifier instead of hot water. Informed student the brownish slim material was probably the iron particles in the water combining due to the humidifier. Water testing for the building had been done on January 20, 2009.

Complaint form

Drinking Water Complaint Form

Date: 7/22/09

Time: 2:30 PM

Location: Webster basement

Contact: Lorie Druffel (druffla@wsu.edu) 5-7206

Problem: colored water off and on over the last year and a half

Results of Investigation: Fac Ops investigated and did not find any problems. EH&S will test the water for iron. 8/11/09: Tested water and it had 0.5 ppm Fe. I discussed WSU's iron in the water and they will call if they have any further problems.

Complaint form

Drinking Water Complaint Form

Date: 11/7/11

Time: 9:22 AM

Location: Lighty

Contact: Amy Poirier

Problem: Yellow water

Results of Investigation: Iron in water after weekend. Gave her the water talk. She will flush line in the morning.

Complaint form

Drinking Water Complaint Form

Date: 10/14/14

Time: 3 PM

Location: Central Receiving

Contact:

Problem: Water tastes and smells bad

Results of Investigation: Requested that the line be flushed out. They said they had flushed the sink for an hour. Referred them to Utilities and notified Utilities of their concerns.

Complaint form

APPENDIX G

Item 10 - 2014 Consumer Confidence Report

2014 Annual Drinking Water Quality Report
Washington State University Pullman Drinking Water System
(Public Water System #93200Q)

The U.S. Environmental Protection Agency (EPA) and the Washington Department of Health (WDOH) requires that WSU Pullman's public drinking water system routinely provide an annual drinking water quality report to its consumers. This annual report explains where WSU Pullman's drinking water comes from, what it contains, and the sampling, testing, and treatment that is done to provide safe drinking water.

If future samples show that the drinking water is not safe to consume, EPA and WDOH requires that WSU notify consumers immediately.

Summary of the Report

EPA and WDOH require that public drinking water systems sample and analyze their water for:

- Microbial contaminants, such as bacteria (coliforms), which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic Chemical contaminants (IOCs), such as salts, minerals and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Organic chemical contaminants, including Synthetic Organic Chemicals (SOCs), Volatile Organic Chemicals (VOCs), and Disinfection Byproducts, which can be by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, septic systems, and chlorine disinfection reacting with organic chemicals.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

The frequency and number of drinking water samples and tests for contaminants varies each year depending on the source of drinking water (groundwater vs. surface water sources – WSU Pullman has groundwater sources), vulnerability of the sources to contamination, the size of the system, the type of distribution system piping (metal, plastic, asbestos/concrete), and previous sample results.

WSU chlorinates its drinking water daily to prevent microbial contamination. The chlorine levels are monitored continuously and WSU takes at least 280 microbial samples each year on a monthly basis.

The WDOH reduced the monitoring requirements for WSU for Inorganic Chemicals (IOCs), Synthetic Organic Chemicals (SOCs) and Volatile Organic Chemicals (VOCs) because WSU's wells are at a low to moderate risk of contamination. The most recent well samples for nitrates were obtained on 11-10-14. Other IOCs were obtained in 2012. The most recent SOC and VOC samples were obtained on 10-31-14. The most recent Disinfection Byproduct samples were obtained on 8-1-14. All contaminants listed above were Non-Detect, and therefore not listed in the table below.

WDOH has a State Reporting Limit (SRL) and Maximum Contaminant Limits (MCL) for drinking water contaminants. State Reporting Limits (SRL) refer to contaminants that are detected in drinking water but do not exceed health hazard or aesthetic Maximum Contaminant Levels (MCL).

WSU's drinking water system did exceed the Secondary MCL for iron and manganese, but they are aesthetic contaminants that do not affect health. Therefore they are not in violation of drinking water health standards.

Sources of WSU's Drinking Water

The WSU water system is supplied by groundwater from the Palouse Basin Aquifer. Drinking water is pumped from four (4) groundwater sources (wells) on campus (well #4 [source S04], well #6 [source S06], well #7 [source S08], and well #8 [source S09]). The WSU water system is separate from the City of Pullman system except for four emergency interties. WDOH has Source Water Assessment Program data on the WSU water system which includes the susceptibility rating of potential contamination for each well on campus. For more information contact the WDOH at (509) 329-2100.

The table below displays reportable contaminants in the most recent samples required by the WDOH and EPA, the range of detections, typical sources of contamination, units of measurement, whether there was a violation, and a key and footnotes explaining the test results.

An Explanation of the Drinking Water Quality Table

Please note the following definitions:
Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.
Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Maximum Residual Disinfectant Level (MRDL): The highest level of chlorine disinfectant allowed in the drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): The level of chlorine disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water. The WSU system uses chlorine as the TT intended to reduce the level of microbial contaminants in the drinking water.

Contaminant [1]	Date Sampled	Range of Detections [2]	Unit	MCL	MCLG	Typical Source of Contaminant	Violation
Contaminants with Primary MCLs							
Copper	7-18-12 8-8-12	5.02 - 600[3]	ppb	AL = 1300	0	Corrosion of household plumbing systems; Erosion of natural deposits	No
Lead	7-18-12 8-8-12	1.27 - 14.9[3]	ppb	AL = 15	0	Corrosion of household plumbing systems; Erosion of natural deposits	No
Fluoride	6-2-09 5-12-09	706 - 692	ppb	4000	4000	Erosion of natural deposits	No
Sodium	5-24-12 6-2-09	20.4 - 23.1	ppm	NA	NA	Erosion of natural deposits	No [4]
Total Trihalomethane	8-1-12	.59 – 1.12	ppb	80	NA	By-product of drinking water disinfection	No
Contaminants with Secondary MCLs [5]							
Iron	5-24-12 6-3-10 5-12-09	381 907 213	ppb	300	NA	Erosion of natural deposits	No [6]
Manganese	5-24-12 5-12-09	49.7 187	ppb	50	NA	Erosion of natural deposits	No [6]
Chlorine (Residual)	3-10-14/ Every day	0 – 770	ppb	4000 MRDL	2000 MRDLG	Water additive to control microbes	No
Conductivity	5-24-12 6-2-09 5-12-09	352 312 403	umhos/ cm	700	NA	Erosion of natural deposits	No
Total Dissolved Solids	5-24-12 6-2-09	285 209	ppm	500	NA	Erosion of natural deposits	No

Key:

AL	= Action Level, the concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow
color units	= The amount of color in water measured in color units
MCL	= Maximum Contaminant Level
MCLG	= Maximum Contaminant Level Goal
MRDL	= Maximum Residual Disinfectant Level
MRDLG	= Maximum Residual Disinfectant Level Goal
NA	= Not applicable
ND	= None detected
NTU	= Nephelometric Turbidity Units
pCi/l	= picocuries per liter
ppb	= parts per billion or micrograms per liter (ug/l)
ppm	= parts per million or milligrams per liter (mg/l)
umhos/cm	= micromhos per centimeter (a measure of conductivity)

Footnotes:

[1] Only the most recent samples with contaminants above the SRL found in the water are listed. There were no contaminants detected in the water in 2014.

[2] The most recent sample and the lowest to highest detected contaminant levels from any well or sample is reported.

[3] Thirty (30) samples were analyzed with none above the AL for lead or copper. The 90th percentile sample (out of every 10 samples 9 were at or below this level) was 11.6 ppb for lead and 223 ppb for copper (both below the AL). This does not trigger treatment, more sampling or other sampling requirements. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. WSU is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for thirty seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (800) 426-4791 or at http://www.epa.gov/safewater/lead.

[4] The EPA has established a recommended level of 20 ppm for sodium as a level of concern for those consumers that may have daily sodium intake restrictions in their diets.

[5] Secondary MCLs are standards developed to protect the aesthetic qualities of drinking water and are not health based. Because they are not health based, they are not considered violations.

[6] Iron and manganese are secondary contaminants due to aesthetic water quality, are not a health hazard, and therefore they are not in violation of drinking water standards.

Unregulated Contaminants

Unregulated contaminants are those for which EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to assist EPA in determining their occurrence in drinking water and whether future regulation is warranted. WSU samples for these unregulated

contaminants which include pesticides, herbicides and other SOCs and VOCs. In addition, WSU drinking water comes from groundwater, and is not required to sample for *Cryptosporidium* since it is usually found only in surface waters.

Additional Health Information

To ensure that tap water is safe to drink, the WDOH and EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and the Dept. of Agriculture regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800) 426-4791.

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, and in some cases, radioactive material. Water can also pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria (coliforms), which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts, minerals and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including SOCs and VOCs, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV / AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA / Center for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800) 426-4791.

WSU is active in protecting the health and safety of students, faculty, staff and visitors of the University, and we will notify you immediately if the drinking water is not safe to consume.

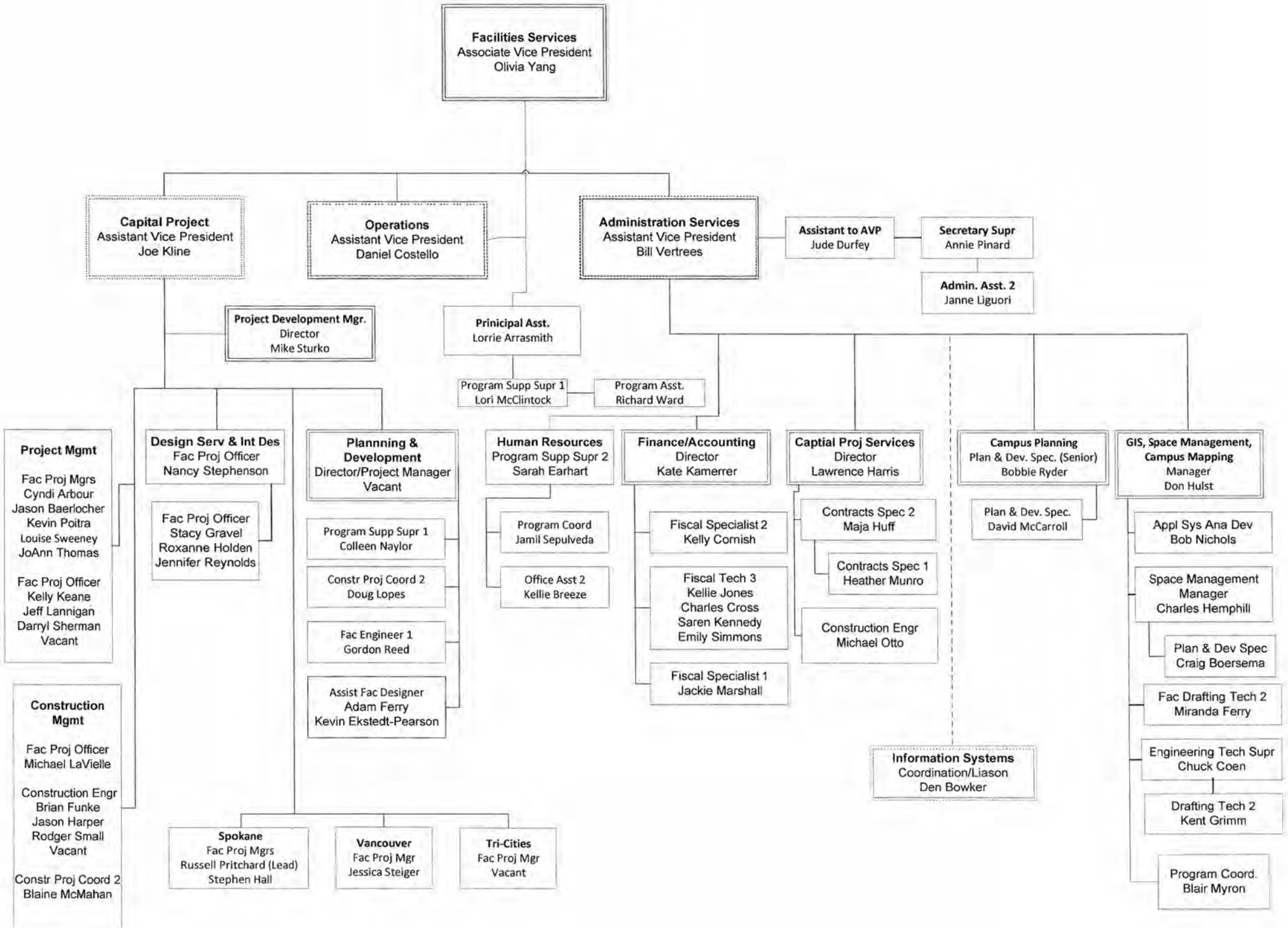
For More Information

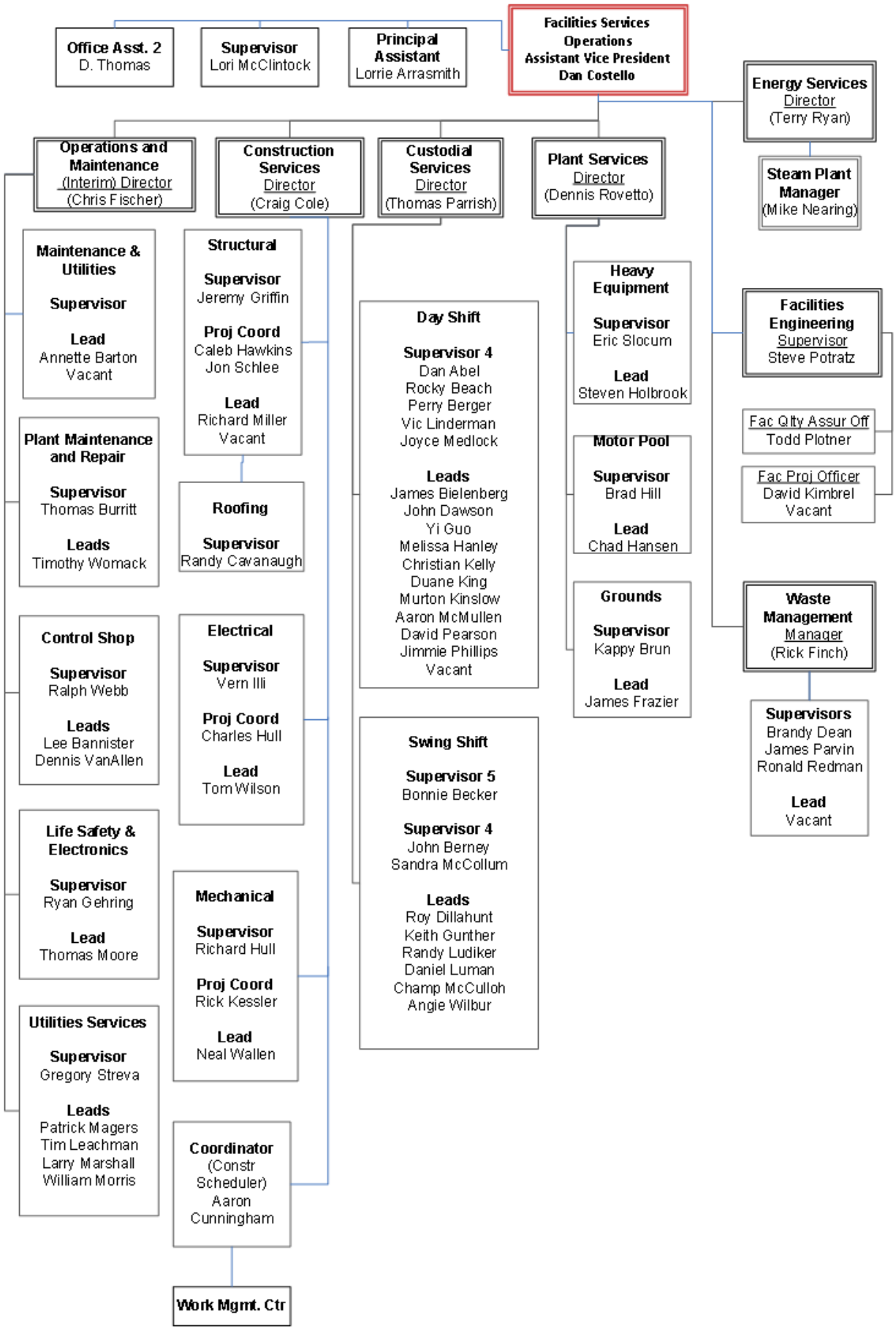
The WSU Water Board is responsible for ensuring that the water system conforms to all applicable regulations. If you are interested in attending a Water Board meeting, contact Environmental Health and Safety (EH&S) 335-3041 for the next meeting time and date.

This report was prepared by the EH&S and is available at http://ehs.wsu.edu/PH/documents/2014%20Report.pdf. For more information about the WSU water system, please contact Gene Patterson at 509-335-3041, via email at gpatters@wsu.edu or the WSU Environmental Health and Safety web page at http://ehs.wsu.edu/. Additional information is available from EPA at http://water.epa.gov/drink/.

APPENDIX G

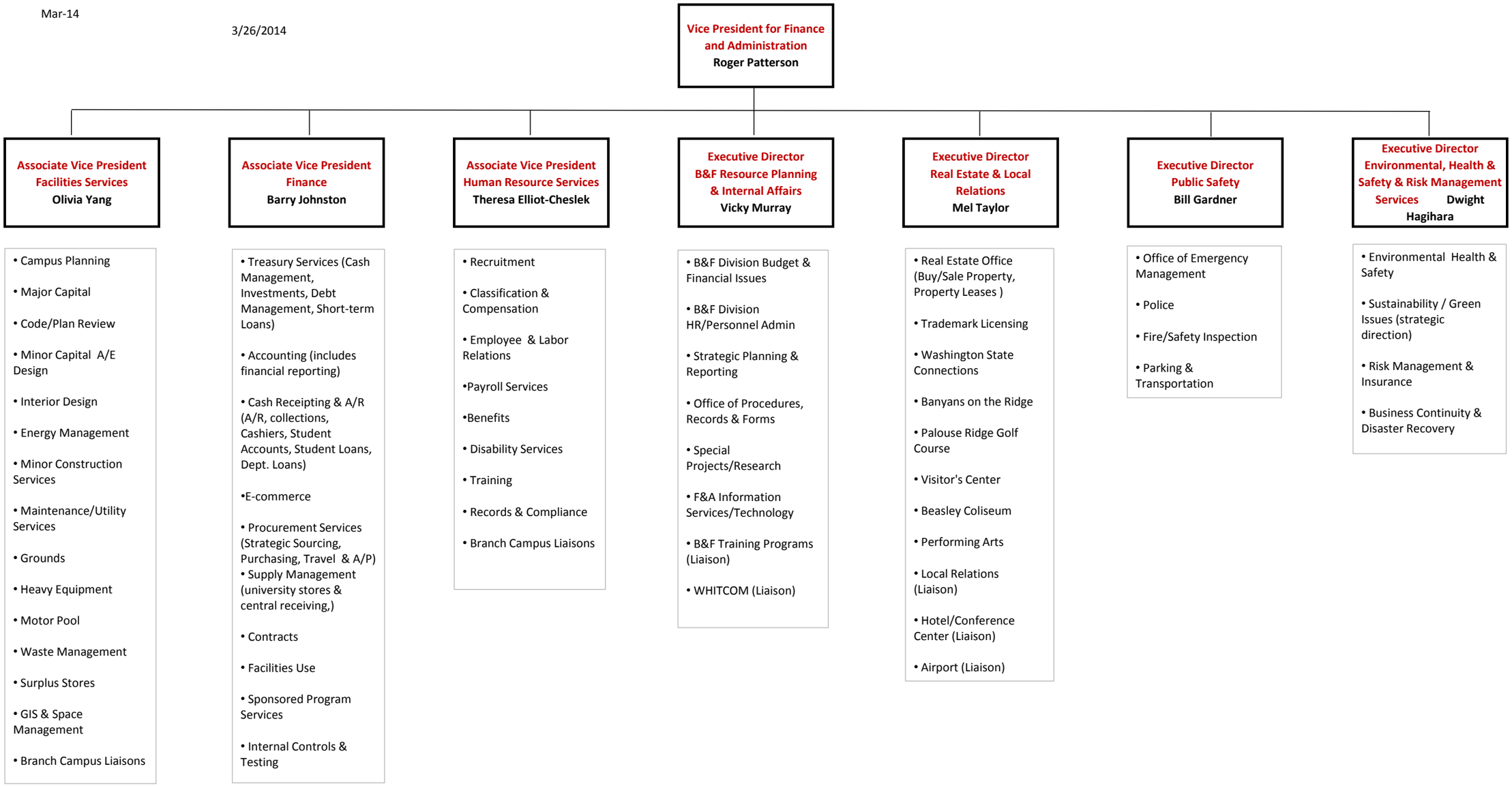
Item 11 - Facility Operations Organization Charts


Facilities Services
Associate Vice President
Olivia Yang
Capital Project
Assistant Vice President
Joe Kline
Operations
Assistant Vice President
Daniel Costello
Administration Services
Assistant Vice President
Bill Vertrees
Assistant to AVP
Jude Durfey
Secretary Supr
Annie Pinard
Admin. Asst. 2
Janne Liguori
Project Development Mgr.
Director
Mike Sturko
Prinicipal Asst.
Lorrie Arrasmith
Program Supp Supr 1
Lori McClintock
Program Asst.
Richard Ward
Project Mgmt
Fac Proj Mgrs
Cyndi Arbour
Jason Baerlocher
Kevin Poitra
Louise Sweeney
JoAnn Thomas
Fac Proj Officer
Kelly Keane
Jeff Lannigan
Darryl Sherman
Vacant
Design Serv & Int Des
Fac Proj Officer
Nancy Stephenson
Fac Proj Officer
Stacy Gravel
Roxanne Holden
Jennifer Reynolds
Plannning & Development
Director/Project Manager
Vacant
Program Supp Supr 1
Colleen Naylor
Constr Proj Coord 2
Doug Lopes
Fac Engineer 1
Gordon Reed
Assist Fac Designer
Adam Ferry
Kevin Ekstedt-Pearson
Human Resources
Program Supp Supr 2
Sarah Earhart
Program Coord
Jamil Sepulveda
Office Asst 2
Kellie Breeze
Finance/Accounting
Director
Kate Kamerrer
Fiscal Specialist 2
Kelly Cornish
Fiscal Tech 3
Kellie Jones
Charles Cross
Saren Kennedy
Emily Simmons
Fiscal Specialist 1
Jackie Marshall
Captial Proj Services
Director
Lawrence Harris
Contracts Spec 2
Maja Huff
Contracts Spec 1
Heather Munro
Construction Engr
Michael Otto
Campus Planning
Plan & Dev. Spec. (Senior)
Bobbie Ryder
Plan & Dev. Spec.
David McCarroll
GIS, Space Management, Campus Mapping
Manager
Don Hulst
Appl Sys Ana Dev
Bob Nichols
Space Management Manager
Charles Hemphill
Plan & Dev Spec
Craig Boersema
Fac Drafting Tech 2
Miranda Ferry
Engineering Tech Supr
Chuck Coen
Drafting Tech 2
Kent Grimm
Program Coord.
Blair Myron
Construction Mgmt
Fac Proj Officer
Michael LaVielle
Construction Engr
Brian Funke
Jason Harper
Rodger Small
Vacant
Constr Proj Coord 2
Blaine McMahan
Spokane
Fac Proj Mgrs
Russell Pritchard (Lead)
Stephen Hall
Vancouver
Fac Proj Mgr
Jessica Steiger
Tri-Cities
Fac Proj Mgr
Vacant
Information Systems
Coordination/Liason
Den Bowker


Office Asst. 2
D. Thomas
Supervisor
Lori McClintock
Principal Assistant
Lorrie Arrasmith
Facilities Services Operations Assistant Vice President
Dan Costello
Energy Services
Director
(Terry Ryan)
Steam Plant Manager
(Mike Nearing)
Operations and Maintenance
(Interim) Director
(Chris Fischer)
Construction Services
Director
(Craig Cole)
Custodial Services
Director
(Thomas Parrish)
Plant Services
Director
(Dennis Rovetto)
Maintenance & Utilities
Supervisor
Lead
Annette Barton
Vacant
Plant Maintenance and Repair
Supervisor
Thomas Burritt
Leads
Timothy Womack
Control Shop
Supervisor
Ralph Webb
Leads
Lee Bannister
Dennis VanAllen
Life Safety & Electronics
Supervisor
Ryan Gehring
Lead
Thomas Moore
Utilities Services
Supervisor
Gregory Streva
Leads
Patrick Magers
Tim Leachman
Larry Marshall
William Morris
Structural
Supervisor
Jeremy Griffin
Proj Coord
Caleb Hawkins
Jon Schlee
Lead
Richard Miller
Vacant
Roofing
Supervisor
Randy Cavanaugh
Electrical
Supervisor
Vern Illi
Proj Coord
Charles Hull
Lead
Tom Wilson
Mechanical
Supervisor
Richard Hull
Proj Coord
Rick Kessler
Lead
Neal Wallen
Coordinator
(Constr Scheduler)
Aaron Cunningham
Work Mgmt. Ctr
Day Shift
Supervisor 4
Dan Abel
Rocky Beach
Perry Berger
Vic Linderman
Joyce Medlock
Leads
James Bielenberg
John Dawson
Yi Guo
Melissa Hanley
Christian Kelly
Duane King
Murton Kinslow
Aaron McMullen
David Pearson
Jimmie Phillips
Vacant
Swing Shift
Supervisor 5
Bonnie Becker
Supervisor 4
John Berney
Sandra McCollum
Leads
Roy Dillahunt
Keith Gunther
Randy Ludiker
Daniel Luman
Champ McCulloh
Angie Wilbur
Heavy Equipment
Supervisor
Eric Slocum
Lead
Steven Holbrook
Motor Pool
Supervisor
Brad Hill
Lead
Chad Hansen
Grounds
Supervisor
Kappy Brun
Lead
James Frazier
Facilities Engineering
Supervisor
Steve Potratz
Fac Qlty Assur Off
Todd Plotner
Fac Proj Officer
David Kimbrel
Vacant
Waste Management
Manager
(Rick Finch)
Supervisors
Brandy Dean
James Parvin
Ronald Redman
Lead
Vacant

Mar-14

3/26/2014



APPENDIX G

Item 12 - MSDS – Chlorine Gas

Material Safety Data Sheet

Chlorine

Section 1. Chemical product and company identification

Product Name : Chlorine

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

MSDS# : 001015

Date of Preparation/Revision : **2/25/2007.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. (GREENISH-YELLOW GAS WITH SUFFOCATING ODOR)

Emergency overview : Danger!

MAY BE FATAL IF INHALED.
CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
OXIDIZER.
CONTENTS UNDER PRESSURE.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA.
Contact with combustible material may cause fire.

Do not get in eyes, on skin or clothing. Do not breathe gas. Do not puncture or incinerate container. Store in tightly closed container. Avoid contact with combustible materials. Use only with adequate ventilation. Wash thoroughly after handling.

Contact with rapidly expanding gases can cause frostbite.

Routes of entry : Inhalation,Dermal,Eyes

Potential acute health effects

Eyes : Severely corrosive to the eyes.

Skin : Severely corrosive to the skin.

Inhalation : Very toxic by inhalation. Severely corrosive to the respiratory system.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects : **CARCINOGENIC EFFECTS** A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by overexposure : Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

See toxicological Information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Chlorine	7782-50-5	100	**ACGIH TLV (United States, 5/2004). Notes: 1996 Adoption Substances for which the TLV is higher than the OSHA Permissible Exposure Limit (PEL) and/or the NIOSH Recommended Exposure Limit (REL). See CFR 58(124) :36338-33351, June 30, 1993, for revised OSHA PEL. Refers to Appendix A -- Carcinogens.** STEL: 2.9 mg/m^3 15 minute(s). Form: All forms

STEL: 1 ppm 15 minute(s). Form: All forms
TWA: 1.5 mg/m^3 8 hour(s). Form: All forms
TWA: 0.5 ppm 8 hour(s). Form: All forms

NIOSH REL (United States, 6/2001).
CEIL: 1.45 mg/m^3 15 minute(s). Form: All forms
CEIL: 0.5 ppm 15 minute(s). Form: All forms

OSHA PEL (United States, 6/1993).
CEIL: 3 mg/m^3 Form: All forms
CEIL: 1 ppm Form: All forms

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If fumes are still suspected to be present, the rescuer should wear an appropriate mask or a self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion : Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Section 5. Fire fighting measures

Flammability of the product : Non-flammable.

Fire fighting media and instructions : Use an extinguishing agent suitable for surrounding fires.

This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire.

Special protective equipment for fire-fighters : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 7. Handling and storage

Handling : Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Store in tightly closed container. Avoid contact with combustible materials. Do not puncture or incinerate container. Wash thoroughly after handling. High pressure gas. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container tightly closed. Keep container in a cool, well-ventilated area. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure Controls, Personal Protection

Engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, vapor or mist, use process enclosures, local exhaust ventilation, or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Full chemical resistant suit and self-contained breathing apparatus only by trained and authorized persons.

Product name

Chlorine

ACGIH TLV (United States, 5/2004). Notes: 1996 Adoption Substances for which the TLV is higher than the OSHA Permissible Exposure Limit (PEL) and/or the NIOSH Recommended Exposure Limit (REL). See CFR 58(124) :36338-33351, June 30, 1993, for revised OSHA PEL. Refers to Appendix A -- Carcinogens.
STEL: 2.9 mg/m^3 15 minute(s). Form: All forms
STEL: 1 ppm 15 minute(s). Form: All forms
TWA: 1.5 mg/m^3 8 hour(s). Form: All forms
TWA: 0.5 ppm 8 hour(s). Form: All forms
NIOSH REL (United States, 6/2001).
CEIL: 1.45 mg/m^3 15 minute(s). Form: All forms
CEIL: 0.5 ppm 15 minute(s). Form: All forms
OSHA PEL (United States, 6/1993).
CEIL: 3 mg/m^3 Form: All forms
CEIL: 1 ppm Form: All forms

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 70.9 g/mole

Molecular formula : Cl2

Boiling/condensation point : -33.88°C (-29°F)

Melting/freezing point : -101.11°C (-150°F)

Critical temperature : 143.9°C (291°F)

Vapor pressure : 85.3 psig

Vapor density : 2.4 (Air = 1)

Specific Volume (ft^3/lb) : 5.40541

Gas Density (lb/ft^3) : 0.185

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Extremely reactive or incompatible with reducing agents, combustible materials, organic materials, alkalis.

Hazardous decomposition products : These products are halogenated compounds, hydrogen chloride.

Section 11. Toxicological information

Toxicity data

Ingredient name	Test	Result	Route	Species
Chlorine	LC50	293 ppm (1 hour (s))	Inhalation	Rat
	LC50	137 ppm (1 hour (s))	Inhalation	Mouse

IDLH : 10 ppm

Chronic effects on humans : **CARCINOGENIC EFFECTS** A4 (Not classifiable for human or animal.) by ACGIH. Causes damage to the following organs: lungs, upper respiratory tract, skin, eye, lens or cornea.

Other toxic effects on humans : Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation (lung irritant).

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Ecotoxicity data

Ingredient name	Species	Period	Result
Chlorine	Oncorhynchus mykiss (LC50)	96 hour(s)	0.014 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	0.029 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	0.132 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	0.159 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	0.192 mg/l
	Oncorhynchus mykiss (LC50)	96 hour(s)	0.291 mg/l

Products of degradation : These products are halogenated compounds.

Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Environmental fate : Not available.

Environmental hazards : Very toxic to aquatic organisms.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1017	CHLORINE. Marine pollutant (Chlorine)	2.3	Not applicable (gas).		**Marine pollutant** Marine pollutant (P) **Reportable quantity** 10 lbs. (4.536 kg) **Limited quantity** Yes. **Packaging instruction** **Passenger Aircraft** Quantity limitation: Forbidden. **Cargo Aircraft** Quantity limitation: Forbidden. **Special provisions** 2, B9, B14, T50, TP19
TDG Classification	UN1017	CHLORINE. Marine pollutant (Chlorine)	2.3	Not applicable (gas).		**Marine pollutant** Marine pollutant (P) **Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 500 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden

Chlorine						
Mexico Classification	UN1017	CHLORINE. Marine pollutant (Chlorine)	2.3	Not applicable (gas).		-

Section 15. Regulatory information

United States

U.S. Federal regulations : TSCA 8(a) CAIR: Chlorine
TSCA 8(b) inventory: Chlorine

SARA 302/304/311/312 extremely hazardous substances: Chlorine
SARA 302/304 emergency planning and notification: Chlorine
SARA 302/304/311/312 hazardous chemicals: Chlorine
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Chlorine: Fire hazard, Sudden Release of Pressure, Immediate (Acute) Health Hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: Chlorine

Clean air act (CAA) 112 accidental release prevention: Chlorine

Clean air act (CAA) 112 regulated flammable substances: No products were found.

Clean air act (CAA) 112 regulated toxic substances: Chlorine

SARA 313

		Product name	CAS number	Concentration
Form R - Reporting requirements	:	Chlorine	7782-50-5	100
Supplier notification	:	Chlorine	7782-50-5	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : Pennsylvania RTK: Chlorine: (environmental hazard, generic environmental hazard)
Massachusetts RTK: Chlorine
New Jersey: Chlorine

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
Class E: Corrosive gas.

CEPA DSL: Chlorine

Section 16. Other information

United States

Label Requirements : MAY BE FATAL IF INHALED.
CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
OXIDIZER.
CONTENTS UNDER PRESSURE.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

Canada

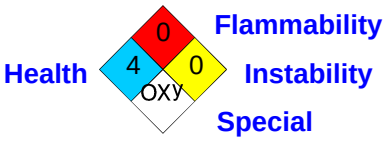
Label Requirements : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
Class E: Corrosive gas.

Hazardous Material Information System (U.S.A.) :

Health	*	4
Fire hazard		0
Reactivity		0

Personal protection	C

National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX G

Item 13 – Safety Policies and Procedures Manual

Washington State University
SAFETY POLICIES AND PROCEDURES MANUAL

PUBLIC HEALTH AND ENVIRONMENTAL QUALITY
6.50
Revised 6-08
Environmental Health and Safety
335-3041

Drinking Water Systems

PDF link

PURPOSE

The University is responsible for planning, operating, sampling, maintaining, and protecting University-owned public drinking water systems and water supply connections to meet federal, state, and local requirements. The University is also responsible for helping to ensure that the quality of water which WSU facilities receive from non-WSU public water systems meets state and federal requirements. (WAC Chapters 246-290 to -296, WAC 173-160, WAC 51-56)

REPORTING CONCERNS OR EMERGENCIES

Water Leaks or Lack of Service

Report water leaks or lack of service to the one of the following offices, as appropriate:

In Whitman County

In Whitman County, immediately contact Facilities Services, Operations at 509-335-9000.

Outside Whitman County

All other WSU locations are to immediately contact the local facilities maintenance organization.

Drinking Water Quality Concerns or Suspected Illnesses

Report drinking water quality concerns or suspected illnesses from drinking water immediately to Environmental Health and Safety (EH&S) for prompt investigation.

In Whitman County

For water systems within Whitman County, use the following contact telephone numbers:

During Regular Working Hours

Contact EH&S; telephone 509-335-3041.

During Off-Hours

Contact Facilities Services, Operations; telephone 509-335-9000.

Outside Whitman County

For all other water systems, use the following contact telephone numbers, as appropriate:

During Regular Working Hours

Contact Statewide EH&S Services-Regional Campuses and Research Units at or near the following locations; telephone:

- Spokane 509-358-7993
- Tri-Cities 509-372-7163
- Vancouver 360-546-9706
- Wenatchee 509-663-8181, ext. 230

To obtain EH&S telephone numbers for other statewide locations, go to the Statewide EH&S website at:

http://www.tricity.wsu.edu/BC-RS/statewide.asp

Select a location to obtain the telephone number for the EH&S representative assigned to the location.

During Off-Hours

Contact the local public water system or the Whitman County Communications Center (WHITCOM) Non-Emergency Response; telephone 509-332-2521. WHITCOM is able to assist by contacting the appropriate local agencies.

WSU Spokane

At WSU Spokane, contact Campus Security; telephone 509-358-7995. For emergencies, Campus Security must contact the City of Spokane Water Department; telephone 509-625-7800.

WATER SYSTEM MODIFICATIONS OR ADDITIONS

Contact the Architectural and Engineering Manager and the Water Distribution Manager, both at Facilities Services, Operations, regarding all modifications or additions to WSU drinking water systems.

Facilities Services, Operations recommends that WSU Pullman departments submit requests for water system modifications or additions through the myFacilities website. See BPPM 80.45. The myFacilities website is located at:

https://myfacilities.wsu.edu

WSU Pullman departments unable to access or utilize the myFacilities website may submit requests for water system modifications or additions to Facilities Services, Operations; telephone 335-9000.

Non-Pullman units are to contact facilities services, operations managers at their locations who submit requests for water system modifications or additions to Pullman Facilities Services, Operations; telephone 335-9000.

See also below.

All University departments, organizations, persons, or non-University entities must receive approval from Facilities Services, Operations **before**:

- Connecting equipment to water lines,
- Repairing or maintaining piping,
- Drilling a well, or
- Making any changes to water systems.

Connecting to Water Lines

Each new water system point of use connection must have a service meter and premises isolation or in-premises isolation (backflow prevention assemblies) as determined by the WSU Cross Connection Control Specialist.

Non-University entities are required to install service meters and premises isolation or in-premises isolation (backflow prevention assemblies) as determined by the WSU Cross Connection Control Specialist. Non-University entities must also reimburse the University for water used.

The Facilities Services, Operations Water Distribution Manager must receive certification of backflow prevention testing and verify the installation of appropriate metering and backflow prevention assemblies **prior** to turning on the system water to new services.

WATER BOARD

The Water Board is responsible for ensuring that University water systems and facilities conform to applicable regulations.

The board is comprised of staff or representatives from:

- Facilities Services, Operations,
- EH&S,
- Regional Campuses and Research Units (RCRU),
- Housing and Dining Services, and
- Facilities Services, Capital.

The Water Board is also responsible for coordinating the planning, operation, sampling, maintenance, and protection of the University's public drinking water systems and water supply connections throughout the state in order to meet state requirements. (WAC 246-290 through WAC 246-296, WAC 173-160, and WAC 51-56)

Program Document

The Water Board develops all policies and procedures in the WSU Drinking Water, Cross-connection Control, and Water Conservation Program (hereinafter referred to as the Program). The Program provides detailed planning, development, construction, maintenance, sampling, monitoring, and operating procedures to ensure that University drinking water systems are maintained and operated in a safe and cost-effective manner.

The most current version of the Program is located on the WSU Environmental Health and Safety Public Health website under drinking water. To view the Program, go to:

http://ehs.wsu.edu/

Select Public Health, then
Select Drinking Water Quality, then
Select Drinking Water Program.

Board Member Positions

The Water Board is co-chaired by the Facilities Services, Operations and EH&S directors. Regional Campus and Research Unit representatives assign appropriate staff members to serve on the board. The Water Board meets at least annually.

The Board is comprised of the following positions:

- Facilities Services, Operations

  Assistant Vice President
  Director, Maintenance and Utilities Services
  Water Distribution Manager
  Water System Engineer

- Environmental Health and Safety

  Director
  Public Health Manager
  Facility Health and Safety Coordinator

- Regional Campuses and Research Units (RCRU)

  WSU Spokane--Facility Services Director
  WSU Tri-Cities--Facilities Department Manager
  WSU Vancouver--Facilities Operations Director
  Director, CAHNRS Business and Personnel Office

- Facilities Services, Capital

  Director, Construction Service and Quality Assurance
  Project Manager / Professional Engineer

- Housing and Dining Services

  Director, Housing and Dining Maintenance Services
  Industrial Hygienist
  Maintenance Coordinator

RESPONSIBILITIES

Water Board

The Water Board:

- Develops all drinking water programs, policies, and procedures for WSU.

- Helps protect drinking water systems and water supply connections including, but not

limited to, establishing and enforcing cross-connection control programs.

- Performs and enforces corrective actions.
- Ensures that qualified personnel are provided to develop and implement all applicable programs.
- Develops schedules for performing risk assessments.
- Develops a quality assurance program for backflow prevention assembly testing.
- Develops procedures for responding to drinking water quality and backflow incidents.
- Provides educational programs for consumers about drinking water systems, conservation, cross-connection controls, etc.
- Coordinates with and notifies the Department of Health (DOH), local administrative and/or health authorities of any incidents, and documents the incidents.

Facilities Services, Operations

Facilities Services, Operations:

- Operates and maintains all Group A and B water systems located in Whitman County, excluding the Palouse Conservation Field Station, which is operated by the U.S. Department of Agriculture (USDA) and maintained and repaired by Facilities Services, Operations. See below for water system definitions.
- Conducts limited monitoring of the drinking water system.
- Provides a certified Water Distribution Manager who is responsible for the daily operational activities of the Whitman County water systems, treatment facilities, and distribution systems that directly impact water quality and/or quantity as required in accordance with WAC 246-292.
- Coordinates water conservation efforts.
- Coordinates master planning with the Infrastructure Master Planning Committee.

  NOTE: The committee is comprised of engineering staff from Facilities Services, Capital and Facilities Services, Operations.
- Is responsible, along with Facilities Services, Capital and RCRU, for the design and construction of additions and modifications to University drinking water systems throughout the state.

  The Utilities division of Facilties Services, Operations must review and approve all plans and specifications for new and remodeled construction.
- Provides bacteriological and chlorine disinfection water sampling for construction and repairs (or oversees the contractor that performs the sampling), with assistance from EH&S, Housing and Dining Services, RCRU, and/or Facilities Services, Capital.

Prior to water being used for drinking purposes, Facilities Services, Operations must:

Test all new backflow prevention assemblies (Whitman County),

Obtain backflow prevention assembly testing results from RCRU or contractors (outside of Whitman County), and

Obtain satisfactory bacteriological sample results from repairs or maintenance (Whitman County).

Facilities Services, Operations (or the contractor, if applicable) must provide the bacteriological sample results to EH&S.

- Provides alternative drinking water sources if construction and/or maintenance requires disruption of water service on a case by case basis.

Environmental Health and Safety (EH&S)

EH&S:

- Conducts bacteriological and chemical sampling for Whitman County water systems (excluding construction and repair samples), as required by federal and state regulations.

  NOTE: Facilities Services, Operations or the contractor performs sampling for water system construction and repairs. See above.

- Assists Facilities Services, Operations, RCRU, and contractors with sampling responsibilities for water systems at WSU locations around the state.

- Investigates concerns regarding drinking water quality and performs sanitary surveys of drinking water systems, including wells, reservoirs, distribution systems, and treatment facilities.

- Reviews plans and specifications for new construction and remodels.

- Evaluates current and new regulations to help ensure the University remains in compliance and maintains safe and healthy drinking water.

- Acts as the liaison with the Washington State Department of Health, Department of Ecology, local health departments and districts, and the Environmental Protection Agency (EPA) regarding regulatory compliance.

- Develops and prepares various regulatory reports as required.

Facilities Services, Capital

Facilities Services, Capital:

- Coordinates with and receives approval from the Facilities Services, Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

  Prior to water being used for drinking purposes, Facilities Services, Capital must

obtain satisfactory bacteriological sample results and must have Facilities Services, Operations test backflow prevention assemblies from new construction or repairs in Whitman County. Outside of Whitman County, the contractor must test backflow prevention assemblies and obtain satisfactory bacteriological sample results prior to water being used for drinking purposes.

Facilities Services, Capital or the contractor, as applicable, must provide the bacteriological sample results to EH&S. The contractor must provide the backflow prevention assembly test results for operations outside of Whitman County, and the names, certfications, and telephone numbers of the certified backflow assembly testers (BATs) to Facilities Services, Operations.

Housing and Dining Services

Housing and Dining Services:

- Coordinates with and receives approval from the Facilities Services, Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

- Conducts maintenance on water lines, and if a certified backflow assembly tester (BAT) and equipment is available, maintains backflow preventers for departmental facilities.

  Prior to water being used for drinking purposes, Housing and Dining Services must obtain satisfactory bacteriological sample and backflow prevention assembly testing results from new construction or repairs. Housing and Dining Services or the contractor must provide bacteriological sample and backflow prevention assembly testing results to EH&S. Certified BATs hired or contracted by Housing and Dining Services must provide their names, certifications, and telephone numbers to Facilities Services, Operations.

Regional Campuses and Research Units (RCRU)

The Regional Campuses and Research Units group (RCRU):

- Operates, maintains, and conducts limited monitoring of the drinking water systems located outside Whitman County, and coordinates water conservation efforts.

- Provides a certified Water Distribution Manager who is responsible for the daily operational activities of the following, as required in accordance with WAC 246-292:

  WSU Prosser Irrigated Agriculture Research and Extension Center (IAREC) water system;

  Group B systems at the Roza, Royal Slope, Lind, and Othello Research Units; and

  Associated treatment facilities and distribution systems that directly impact water quality and/or quantity.

  See below for water system definitions.

RCRU Representatives

RCRU representatives are responsible for the following:

- The RCRU Facilities Services, Capital representative coordinates master planning with the Infrastructure Master Planning Committee.

- The RCRU Facilities Services, Operations and Capital representatives, in coordination with Facilities Services, Operations, and Facilities Services, Capital, are responsible for the design and construction of additions and modifications to WSU drinking water systems across the state. RCRU Facilities Services, Operations and Capital representatives, Facilities Services, Operations, and Facilities Services, Capital review plans and specifications for new construction and remodels to ensure compliance with all regulations.

- The RCRU Facilities Services, Operations representative coordinates with and receives approval from the Facilities Services, Operations Cross-connection Control Specialist and Water Distribution Manager on water line maintenance and installation, backflow prevention assembly testing, connection of new equipment, etc.

- The RCRU Facilities Services, Operations and EH&S representatives provide bacteriological and chemical sampling for WSU water systems located outside Whitman County (excluding construction and repair samples) as required by federal and state regulations. The RCRU Facilities Services, Operations and EH&S representatives assist Facilities Services, Operations and managers of other WSU water systems across the state with sampling responsibilities. The department or the contractor which completes construction and/or repairs must perform any required sampling.

  Prior to water being used for drinking purposes, the RCRU Facilities Services, Operations and/or Capital, and/or EH&S representative must obtain satisfactory bacteriological sample and backflow prevention assembly testing results from new construction or repairs. RCRU or the contractor must provide the bacteriological sample results to EH&S and the backflow prevention assembly testing results to Facilities Services, Operations. Certified BATs hired or contracted by RCRU must provide their names, certifications, and telephone numbers to Facilities Services, Operations.

- The RCRU Facilities Services, Operations or the RCRU Facilities Services, Capital representative must provide alternative drinking water sources if construction and/or maintenance requires disruption of water service on a case by case basis.

- The RCRU EH&S representative investigates concerns regarding drinking water quality and performs sanitary surveys of drinking water systems, including wells, reservoirs, distribution systems, and treatment facilities.

- The RCRU EH&S representative acts as the liaison with the Washington State Department of Health, Department of Ecology, and the EPA regarding regulatory compliance.

- The RCRU EH&S representative develops and prepares various regulatory reports as required.

EH&S, WSU Pullman, evaluates current and new regulations to help ensure WSU remains in compliance with state and federal regulations and maintains safe and healthy drinking water.

Water System Users

Any University department, organization, non-University entity, or person that connects equipment, installs piping, or makes changes to University water systems must receive prior approval from Facilities Services, Operations.

For University water systems outside Whitman County, the departments, organization, non-University entities, or person must also contact RCRU for approval prior to connecting equipment, installing piping, or making changes.

Assigned Responsibilities

The Water Board may assign or reassign drinking water responsibilities to water system users (e.g., USDA Palouse Conservation Field Station). Such assignments and/or reassignments must be submitted in writing and maintained on file at EH&S.

PROGRAM ELEMENTS

The following summarizes each program element in this policy. Refer to the Program for more specific information on these program elements.

To view the Program, go to:

http://ehs.wsu.edu/

Select Public Health, then
Select Drinking Water Quality, then
Select Drinking Water Program.

Public Water Systems

WSU facilities receive water from either WSU-owned and operated Group A or Group B water systems or from non-WSU-owned public water systems.

Group A System

A Group A water system is a public water system that serves fifteen or more residential service connections **or** twenty-five or more people per day for 60 or more days per year.

For any new Group A systems that are developed, refer to WAC 246-290-020.

WSU-Owned and -Operated

The Group A water systems owned and operated by WSU are:

- WSU Pullman (Group A community)
- Tula Young Hastings Farm (Group A nontransient noncommunity)
- WSU Prosser—Irrigated Agricultural Research and Extension Center (Group A nontransient noncommunity)

Group B System

A Group B water system is a public water system that serves less than fifteen residential service connections **and** less than twenty-five people per day, or 25 or more people per day for less than sixty days per year.

For any new Group B systems that are developed, refer to WAC 246-291.

WSU-Owned and -Operated

The Group B water systems owned and operated by WSU are:

- Central Ferry Research Farm
- Colockum Multiple Use Research Unit
- Columbia View Orchard Research Unit
- Lind Dry Land Research Unit
- Othello Research Unit
- Palouse Conservation Field Station (operated by USDA)
- Smoot Hill Biological Field Study Area
- Spillman Farm
- Royal Slope Columbia Basin Research Unit #2 (operated by private organization)
- Roza Research Unit

Non-WSU-Owned Public Water Systems

The WSU facilities which receive water from non-WSU-owned public water systems are:

- WSU Spokane
- WSU Tri-Cities
- WSU Vancouver
- Intercollegiate Center for Nursing—Spokane
- Smith Tract--Spokane
- Spokane Intercollegiate Research and Technology Institute (SIRTI)
- WSU Mount Vernon Research and Extension Unit
- WSU Puyallup Research and Extension Unit
- WSU Vancouver Research and Extension Unit
- WSU Wenatchee TFREC

Construction, Cross-connection Controls, and Plan Review

Construction

Facilities Services, Operations, RCRU, and Facilities Services, Capital must submit project reports and construction documents to the Department of Health (DOH) for approval prior to commencing construction on:

- Group A and B water systems (see definitions above),
- Extension of systems, or
- Improvements.

Facilities Services, Operations or Facilities Services, Capital must also provide copies of project reports and construction documents to EH&S.

EXCEPTION: The Washington Department of Health (DOH) does not require project reports and construction documents be submitted for activities listed under WAC 246-290-125.

Refer also to the Plan Review section below.

Facilities Services, Operations, RCRU, and Facilities Services, Capital work with the owners of

non-WSU public water systems when planning construction or projects which may affect those systems.

During construction projects, Facilities Services, Capital notifies EH&S, Facilities Services, Operations, or RCRU for public notification if a water line is contaminated.

Cross-connection Control

The University maintains safe drinking water supplies by eliminating or controlling existing cross-connections between:

- Potable and non-potable water systems,
- Plumbing fixtures, and
- Industrial piping systems (including reclaimed and/or reuse water).

After new construction or repairs, and prior to water being used for drinking purposes, the department overseeing the project must obtain satisfactory backflow prevention assembly testing results, The department must provide these results to Facilities Services, Operations as soon as possible.

Departments and owners responsible for Group A water systems must have a certified cross-connection control specialist inspect and survey the water system facilities on an annual basis or after a backflow incident per WAC 246-290-490(7)(b).

For Group B water systems and WSU facilities on non-WSU public water systems, all responsible departments and owners must have a certified cross-connection control specialist inspect and survey them as determined by the Water Board or after a backflow incident.

The Water Board has established the Cross-connection Control Program in the Program document to comply with WAC 246-290-490, WAC 246-291-270, WAC 51-56-0600, and Uniform Plumbing Code (UPC) regulations.

WSU must adhere to WAC 246-290-490 and WAC 246-291-270 for premises isolation (water supply to buildings), and the UPC and WAC 51-56-0600 for in-premises isolation (internal building water distribution).

Plan Review and Design Standards

Facilities Services, Operations, a certified cross-connection control specialist, EH&S, Housing and Dining Services, RCRU, and Facilities Services, Capital must review all plans and design standards for new or remodeled construction involving water systems.

All plans and work must meet Group A and B water system engineering requirements and design standards, as well as the requirements of the local administrative authority, if applicable.

Plans must be prepared under the direction of a professional engineer licensed in Washington.

Water System Plans

The Pullman campus system is required to submit a revised water system plan every six years to DOH. Facilities Services, Operations is responsible for preparing and submitting this plan.

Small water system plans are required for small Group A water systems. (See definition above

under **Group A System**.) The RCRU, Facilities Services, Operations, Facilities Services, Capital, and EH&S are responsible for developing these plans for their respective systems.

Well Construction, Decommissioning, Maintenance, Source Approval, and Interties

Facilities Services, Operations and RCRU, with assistance from EH&S, are responsible for:

- Obtaining source water approval.
- Interties with other systems.
- Construction and decommissioning of all University wells, including agricultural, municipal, industrial, domestic, or commercial wells.
- Water rights.

  NOTE: The Real Estate Office, Finance and Administration, assists with applications for water rights.

Sampling, Monitoring, Repair, Reporting, and Recordkeeping

Sampling, Monitoring, and Repair

EH&S, Facilities Services, Operations, and RCRU are responsible for all bacteriological and chemical sampling (excluding construction and repair sampling). The Water Distribution Manager provides assistance with daily monitoring.

For repairs and installation of new lines and systems, Facilities Services, Operations, Housing and Dining Services, RCRU, and/or Facilities Services, Capital are responsible for:

- Ensuring chlorination meets the most recent American Water Works Association (AWWA) standards
- Obtaining adequate bacteriological sampling results

After new construction or repairs, and prior to water being used for drinking purposes, the department overseeing the project must obtain satisfactory results of bacteriological samples. The department must provide these results to EH&S as soon as possible.

Reporting, Public Notification, and Recordkeeping

EH&S, RCRU, Facilities Services, Operations, and Facilities Services, Capital are responsible for all regulatory reporting and recordkeeping (excluding cross-connection control), and public notification in cases of water quality violations. The Water Distribution Manager provides assistance with these functions.

Facilities Services, Operations, EH&S, and RCRU are responsible for all cross-connection control recordkeeping, in accordance with applicable records retention requirements. See BPPM 90.01.

Sanitary Surveys, Vulnerability Assessments, and Emergency Response Plans

Sanitary Surveys

A qualified sanitary surveyor is required to perform Group A water system surveys every five

years. EH&S is responsible for coordinating the surveys.

Vulnerability Assessments and Emergency Response Plans

EH&S, Facilities Services, Operations, Housing and Dining Services, RCRU, Facilities Services, Capital, and Public Safety are responsible for vulnerability assessments and emergency response plans for their respective systems and facilities.

Wellhead Protection and Sanitary Control Areas

Facilities Services, Operations, RCRU, Facilities Services, Capital, and EH&S are responsible for maintaining wellhead protection programs and sanitary control areas around wellheads for Group A water systems.

Group B water systems are not required to have wellhead protection programs. However, the University must maintain sanitary control areas (100 foot radius) around the wellheads.

Facilities Services, Operations and RCRU must ensure that their wellhead protection program for Group A systems is incorporated into the these water system plans every six years.

EH&S and RCRU must ensure that the contaminant inventory list required in their wellhead protection program for Group A systems is updated every two years with appropriate notification to regulatory and owner agencies.

Operating Permits and Water Works Operators Certifications

All Group A water systems are required to have operating permits. (WAC 246-294)

In addition, the Pullman campus water system is required to have at least one certified Water Distribution Manager 3 in responsible charge of the daily operational activities of the system. Smaller Group A water systems are required to have at least one certified Water Distribution Specialist. (WAC 246-292)

Water Conservation

Two representatives from WSU serve on the Palouse Basin Aquifer Committee to promote water conservation at University facilities in Whitman County. For all other University water systems and facilities, the RCRU promotes water conservation at those locations.

APPENDIX G

Item 14 – Lead and Copper Monitoring Plan

Lead and Copper Sample Plan / Locations
Revised 9-06

30 samples required every 3 years.

Chinook, Columbia and Nez Perce Apts. meet Tier 3 category requirements (multi-family residences constructed prior to 1983 with lead soldered copper pipes installed).

Yakima was constructed in the 1990s and has copper pipes but no lead solder. DOH instructed EH&S to sample these units anyway.

Stimson, EE/ME and Food Services buildings meet Tier 2 category requirements (constructed or remodeled after 1983 with lead soldered copper pipes installed).

Chinook Apts (126 units [31.3 % of total # apt]):	8
Columbia Apts (54 units [13.4 % of total # apt]):	4
Nez Perce Apts (96 units [23.8 % of total # apt]):	6
Yakima Apts (127 units [31.5 % of total # apt]):	9
Stimson	1
EE/ME	1
Food Services	1
Total	30

Lead and Copper Consumer Notice certification form

All Group A water systems that conduct lead and copper monitoring must provide individual sampling results to the persons at each sample location. (CFR 141.85 (d))

Notification of Results: The water system must provide the consumer notice as soon as possible, but no later than 30 days after learning the results.

Community water systems: You must provide individual sampling results to all residences for which you received lead and copper samples. In multi-unit structures, only notify each unit tested.

Nontransient noncommunity water systems (NTNCs): You must notify all consumers who use water from the sample tap, even if they do not receive a water bill. With prior approval from DOH, NTNC water systems can post the notice in public areas.

Certification to the state: DOH must receive a sample copy of one consumer notice and a signed certification form (below) within 90 days after the end of the monitoring period.

To meet this reporting requirement, you may:

- Use the DOH Consumer Notice Template.
- Use the applicable EPA Consumer Notice template.
- Prepare your own Consumer Notice in conjunction with the state.

If you choose to produce your own Consumer Notice, it must include all of the following:

1. The sample results of the tap tested.
2. An explanation of the health effects of lead.
3. Steps consumers can take to reduce exposure to lead in drinking water.
4. The water system's contact information.
5. The maximum contaminant level goal (MCLG) and action level for lead, and the definitions of these two terms.

If you are responsible for multiple water systems, you can send to the Office of Drinking Water:

- A list of the water systems you provided Consumer Notices to, with name and PWS ID number.
- Send one copy of the Consumer Notice you used.
- Send one completed certification form (below).

Lead and Copper Results: Consumer Notification Certification Form

The water system must complete this section. The signature below certifies that the notice contains all required elements.

Complete the following items (check all that apply):

X I emailed all Consumer Notices to the water users at all of the lead and copper sampling locations within 30 days of receiving the lead and copper results from the laboratory.

☐ **(For NTNC systems ONLY)** Notice posted at _____ on ___/___/____ within 30 days of receiving the lead and copper results from the laboratory. ***(Only By Department Approval)***

Washington State University Water System	93200Q PWS ID		
Signature of owner or operator		Public Health Manager Position	7-30-15 Date

Send a copy of the completed notice and this certification form to: Washington State Department of Health, Office of Drinking Water, Water Quality Section,PO Box 47822, Olympia WA 98504-7822 or fax to (360) 236-2252.

DOH Form 331-462-F

If you need this publication in alternate format, call (800) 525-0127. For TTY/TDD, call (800) 833-6388

Sent 7-30-15

CONSUMER NOTICE
Lead and Copper Water Sample Results

The WSU Water System, I.D. 93200Q, is providing you with the lead and copper test results on the water sample collected at your location. Please share this notice with everyone who uses or drinks the water.

Results:

Location	Lead (mg/L)	Copper (mg/L)
Chinook A4	ND *	0.0123
Chinook J47	0.00287	0.0246
Chinook K51	0.00117	0.0344
Chinook L58	0.00154	0.0298
Chinook N64	ND	0.0131
Chinook P72	0.00112	0.0380
Chinook W105	ND	0.0212
Chinook Y118	0.00150	0.0417
Columbia D13	0.00259	0.0399
Columbia G19	0.00237	0.0684
Columbia L38	0.00171	0.0654
Columbia Q52	0.00262	0.0786
Nez Perce A1	0.00497	0.00522
Nez Perce B7	0.00491	0.0106
Nez Perce G21	0.00821	0.00432
Nez Perce L45	0.00422	0.00411
Nez Perce Q71	0.00400	0.00847
Nez Perce S83	0.00529	0.00365
Yakima A608	ND	0.108
Yakima H658	ND	0.0630
Yakima M718	0.00166	0.114
Yakima P737	0.00966	0.156
Yakima Q757	0.00411	0.138

* ND means none detected.

The maximum contaminant level goal (MCLG) is the level of a contaminant in drinking water below which there are no known or expected risks to health. MCLGs allow for a margin of safety. The action level is the concentration of a contaminant that, if exceeded, triggers treatment requirements or actions a water system must follow.

- The MCLG for lead is "0" and the action level is 15 ppb (or 0.015 mg/L).
- The MCLG and action level for copper is 1,300 ppb (or 1.3 mg/L).

The water system's compliance with the Lead and Copper Rule (LCR) is calculated by using sample results collected from sites in our sampling pool. Your location's lead or copper results may be higher or lower than the compliance calculation for the overall water system and does not

reflect our water system's compliance with the LCR. We will notify all water users if the lead or copper results from our water system exceed the action level.

For more information, please contact: Gene Patterson .
(owner or operator)

at (509) 335 – 3041 or PO Box 641172 Pullman, WA 99164 – 1172.
(phone number) (address)

This notice is sent to you by WSU Water System on 7/30/15 .

How Lead Gets Into Water

Lead in drinking water most often comes from water distribution lines or household plumbing rather than from the water system source. Plumbing sources can include lead pipes, lead solder, faucets, valves, and other components made of brass. Lead from other sources (such as lead-based paint and contaminated dust or soil) can increase a person's overall exposure, which adds to the effects of lead in water.

Potential Health Effects of Lead

The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead can cause serious health problems if too much enters the body. Lead is stored in the bones and can be released later in life. Lead can cause damage to the brain and kidneys, interfere with production of red blood cells that carry oxygen, and may result in lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Low levels of lead can affect adults with high blood pressure or kidney problems.

How Copper Gets Into Water

Copper is a mineral and natural component in soils. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight.

Potential Health Effects of Copper

Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps. Severe cases of copper poisoning have led to anemia and to disruption of liver and kidney functions. Individuals with Wilson's or Menke's diseases are at higher risk from copper exposure.

How you can reduce exposure:

- When your water has been sitting for several hours, flush the pipe by running the cold-water tap until the water is noticeably colder before using the water for drinking or cooking. **(The longer water has been sitting in the pipes, the more dissolved metals it may contain).**

- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of lead or copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation (such as kitchen or bathroom sinks).

Sent to Mike Burt 6-3-15

CONSUMER NOTICE
Lead and Copper Water Sample Results

The WSU Water System, I.D. 93200Q, is providing you with the lead and copper test results on the water sample collected at your location. Please share this notice with everyone who uses or drinks the water.

Results:

Location	Lead (mg/L)	Copper (mg/L)
Yakima B613	ND*	0.0914
Yakima E638	ND	0.0819
Yakima G651	ND	0.0734
Yakima L701	0.00162	0.152
Stimson 44	ND	0.0331
Food Services 121	0.00273	0.131

* ND means none detected.

The maximum contaminant level goal (MCLG) is the level of a contaminant in drinking water below which there are no known or expected risks to health. MCLGs allow for a margin of safety. The action level is the concentration of a contaminant that, if exceeded, triggers treatment requirements or actions a water system must follow.

- The MCLG for lead is "0" and the action level is 15 ppb (or 0.015 mg/L).
- The MCLG and action level for copper is 1,300 ppb (or 1.3 mg/L).

The water system's compliance with the Lead and Copper Rule (LCR) is calculated by using sample results collected from sites in our sampling pool. Your location's lead or copper results may be higher or lower than the compliance calculation for the overall water system and does not reflect our water system's compliance with the LCR. We will notify all water users if the lead or copper results from our water system exceed the action level.

For more information, please contact: Gene Patterson.
(owner or operator)

at (509) 335 – 3041 or PO Box 641172 Pullman, WA 99164 – 1172 .
(phone number) (address)

This notice is sent to you by WSU Water System on 6/3/15 .

How Lead Gets Into Water

Lead in drinking water most often comes from water distribution lines or household plumbing rather than from the water system source. Plumbing sources can include lead pipes, lead solder, faucets, valves, and other components made of brass. Lead from other sources (such as lead-based paint and contaminated dust or soil) can increase a person's overall exposure, which adds to the effects of lead in water.

Potential Health Effects of Lead

The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead can cause serious health problems if too much enters the body. Lead is stored in the bones and can be released later in life. Lead can cause damage to the brain and kidneys, interfere with production of red blood cells that carry oxygen, and may result in lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Low levels of lead can affect adults with high blood pressure or kidney problems.

How Copper Gets Into Water

Copper is a mineral and natural component in soils. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight.

Potential Health Effects of Copper

Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps. Severe cases of copper poisoning have led to anemia and to disruption of liver and kidney functions. Individuals with Wilson's or Menke's diseases are at higher risk from copper exposure.

How you can reduce exposure:

- When your water has been sitting for several hours, flush the pipe by running the cold-water tap until the water is noticeably colder before using the water for drinking or cooking. **(The longer water has been sitting in the pipes, the more dissolved metals it may contain).**
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of lead or copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation (such as kitchen or bathroom sinks).

Email to Roanne
Answer EE Dept 6-4-15

CONSUMER NOTICE
Lead and Copper Water Sample Results

The WSU Water System, I.D. 93200Q,
is providing you with the lead and copper test results on the water sample collected at your location. Please share this notice with everyone who uses or drinks the water.

Results:

Location	Lead (mg/L)	Copper (mg/L)
EE/ME Bathroom Across from 120	0.00115	0.0328

The maximum contaminant level goal (MCLG) is the level of a contaminant in drinking water below which there are no known or expected risks to health. MCLGs allow for a margin of safety. The action level is the concentration of a contaminant that, if exceeded, triggers treatment requirements or actions a water system must follow.

- The MCLG for lead is "0" and the action level is 15 ppb (or .015 mg/L).
- The MCLG and action level for copper is 1,300 ppb (or 1.3 mg/L).

The water system's compliance with the Lead and Copper Rule (LCR) is calculated by using sample results collected from sites in our sampling pool. Your location's lead or copper results may be higher or lower than the compliance calculation for the overall water system and does not reflect our water system's compliance with the LCR. We will notify all water users if the lead or copper results from our water system exceed the action level.

For more information, please contact: Gene Patterson.
(owner or operator)

at (509) 335 – 3041 or PO Box 641172 Pullman, WA 99164 – 1172.
(phone number) (address)

This notice is sent to you by Environmental Health & Safety Water System on 6/3/15.

How Lead Gets Into Water

Lead in drinking water most often comes from water distribution lines or household plumbing rather than from the water system source. Plumbing sources can include lead pipes, lead solder, faucets, valves, and other components made of brass. Lead from other sources (such as lead-based paint and contaminated dust or soil) can increase a person's overall exposure, which adds to the effects of lead in water.

Potential Health Effects of Lead

The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead can cause serious health problems if too much enters the body. Lead is stored in the bones and can be released later in life. Lead can cause damage to the brain and kidneys, interfere with production

of red blood cells that carry oxygen, and may result in lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Low levels of lead can affect adults with high blood pressure or kidney problems.

How Copper Gets Into Water

Copper is a mineral and natural component in soils. In the correct amounts, it is an essential nutrient for humans and plants. In Washington State, most copper in drinking water comes from corrosion of household plumbing. Plumbing sources can include copper pipe and brass fixtures. Copper from plumbing corrosion can accumulate overnight.

Potential Health Effects of Copper

Although copper is an essential mineral in the diet, too much copper can cause health problems. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps. Severe cases of copper poisoning have led to anemia and to disruption of liver and kidney functions. Individuals with Wilson's or Menke's diseases are at higher risk from copper exposure.

How you can reduce exposure:

- When your water has been sitting for several hours, flush the pipe by running the cold-water tap until the water is noticeably colder before using the water for drinking or cooking. **(The longer water has been sitting in the pipes, the more dissolved metals it may contain).**
- Use only cold water for drinking, cooking, and making baby formula. Hot water may contain higher levels of lead or copper.
- Frequently clean the filter screens and aerators in faucets to remove captured particles.
- If building or remodeling, only use "lead free" or low lead piping and materials. Avoid using copper piping or brass fixtures for locations where water will be consumed or used in food preparation (such as kitchen or bathroom sinks).

Lead and Copper Sampling Results by Lead - 2015

Location	Status (Vacant/Occupied?)	Crossover (Y/N)	Sample Date	Lead mg/L	Copper mg/L
Yakima P737	Vacant	N	7/2/2015	0.00966	0.156
Nez Perce G21	Vacant	N	7/2/2015	0.00821	0.00432
Nez Perce S83	Vacant	N	7/7/2015	0.00529	0.00365
Nez Perce A1	Vacant	N	7/2/2015	0.00497	0.00522
Nez Perce B7	Vacant	N	7/7/2015	0.00491	0.0106
Nez Perce L45	Vacant	N	7/9/2015	0.00422	0.00411
Yakima Q757	Vacant	N	7/2/2015	0.00411	0.138
Nez Perce Q71	Vacant	N	7/8/2015	0.004	0.00847
Chinook J47	Vacant	Y *	7/8/2015	0.00287	0.0246
Food Services 121	Occupied	N	5/14/2015	0.00273	0.131
Columbia Q52	Vacant	N	7/2/2015	0.00262	0.0786
Columbia D13	Vacant	N	7/2/2015	0.00259	0.0399
Columbia G19	Vacant	N	7/2/2015	0.00237	0.0684
Columbia L38	Vacant	N	7/7/2015	0.00171	0.0654
Yakima M718	Vacant	N	7/1/2015	0.00166	0.114
Yakima L701	Vacant	N	5/13/2015	0.00162	0.152
Chinook L58	Vacant	N	7/8/2015	0.00154	0.0298
Chinook Y118	Vacant	Y *	7/8/2015	0.0015	0.0417
Chinook K51	Vacant	N	7/8/2015	0.00117	0.0344
EE/ME 120	Occupied	N	5/14/2015	0.00115	0.0328
Chinook P72	Vacant	N	7/8/2015	0.00112	0.038
Chinook A4	Vacant	N	7/8/2015	ND	0.0123
Chinook N64	Vacant	N	7/8/2015	ND	0.0131
Chinook W105	Vacant	N	7/8/2015	ND	0.0212
Yakima A608	Vacant	N	6/30/2015	ND	0.108
Yakima B613	Vacant	N	5/13/2015	ND	0.063
Yakima E638	Vacant	N	5/13/2015	ND	0.0819
Yakima G651	Vacant	N	5/13/2015	ND	0.0734
Yakima H658	Vacant	N	7/1/2015	ND	0.063
Stimson 44	Vacant	N	5/14/2015	ND	0.0331

* Housing Notified

Chinook - 8 apts, Columbia - 4, Nez Perce - 6, Yakima - 9, Stimson - 1, Food Services - 1, EE/ME - 1

Federal Action Level (mg/L): Lead = 0.015 Copper = 1.3

Lead 90th Percentile (n 0.00497

Lead and Copper Sampling Results by Copper - 2015

Location	Status (Vacant/Occupied?)	Crossover (Y/N)	Sample Date	Lead mg/L	Copper mg/L
Yakima P737	Vacant	N	7/2/2015	0.00966	0.156
Yakima L701	Vacant	N	5/13/2015	0.00162	0.152
Yakima Q757	Vacant	N	7/2/2015	0.00411	0.138
Food Services 121	Occupied	N	5/14/2015	0.00273	0.131
Yakima M718	Vacant	N	7/1/2015	0.00166	0.114
Yakima A608	Vacant	N	6/30/2015	ND	0.108
Yakima B613	Vacant	N	5/13/2015	ND	0.0914
Yakima E638	Vacant	N	5/13/2015	ND	0.0819
Columbia Q52	Vacant	N	7/2/2015	0.00262	0.0786
Yakima G651	Vacant	N	5/13/2015	ND	0.0734
Columbia G19	Vacant	N	7/2/2015	0.00237	0.0684
Columbia L38	Vacant	N	7/7/2015	0.00171	0.0654
Yakima H658	Vacant	N	7/1/2015	ND	0.063
Chinook Y118	Vacant	Y *	7/8/2015	0.0015	0.0417
Columbia D13	Vacant	N	7/2/2015	0.00259	0.0399
Chinook P72	Vacant	N	7/8/2015	0.00112	0.038
Chinook K51	Vacant	N	7/8/2015	0.00117	0.0344
Stimson 44	Vacant	N	5/14/2015	ND	0.0331
EE/ME 120	Occupied	N	5/14/2015	0.00115	0.0328
Chinook L58	Vacant	N	7/8/2015	0.00154	0.0298
Chinook J47	Vacant	Y *	7/8/2015	0.00287	0.0246
Chinook W105	Vacant	N	7/8/2015	ND	0.0212
Chinook N64	Vacant	N	7/8/2015	ND	0.0131
Chinook A4	Vacant	N	7/8/2015	ND	0.0123
Nez Perce B7	Vacant	N	7/7/2015	0.00491	0.0106
Nez Perce Q71	Vacant	N	7/8/2015	0.004	0.00847
Nez Perce A1	Vacant	N	7/2/2015	0.00497	0.00522
Nez Perce G21	Vacant	N	7/7/2015	0.00821	0.00432
Nez Perce L45	Vacant	N	7/9/2015	0.00422	0.00411
Nez Perce S83	Vacant	N	7/7/2015	0.00529	0.00365

* Housing Notified

Chinook - 8 apts, Columbia - 4, Nez Perce - 6, Yakima - 9, Stimson - 1, Food Services - 1, EE/ME - 1

Federal Action Level (mg/L): Lead = 0.015 Copper = 1.3

Copper 90th Percentile (mg/L): 0.131

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	5/13/2015	Date Reported: 5/21/2015	Supervisor: JWC
Date Analyzed:	5/19/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #		Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125	60031	5/13/2015	YAKIMA B613	Lead	ND	mg/L	EPA 200.8	HSW	
125	60031	5/13/2015	YAKIMA B613	Copper	0.0914	mg/L	EPA 200.8	HSW	
125	60032	5/13/2015	YAKIMA E638	Lead	ND	mg/L	EPA 200.8	HSW	
125	60032	5/13/2015	YAKIMA E638	Copper	0.0819	mg/L	EPA 200.8	HSW	
125	60033	5/13/2015	YAKIMA G651	Lead	ND	mg/L	EPA 200.8	HSW	
125	60033	5/13/2015	YAKIMA G651	Copper	0.0734	mg/L	EPA 200.8	HSW	
125	60034	5/13/2015	YAKIMA L701	Lead	0.00162	mg/L	EPA 200.8	HSW	
125	60034	5/13/2015	YAKIMA L701	Copper	0.152	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Cuddy **Date:** 5/21/2015

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	5/14/2015	Date Reported: 5/21/2015	Supervisor: JWC
Date Analyzed:	5/19/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #		Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125	60095	5/14/2015	EE/ME 120	Lead	0.00115	mg/L	EPA 200.8	HSW	
125	60095	5/14/2015	EE/ME 120	Copper	0.0328	mg/L	EPA 200.8	HSW	
125	60096	5/14/2015	STIMSON 44	Lead	ND	mg/L	EPA 200.8	HSW	
125	60096	5/14/2015	STIMSON 44	Copper	0.0331	mg/L	EPA 200.8	HSW	
125	60097	5/14/2015	FOOD SERVICES 121	Lead	0.00273	mg/L	EPA 200.8	HSW	
125	60097	5/14/2015	FOOD SERVICES 121	Copper	0.131	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Coll **Date:** 5/21/2015

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	6/30/2015	Date Reported: 7/9/2015	Supervisor: JWC
Date Analyzed:	7/7/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 61985	6/30/2015	YAKIMA A608	Lead	ND	mg/L	EPA 200.8	HSW	
125 61985	6/30/2015	YAKIMA A608	Copper	0.108	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Call **Date:** 7/9/2015

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/1/2015	Date Reported: 7/8/2015	Supervisor: JWC
Date Analyzed:	7/7/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #		Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125	62038	7/1/2015	YAKIMA M718	Lead	0.00166	mg/L	EPA 200.8	HSW	
125	62038	7/1/2015	YAKIMA M718	Copper	0.114	mg/L	EPA 200.8	HSW	
125	62039	7/1/2015	YAKIMA H658	Lead	ND	mg/L	EPA 200.8	HSW	
125	62039	7/1/2015	YAKIMA H658	Copper	0.0630	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Coll **Date:** 7/8/2015

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Anatek File # 150702017-002

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/2/2015	Date Reported: 7/15/2015	Supervisor: JWC
Date Analyzed:	7/13/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 62059	7/2/2015	COLUMBIA D13	Lead	0.00259	mg/L	EPA 200.8	HSW	
125 62059	7/2/2015	COLUMBIA D13	Copper	0.0399	mg/L	EPA 200.8	HSW	
125 62060	7/2/2015	COLUMBIA G19	Lead	0.00237	mg/L	EPA 200.8	HSW	
125 62060	7/2/2015	COLUMBIA G19	Copper	0.0684	mg/L	EPA 200.8	HSW	
125 62061	7/2/2015	COLUMBIA Q52	Lead	0.00262	mg/L	EPA 200.8	HSW	
125 62061	7/2/2015	COLUMBIA Q52	Copper	0.0786	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cahill **Date:** 7/15/2015

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/2/2015	Date Reported: 7/15/2015	Supervisor: JWC
Date Analyzed:	7/13/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #		Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125	62062	7/2/2015	NEZ PERCE A1	Lead	0.00497	mg/L	EPA 200.8	HSW	
125	62062	7/2/2015	NEZ PERCE A1	Copper	0.00522	mg/L	EPA 200.8	HSW	
125	62063	7/2/2015	YAKIMA P737	Lead	0.00966	mg/L	EPA 200.8	HSW	
125	62063	7/2/2015	YAKIMA P737	Copper	0.156	mg/L	EPA 200.8	HSW	
125	62064	7/2/2015	YAKIMA Q757	Lead	0.00411	mg/L	EPA 200.8	HSW	
125	62064	7/2/2015	YAKIMA Q757	Copper	0.138	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John. Coll **Date:** 7/15/2015

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
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Anatek File # 150706005-003

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/7/2015	Date Reported: 7/15/2015	Supervisor: JWC
Date Analyzed:	7/13/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #		Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125	62169	7/7/2015	COLUMBIA L38	Lead	0.00171	mg/L	EPA 200.8	HSW	
125	62169	7/7/2015	COLUMBIA L38	Copper	0.0654	mg/L	EPA 200.8	HSW	
125	62170	7/7/2015	NEZ PERCE B7	Lead	0.00491	mg/L	EPA 200.8	HSW	
125	62170	7/7/2015	NEZ PERCE B7	Copper	0.0106	mg/L	EPA 200.8	HSW	
125	62171	7/7/2015	NEZ PERCE G21	Lead	0.00821	mg/L	EPA 200.8	HSW	
125	62171	7/7/2015	NEZ PERCE G21	Copper	0.00432	mg/L	EPA 200.8	HSW	
125	62173	7/7/2015	NEZ PERCE S83	Lead	0.00529	mg/L	EPA 200.8	HSW	
125	62173	7/7/2015	NEZ PERCE S83	Copper	0.00365	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Crabtree **Date:** 7/15/2015

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Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/8/2015	Date Reported: 7/21/2015	Supervisor: JWC
Date Analyzed:	7/17/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 62284	7/8/2015	CHINOOK A4	Lead	ND	mg/L	EPA 200.8	HSW	
125 62284	7/8/2015	CHINOOK A4	Copper	0.0123	mg/L	EPA 200.8	HSW	
125 62285	7/8/2015	CHINOOK J47	Lead	0.00287	mg/L	EPA 200.8	HSW	
125 62285	7/8/2015	CHINOOK J47	Copper	0.0246	mg/L	EPA 200.8	HSW	
125 62286	7/8/2015	CHINOOK K51	Lead	0.00117	mg/L	EPA 200.8	HSW	
125 62286	7/8/2015	CHINOOK K51	Copper	0.0344	mg/L	EPA 200.8	HSW	
125 62287	7/8/2015	CHINOOK L58	Lead	0.00154	mg/L	EPA 200.8	HSW	
125 62287	7/8/2015	CHINOOK L58	Copper	0.0298	mg/L	EPA 200.8	HSW	
125 62288	7/8/2015	CHINOOK N64	Lead	ND	mg/L	EPA 200.8	HSW	
125 62288	7/8/2015	CHINOOK N64	Copper	0.0131	mg/L	EPA 200.8	HSW	
125 62289	7/8/2015	CHINOOK P72	Lead	0.00112	mg/L	EPA 200.8	HSW	
125 62289	7/8/2015	CHINOOK P72	Copper	0.0380	mg/L	EPA 200.8	HSW	
125 62290	7/8/2015	CHINOOK W105	Lead	ND	mg/L	EPA 200.8	HSW	
125 62290	7/8/2015	CHINOOK W105	Copper	0.0212	mg/L	EPA 200.8	HSW	
125 62291	7/8/2015	CHINOOK Y118	Lead	0.00150	mg/L	EPA 200.8	HSW	
125 62291	7/8/2015	CHINOOK Y118	Copper	0.0417	mg/L	EPA 200.8	HSW	

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Anatek File # 150709042-008

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/8/2015	Date Reported: 7/21/2015	Supervisor: JWC
Date Analyzed:	7/17/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 62292	7/8/2015	NEZ PERCE Q71	Lead	0.00400	mg/L	EPA 200.8	HSW	
125 62292	7/8/2015	NEZ PERCE Q71	Copper	0.00847	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: _____ **Date:** 7/21/2015

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Inorganic Chemicals (IOC's) Analysis Report For Lead And Copper

System ID#:	WA5393200	System Name: WSU EH&S	
			DOH Source #: S93
Multiple Source Nos:		Sample Type: A	Sample Purpose: C
Date Received:	7/9/2015	Date Reported: 7/21/2015	Supervisor: JWC
Date Analyzed:	7/17/2015		
County:	WHITMAN		
Report To:	Address:	P.O. BOX 641172	
	City, State, ZIP	PULLMAN, WA 99164	
	Phone Number:	(509) 335-3041	

Lab Tracking #	Date Collected	Site/Location:	Analyte	Result	Units	Method	Analyst	Qualifier
125 62296	7/9/2015	NEZ PERCE L45	Lead	0.00422	mg/L	EPA 200.8	HSW	
125 62296	7/9/2015	NEZ PERCE L45	Copper	0.00411	mg/L	EPA 200.8	HSW	

Analyte	DOH#	SRL	AL
Lead	9	0.001 mg/L	0.015 mg/L
Copper	23	0.2 mg/L	1.3 mg/L

NOTES:

ND(Not Detected): Not Detected with the sensitivity of the instrument
SRL (State Reporting Level): Indicates the minimum reporting level required by WA-DOH
Numerical Entry: Detection at level indicated
AL (Federal Action Level) EPA maximum contaminant level. If exceeded, contact your regional DOH office for information.
Anatek Labs PQL for Lead and Copper is 0.001 mg/L.

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Lab Supervisor: John W. Cobb **Date:** 7/21/2015

APPENDIX H:

- Item 1 – WSU Construction Standard Specifications

DIVISION 22 – DOMESTIC WATER PIPING

22 11 00 FACILITY WATER DISTRIBUTION
(FINAL VERSION CONVERTED TO INDIVIDUAL CSI SECTION)

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Washington State University (Pullman campus) is served by both high elevation and low elevation water systems. The high elevation source is the North Fairway Reservoir. The low elevation sources are the Observatory Hill Reservoirs.

B. Refer to WSU utility record drawings for known existing conditions.

1.02 SPECIFIC DESIGN REQUIREMENTS

A. Design of the WSU public drinking water system shall meet the requirements of the most current editions of Chapters 246-290 WAC and the most current edition of the Washington State Department of Health (DOH) Water System Design Manual.

B. Service mains shall be sized to meet the larger demands of either the maximum hourly domestic or the combination of maximum day domestic plus fire flow. In all cases, the minimum service main size shall be 12 inches in diameter.

C. Yearly average domestic demands shall be the product of a 60 gallon per capita day usage and projected population densities. Maximum day rates shall be taken at 150 percent of this yearly average and the maximum hourly rate shall be set at 250 percent. System losses and unaccounted for usages shall be taken at 10 percent of the domestic demand.

D. For design purposes, line velocities shall not average more than 5 feet per second. Exceeding this velocity requires approval from WSU Engineering Services.

E. Mains shall be buried 60 inches below finished grade (to the top of the pipe).

F. Gate valves eight (8) inches and larger shall be installed in a standard vault.

G. Minimum size service branch lines from main shall be 6 inches to inside curb line; reductions may be made at that location if approved by WSU Engineering Services.

H. No saddle taps allowed for service connections. Branch lines tees will be used.

I. Reclaim water pipe shall be color-coded purple.

J. Pipe bedding shall be installed per Washington State University (WSU) Standard Drawing C552.

PART 2 - PRODUCTS

2.01 GENERAL

A. Distribution main shall be one of the following (or approved equal):

1. C900 PVC "Blue Brute"

2. For sleeves, use ductile iron.

B. Fittings shall be class 350 ductile iron per the most current and adopted version of AWWA A21.53.

C. Jointing shall be mechanical.

1. Preferred manufacturer: MegaLug

D. Valves:

1. Shall be flanged, iron body, bronze mounted double disc gate; over eight (8) inches, valves to have non-rising stems. Maximum operating pressure shall be not less than 175 psi for valves up to twelve (12) inches.

2. Shall be installed vertically in level lines and shall meet most current and adopted version of AWWA C500 specifications. Flanges shall be faced and drilled, ASA Class 235, for use with full face gaskets.

E. Shells, lugs, bolts, washers, and nuts shall be type 304 stainless steel.

F. Flanges shall be type 304 stainless steel or ductile iron, most current and adopted version of American Society for Testing and Materials (ASTM) ASTM 536-80, test rated at 200 psi, "Roman" Models SST or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install thrust blocks at locations identified in WSU Standards Drawing C602/603, in accordance with the design standards of the most current Water Agencies' Standards Design Guidelines for Water and Sewer Facilities.

B. Provide a Link-Seal assembly at the building penetration.

3.02 DISINFECTION

A. New or repaired public drinking water systems shall be disinfected prior to connection, in accordance with the standards of the most current Uniform Plumbing Code as modified by Chapter 51-56 WAC, and in accordance with the most current version of ANSI/AWWA C651, "Disinfecting Water Mains."

B. For installation of new lines and systems, the Contractor is responsible to ensure all chlorination is performed according to the most current version of ANSI/AWWA C651, and that adequate bacteriological sampling results are obtained from a WA State approved laboratory. Submit written documentation of chlorination and bacteriological sampling to the WSU Construction Manager, for review and approval

by Environmental Health and Safety (EH&S) and the Water Distribution Manager, prior to placing new lines in service.

3.03 TESTING

A. Test pressure shall not be less than 50 psi above static, but no less than 200 psi or more than 200 percent of the working pressure for the class and size of pipe tested.

B. The line shall be filled between valves with all air expelled at high points. Test pressure shall then be applied and maintained for at least 2 hours. Test pressure must be maintained for 5 minutes without pumping.

C. No testing water or chlorinated water may be discharged into the sanitary or storm sewer system in accordance with the most current and adopted version of Washington Administrative Code (WAC) 173-201A. All chlorinated water shall either be treated to remove chlorine prior to discharge into sewers, or discharged into an area which does not impact storm drains or surface waters. If soil is the only contaminant, the wastewater may be discharged into the storm sewer catch basins provided they are protected using Best Management Practices (BMPs), per the requirements of WSU section 33 40 00 (Storm Drainage Utilities).

D. The Contractor shall notify the WSU Construction Manager in writing 48 hours prior to testing. The Contractor shall make all necessary testing and sampling arrangements, making all necessary arrangements with the WA State approved testing laboratory. The Construction Manager shall notify the following as to date and time of flushing and hydrostatic and bacteriological testing:

1. Facilities Services Water Distribution Manager

2. WSU Environmental Health and Safety

3. WSU Fire Department

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Site Excavation and Embankment

B. Structural Excavation and Backfill

C. Trench Excavation and Backfill

D. Rock Excavation

1.02 CONTROL DATA BY OWNER

A. Reference Points: Owner will provide a base line and a minimum of one bench mark for horizontal and vertical control, where noted on plans.

1.03 REFERENCES

A. WSDOT/APWA M41-10 (Current Edition) Standard Specification for Road, Bridges, and Municipal Construction.

B. ASTM D 698 - Moisture Density Relations of Soils (Standard Proctor).

C. WAC 296-155 - Safety Standards for Construction Work.

1.04 TESTS

A. Tests and analysis of fill and backfill materials will be performed in accordance with ASTM D-698, Standard Proctor.

B. Tests in Section 02200 will be provided by the Owner at the Owner's option and expense and where provided, will be conducted under the provisions of Section 01400.

1.05 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record location of utilities remaining, rerouted utilities, and new utilities by means of horizontal dimensions, elevations of inverts, and slope gradients.

C. Maintain complete, accurate log of control and survey work as it progresses.

1.06 SAMPLES

A. Unless directed otherwise by the Project Manager, deliver to site a sample having a minimum volume of one cubic yard of each type of imported crushed rock and backfill per the requirements of Section 01300.

B. Remove unaccepted samples from the site and deliver additional samples until acceptance of material by the Project Manager.

C. Do not proceed with delivery or placement of fill or backfill materials until acceptance of samples.

1.07 PROTECTION

A. Protect adjacent buildings, driveways, sidewalks, fences, and other items to remain.

B. Protect above and below grade utilities and drains which are to remain. Contractor shall retain markers locating existing utilities until authorized by the Project Manager to remove them.

1.08 HAULING LIMITS ON PUBLIC AND UNIVERSITY ROADWAYS

A. State of Washington Chapter 189 Session Laws of 1937 as amended by Chapter 46.44 Session Laws of 1959 shall apply.
   1. Truck speeds shall be limited to no more than 20 miles per hour on all University roads.

1.09 REMOVAL AND DISPOSAL

A. All surplus materials (suitable or unsuitable) that are to be wasted shall be handled and disposed of in conformance with applicable Federal, State and local laws and regulations.

B. Unless indicated otherwise in the contract documents or directed otherwise by the Owner's Representative, all surplus materials (suitable or unsuitable) shall be hauled to a waste site secured by the Contractor.

1.10 BEST MANAGEMENT PRACTICES

A. Best Management Practices (BMPs) must be implemented prior to beginning construction, and maintained throughout construction, so that soil erosion and other pollutants are prevented from impacting surface waters and storm sewers.

1.11 SUBMITTALS

A. Include with submittals of Section 01300 a list of Best Management Practices (BMPs) that are planned for protecting surface waters and storm sewers.

PART 2 PRODUCTS

2.01 CLASSIFICATION

A. Common excavation shall comprise all materials not classified as rock excavation, and shall include clay, silt, sand, gravel, hardpan, loose shale, loose

stone in masses, and boulders measuring less than 1/2 cubic yard in volume.

B. Rock excavation: Shall comprise boulders measuring 1/2 cubic yard or more in volume, rock materials in ledges, bedded deposits, unstratified masses and conglomerate deposits so firmly cemented that they possess the characteristics of solid rock and cannot be removed without systematic drilling and fracturing.

C. Sidewalks and paving are not included in rock excavation.

2.02 FOUNDATION, BEDDING AND BACKFILL MATERIALS

A. Unless noted otherwise, the following materials shall conform to Section 02510.
1. Foundation material: shall be 2-1/2"(-) crushed rock or naturally occurring 2-1/2"(1) granular material.
2. Backfill material, crushed rock: shall be 1-1/4"(-) crushed surfacing base course.
3. Bedding or backfill material, crushed rock: shall be 3/4"(-) crushed surfacing top course.
4. Bedding or backfill material, granular: shall be 3/4"(-) granular material.
5. Backfill material, select soil: shall be select common or imported soil material.

2.03 NON-EXPLOSIVE DEMOLITION AGENTS

A. Bristar 2,000 as manufactured by Demolition Technologies, Inc. (1-800-282-4384) or approved equivalent.

PART 3 EXECUTION

3.01 GENERAL

A. Construction Staking
1. Verify locations of reference points provided by Owner prior to starting work. Promptly notify Project Manager of any discrepancies discovered.
2. Unless stated otherwise in Section 01001, site boundaries, lines and levels and layout construction staking will not be provided by Owner.
3. Identify known below grade utilities; stake and flag locations.
4. Maintain reference points and construction staking during course of work.

B. Safety
1. All excavation, shoring and other related work shall be in accordance with WAC-296-155 "Safety for Construction Work."
2. Unless specified otherwise herein, the Contractor may employ any type of equipment or procedure so long as it does not endanger the safety of the workmen, adjacent property, property owners, general public, and the work. Care shall be taken so as not to interfere with street traffic, driveways, cross streets and other utilities. All laws and ordinances shall be complied with including signs, lights, watchmen and barricades.

C. Inspection

1. Verify that subsoils to be excavated are not wet.
2. Verify that areas to be backfilled are free of debris, snow, ice, water, and that surfaces are not frozen.

D. Preparation
1. Identify required lines, levels, contours, and datum. Coordinate with mechanical and electrical work.
2. Locate existing underground utilities.
3. When necessary, compact subgrade surfaces to density requirements for backfill material.

E. Compaction Testing
1. Compaction testing will be performed by the Owner's independent agency as allowed in Section 01400.
2. The Owner will provide testing and monitoring for backfill and fill.
3. Contractor shall accommodate all testing activities.

F. Surface and Subsurface Drainage
1. The Contractor shall manage and control all surface and subsurface drainage in the vicinity of all earthwork activities.

G. Unsuitable Material
1. The Contractor shall remove from site and legally dispose of any unsuitable fill, backfill or excavated material.
2. The Contractor shall be responsible for replacing any soft spots in the excavation subgrade, fill or backfill which are created or aggravated by the Contractor's construction activities.

3.02 SITE EXCAVATION, EMBANKMENT AND BACKFILL

A. Excavation
1. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the drawings or as otherwise specified.
2. The Contractor may employ any type of equipment or procedure so long as it does not endanger the safety of the workmen, adjacent property, property owners, general public, and the work. Care shall be taken so as not to interfere with street traffic, driveways, cross streets and other utilities. All laws and ordinances shall be complied with including signs, lights, watchmen and barricades.
3. During excavation, material suitable for backfilling or embankments shall be piled in an orderly manner a sufficient distance from the banks of the excavation to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill or embankments shall be removed and wasted.
4. Grade to prevent surface water from flowing into the excavations. Accumulated water shall be removed by pumping or by other approved methods.
5. All suitable material removed from the excavation shall be used as far as practicable in the formation of embankments. Unsuitable material

encountered in excavation shall be wasted.

6. Suitable material shall not be wasted without permission from the Owner. When suitable material is to be wasted, it shall be disposed of in a manner satisfactory to the Owner.
7. Where shown on the plans or directed, excavation shall be made below subgrade as required and the excavation backfilled to subgrade with approved material. All soft or unsuitable material encountered which cannot be properly consolidated shall be removed and wasted.
8. The surface of excavated areas shall be finished true to line, grade, and cross section.

B. Embankment and Backfill
1. After stripping, the foundation shall be loosened thoroughly by scarifying or plowing to a minimum depth of 2 inches. The foundation area shall be bonded with the first layer of fill by compaction to the density and moisture specified for the fill.
2. Place excavated soils at areas required to receive fill or backfill.
3. Place in uniform layers not to exceed 8 inches in depth before compaction unless noted otherwise on the plans.

C. Compaction
1. Compact preceding layer to specified density before placing subsequent layer.
2. Compact in accordance with specified provisions to the following densities.
   a. 95 percent maximum dry density (Standard Proctor);

3. Road embankments, dikes, dams and berms. Other areas as may be noted on drawings.
   a. 90 percent maximum dry density (Standard Proctor): All areas not specifically noted otherwise.
   b. Compact all imported crushed rock or granular materials (indicated in Section 02510) to not less than 98% maximum dry density (Standard Proctor) unless noted otherwise.
4. Recompact or replace and compact those areas not compacted to specified densities.

D. Rough Grading
1. Grade all areas to $\pm$ 0.10 foot from plan grade.
2. Roll or round cut surfaces at abrupt elevation changes.

E. Subgrade Shaping
1. Shape the entire subgrade to a uniform surface running reasonably true to the line and grade as shown on the plans.

F. Excess or Shortage of Material
1. Coordination: Layout work to provide reasonable balance of cut and fill within the scope of work indicated.

2. Provide additional cutting as directed if required to yield additional

material for fill. Extend areas of fill as directed to exhaust excess materials.

3.03 TRENCH EXCAVATION AND BACKFILL

A. Excavation
1. Excavate subsoil required for underground utilities.
2. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
3. Hand trim excavation and leave free of loose matter.
4. Remove lumped subsoil, boulders, and rock.
5. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
6. Correct unauthorized excavation at no additional cost to Owner.
7. Fill over-excavated areas under pipe bearing surfaces in accordance with direction by Project Manager.
8. Place and compact excavated material over general site required to receive common earth fill as part of Section 02200.
9. Grade excavations to prevent collection of water; provide dewatering as required to keep trenches dry.
10. Where rock or other solid material is encountered, excavate trench to provide a minimum clearance of four (4) inches under the pipe. The materials removed below the pipe shall be replaced with "Bedding Material."
11. Where unsuitable material is encountered, such material shall be removed and backfilled with "Foundation Material" to within four (4) inches of the bottom of the pipe. The remaining four (4) inches shall be replaced with "Bedding Material."
12. When trenches cross-paved areas, the existing pavement shall be saw cut in a neat line along each side of the trench excavation. All damaged or undermined pavement shall be removed. All excavated asphalt concrete, Portland cement concrete and bituminous surface material shall be hauled away by the Contractor. Unless noted otherwise, replacement shall match existing pavement.

B. Bedding of Pipe and Conduit
1. Bedding shall be placed in more than one lift. The first lift is to provide at least 4 inches of bedding under any portion of the pipe and shall be placed before the pipe is installed, and shall be spread smoothly so that the pipe is uniformly supported along the barrel. Subsequent lifts of not more than 6 inches thickness shall be installed to a depth of 6 inches over crown of pipe.

C. Backfilling Trenches
1. Prior to backfilling, all form lumber and debris shall be removed from the trench. Sheeting used by the Contractor shall be removed just ahead of the backfilling. Backfill up to 12 inches over the top of the pipe shall be evenly and carefully placed. Materials capable of damaging the pipe or its coating shall be removed from the backfill material.
2. Where compaction of less than 98% maximum dry density is allowed

select common backfill material (as indicated in Section 02510) may be used.

3. Where compaction of at least 98% maximum dry density is required granular backfill material 3/4"(-) or crushed rock 3/4"(-) shall be used.

D. Compaction of Backfill

1. Each lift of backfill shall be compacted to at least 98% maximum dry density at the following locations:
   a. Under and within 5 feet of all buildings including any future buildings noted.
   b. Under and within 5 feet of roadways, access drives, sidewalks, concrete slabs and service areas.
   c. Other areas as may be noted on the drawings.
2. Each lift of backfill shall be compacted to at least 90% maximum dry density at all locations not specifically noted otherwise.
3. At locations where compaction of at least 98% maximum dry density is required, the backfill material shall be placed in successive layers not exceeding 6 inches in loose thickness and each layer shall be compacted with mechanical trampers.
4. At locations where compaction of less than 98% maximum dry density is allowed, the backfill material shall be placed in 12 inch lifts and compacted by methods as approved by the Project Manager.
5. Maximum dry density shall be determined in accordance with ASTM D-698, Standard Proctor.

E. Grading

1. In areas within building sites, roadways, access drives and service areas, the compacted backfill shall be brought to subgrade elevations.
2. In areas outside of the building sites, roadways, access drives and service areas of the backfill shall be moderately mounded above grade and crowned to prevent collection of water.

3.04 STRUCTURAL EXCAVATION AND BACKFILL

A. Excavation

1. The Contractor shall perform all excavation of whatever substances encountered to the depths indicated on the drawings or as otherwise specified.
2. Unstable foundation material shall be removed below the designated elevation. Suitable surplus excavated material shall be used in the construction of embankments, and unsuitable material shall be wasted. Material removed below designated elevation shall be replaced with foundation material.
3. Where rock, hardpan, or other unyielding material is encountered, it shall be removed to the designated grade. No structure shall be placed until the foundation has been approved. Solid rock excavation below the established footing elevation shall be filled with class 25 concrete.

4. Where the footing is to rest on material other than rock or boulders,

special care shall be taken not to destroy its bearing value. Disturbed materials shall be removed from the excavation and the footing excavation backfilled to the plan elevation with a material approved by the Engineer.

5. No pumping will be permitted during the placing of concrete or for a period of at least 24 hours thereafter unless it is done from a suitable pump or well point separated from the concrete work.

B. Backfill

1. Backfill placed through water around abutments, wing walls and piers shall consist of crushed rock material placed in layers. Compaction of this backfill will not be required. Backfill under and within 5 feet of roadways, access drives, sidewalks, concrete slabs and service areas shall be crushed rock compacted to 98% maximum dry density. All other backfill shall consist of suitable materials uniformly distributed in layers of not more than 8 inches and compacted to 95% of maximum dry density. Backfill materials not having a proper moisture content to allow compaction shall be considered unsuitable. Suitable backfill shall be free of clods of earth, asphalt or stone larger than 8 inches and wood, roots, bark and other extraneous materials. No backfill shall be place against newly constructed masonry or concrete structures for a period of 21 days unless authorized by the Project Manager.
2. Sheeting and bracing shall not be removed until backfilling has progressed to such a stage that no damage to the structure will result form its removal. Unless otherwise indicated in the plans or directed by the Project Manager, all sheeting and bracing used in making structure excavation shall be removed by the Contractor.

C. Surplus Material

1. Excess material from excavation shall be removed off-site and disposed of legally. Should any additional material be required, it shall be taken from sources approved by the Project Manager. When used for topsoil, it shall meet the applicable specification.

3.05 ROCK EXCAVATION

A. Blasting with explosives will not be allowed. Rock will be fractured by using non-explosive expansion grout. Exercise extreme caution and use only in strict accordance with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

A. This section describes the products that will be required where PVC pipe is shown on the plans or called for in these specifications.

PART 2 PRODUCTS

2.01 WATER PIPE AND FITTINGS

A. Class Rated Pipe: Pipe 4" through 12" shall conform to the requirements of AWWA C-900. Pipe 14" through 36" shall conform to the requirements of AWWA C905. All joints shall be rubber gasketed. Gaskets shall be manufactured by the pipe manufacturer. Joints shall conform to ASTM D-3 139 using a restrained *rubber* gasket conforming to ASTM F-4777. Fittings shall conform to AWWA C-110 and C-111, and shall be cement-mortar lined conforming to AWWA C-104. Flanged coupling adapters shall conform to ASTM A-126.

B. Pressure Rated Pipe: Pipe shall conform to the requirements of ASTM D-2241. PVC material shall conform to ASTM D-1784. Bells shall conform to ASTM D-2672. All joints shall be rubber gasketed. Rubber gasket rings shall conform to ASTM D-1869 and F477. Gaskets shall be manufactured by the pipe manufacturer. Flanged couplings adapters shall conform to ASTM A-126.

C. Schedule Rated Pipe: Pipe shall conform to the requirements of ASTM D-1785. Schedule 40 and 80 Socket type fittings shall conform to ASTM D-2466 and ASTM D-2467 respectively. Threaded fittings shall conform to ASTM D-2464.

2.02 GRAVITY SEWER PIPE AND FITTINGS

A. DR 35 pipe: Pipe shall conform to ASTM D-3034. Fittings shall conform to ASTM D-2729. All joints shall be bell and spigot with elastomeric gaskets and shall conform to ASTM D3212. Gaskets shall be manufactured by the pipe manufacturer. unless shown otherwise on the plans, connections to pipes of different materials to be made with "Calder" transition couplings. Connections to pipes of different diameters to be made with "Calder" reducing transition coupling. Side sewer coupling to existing sewer to be "Romac CB" sewer saddle or approved equivalent.

2.03 STRAIGHT AND TRANSITION COUPLINGS

A. Couplings shall be "Romac Style 501" or "Rockwell 411" or an approved equivalent.

PART 3 EXECUTION

3.01 PIPES AND APPURTENANCES

A. All pipes and appurtenances shall be installed in accordance with 02665 and/or 02731 (as applicable).

END OF SECTION

PART 1 GENERAL

A. This section describes the products that will be required where ductile iron pipe is shown on the plans or called for in these specifications.

PART 2 PRODUCTS

2.01 PIPE

A. Pipe shall conform to the requirements of AWWA C 151. Pipe thickness shall conform to ANSI A 21.50, AWWA C150. All pipe shall have a cement mortar lining conforming to AWWA C104.

2.02 FITTINGS

A. All fittings shall be made of cement lined ductile iron and shall conform to AWWA C 153. Flanged couplings adaptors shall conform to ASTM A 126.

B. Straight and transition couplings shall be "Romac Style 501" or "Rockwell 411" or an approved equivalent.

2.03 JOINTS

A. Flanges joints shall conform to ANSI A 21.15, and AWWA C 115. Rubber ring push-on joints shall conform to AWWA C 111. Lock joints shall be the rubber ring push-on type with an approved restraining clamp or twist-lock socket and shall conform to AWWA C 111. Mechanical joints shall conform to the requirements of AWWA C 111.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipe and appurtenances shall be installed in accordance with 02665.

END OF SECTION

PART 1 GENERAL

1.01 The work included in this section shall consist of furnishing all labor and materials and equipment required for the installation of all valves shown on the plans.

PART 2 PRODUCTS

2.01 Product specifications for each type of valve required is given in the sections that follow. In some cases, valves may be called out on the plans by model number and manufacturer. Cast-iron valve boxes for buried valves shall conform to 02659 unless stated otherwise for a specific valve. Valve operating wrenches for each type of valve shall be provided. Concrete thrust blocks shall conform to Division 3.

PART 3 EXECUTION

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Valves and accessories shall be prepared for shipment in accordance with AWWA C 500. Ends of all valves shall be sealed to prevent entry of foreign matter. Storage area shall be protected from weather, moisture or possible damage. Valves shall never be stored directly on the ground. Valves and accessories shall be handled in a manner that will prevent damage to interior or exterior surfaces.

3.02 INSTALLATION

A. Valves shall be installed at locations shown on the plans. All valves and accessories shall be installed in accordance with AWWA standards and the manufacturer's instructions. Buried valves shall be installed so that the operating shafts are in a vertical position. Unless indicated otherwise, a cast iron valve box of sufficient length shall be provided for each buried valve.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section describes the products that will be required where gate valves are shown on the plans. Also, this section presents information relating to execution that is not discussed in 02640.

PART 2 PRODUCTS

2.01 PRODUCT SPECIFICATION

A. All gate valves shall meet the requirements of AWWA C508-8.

B. Gate valves shall be "Waterous" "Series 500" or an approved equivalent.

C. Valve shall be epoxy coated inside and out and have a resilient seat. Unless indicated otherwise on the plans or the Special Provision, the stem shall be non-rising suitable for buried installation. End connections shall be as shown on the plans or as required to fit pipe. For exposed locations, the operator shall be of the hand wheel type with counter clockwise opening direction marked. For buried applications, a 2 inch square operating nut and a cast iron valve box shall be used. Valve boxes shall comply with 02659. Opening direction shall be counter clockwise.

PART 3 EXECUTION

3.01 PRODUCT INSTALLATION

A. All valves and appurtenances shall be installed in accordance with 15100.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section describes the products that will be required where butterfly valves are shown on the plans. Also, this section may present information relating to execution that is not discussed in 02640.

PART 2 PRODUCTS

2.01 PRODUCT SPECIFICATION

A. All butterfly valves shall meet the requirements of AWWA C504.

B. Butterfly valves shall be Pratt "Groundhog" direct burial type. M.J. connections, with diviner ground level position indicator, adaptor to fit a standard five inch (5") cast iron soil pipe bell and coverplate. The ground level positioner shall be of proper length to set operator at finished grade. Valve operators shall be MDT 3 and 4. Valves shall be designed for one hundred-fifty pound per square inch (150 psi) working pressure.

PART 3 EXECUTION

3.01 PRODUCT INSTALLATION

A. All valves and appurtenances shall be installed in accordance with 02640.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section describes the products that will be required where check valves are shown on the plans.

PART 2 PRODUCTS

2.01 SILENT, FLAP AND GLOBE

A. Silent check valves shall be globe type unless indicated otherwise in these specifications or on the plans. All valves shall meet AWWA specifications. Pressure requirements are indicated elsewhere in these specifications or on the plans. Valve body shall be semi-steel or ductile iron and shall have flanged end connections that meet the ANSI specifications for the pressure required. Each valve shall be equipped with bronze plug, seat and guide bushing and stainless steel helical spring. The plug shall be guided at both ends with a through integral shaft and will be opened by the velocity flow and closed by a stainless steel helical spring which returns the plug to seat before reversal of flow occurs.

2.02 SWING

A. Swing check valves shall be equipped with resilient seats and be capable of full port opening with external arm and weight. The body shall be of cast iron and shall have a removable cover for inspection or removal of gate assembly. The gate, gate seat, gate studs, and nuts shall be bronze or other suitable alloy.

2.03 MANUFACTURERS

A. Acceptable manufacturers include:

1. Valve and Primer Corporation
   1420 S. Wright Blvd.
   Shaumburg, IL 60172

2. Clow Corporation
   1050 East Irving Park Road
   Bensenville, IL 60106

3. Milwaukee Valve Co., Inc.
   2375 South Burrel Street
   Milwaukee, WI 53207-1519

PART 3 EXECUTION

3.01 PRODUCT INSTALLATION

A. All valves and appurtenances shall be installed in accordance with 02640.

END OF SECTION

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Fire Hydrants

1.02 References

A. WSDOT/APWA M41-10 – 1984 Standard Specifications for Road, Bridge and Municipal Construction

B. AWWA – American Water Works Association, Standards

1.03 Submittals

A. Manufacturer's catalog data (including illustrations and a schedule for parts and the materials of which they are made) in sufficient detail to serve as a guide in the assembly and disassembly of the hydrants and in ordering repair parts.

PART 2 – PRODUCTS

2.01 FIRE HYDRANTS

A. Fire hydrants shall conform to WSDOT/APWA M41-10, Section 9-30.5.

B. Bury-length shall be five (5) feet.

C. Fire hydrants shall be of break-away design.

D. Fire hydrants shall be Waterous "Pacer" Model WB-67 with 2 – 2 ½" hose ponts and 1 – 4 ½" pumper port.

E. Hydtant shall be equipped with a 5" X 4 ½" "storz".

PART 3 – EXECUTION

A. Install fire hydrants where shown on plans.

B. Install in accordance with the detail included at the end of this specification section.

C. Set hydrants plumb, with the connecting pipe at the same elevation as the main.

D. Set hydrants on concrete blocks note less than 4 inches thick and 12 inches square.

E. Hydrant drain shall waste into pit of drain rock at the base of the hydrant.

F. After installation, hydrants shall be subjected to a hydrostatic test as specified in Section 02665 of these specifications.

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. All labor, materials, and equipment required for the installation of water system piping and associated fittings as shown on the plans and as specified.

1.02 SUBMITTALS

A. Product data and certifications as required shall be submitted under provisions of Section 01300 of these specifications.

1.03 REFERENCES

A. WSDOT/APWA M41-10-(Current Edition) Standard Specifications for Road, Bridge and Municipal Construction.

B. AWWA-American Water Works Association, Standards.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe, fittings, valves, check valves, and other appurtenances shall be those described in other sections of these specifications and/or shown on the plans.

B. Magnetic marking tape shall be two inches in width marked with the word "water".

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pipe, fittings, and appurtenances in accordance with the manufacturer's printed specifications and instructions and to AWWA standards.

B. Where water is encountered in the trench, dewatering shall conform to WSDOT/APWA M41-10, Section 7-11.3(01).

C. Pipe handling shall conform to WSDOT/APWA M41-10, Section 7-11.3(02).

D. Pipe cutting shall conform to WSDOT/APWA M41-10, Section 7-11.3(03).

E. Cleaning and assembling joints shall conform to WSDOT/APWA M41-10, Section 7-11.3(05).

F. Connections to existing mains shall conform to WSDOT/APWA M41-10, Section 7-11.3(09).

G. Line and grade shall conform to project plans and details.

H. Bedding and backfill shall conform to Section 02510 of these specifications.

I. Thrust blocks and restraining ties shall conform to project plans and details and to Thrust Block Detail and Thrust Block Detail Notes included at the end of this specification section.

J. Magnetic marking tape shall be installed over all water lines including service lines. It shall be placed approximately one foot above the top of the pipe and shall extend its full length.

K. Minimum bury depth for domestic water pipe and chilled water pipe is 4-feet and 5-feet respectively unless noted otherwise on the plans or in the Special Conditions of these specifications.

3.02 HYDROSTATIC PRESSURE TEST

A. Hydrostatic pressure tests for all water mains, service lines, hydrants and appurtenances shall conform to WSDOT/APWA M41-10, Sections 711.3(11) through 7-11.3(1l)c, unless noted otherwise.

B. Domestic water pipes shall be tested at 200 psi.

C. Chilled water pipe shall be tested to 150 psi.

3.03 DISINFECTION OF WATER SYSTEM

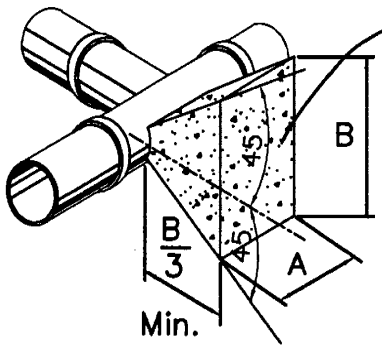
A. Prior to starting work, verify that system is complete, flushed, and clean.

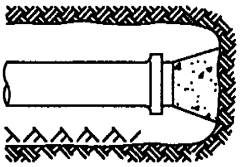
B. Disinfect water lines in accordance with AWWA C651.

C. Bacteriological Testing: After disinfection and flushing are complete, the Contractor shall submit a water sample for bacteriological testing to a Washington State Department of Health (DOH) certified laboratory for analysis. If pipe system is found to be contaminated, Contractor shall correct defects and perform additional disinfection flushing and testing until satisfactory results are obtained. All disinfection tests shall be made with the Washington State University Sanitarian present. Disinfection shall not be considered complete until approved by WSU Sanitarian.

D. Chlorinated water that is to be wasted shall be disposed of using methods that will not violate applicable federal, state, and local laws. Forbidden acts include but are not limited to discharging water containing chlorine to storm drains and surface waters.

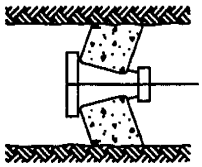
END OF SECTION



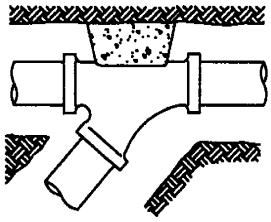


1/4" PLYWOOD OVER FACE
FACD OF BOLTS

PLUG OR CAP



REDUCER



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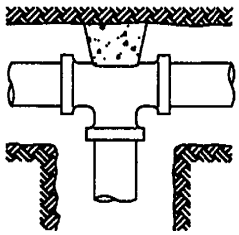
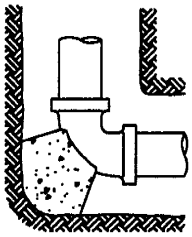
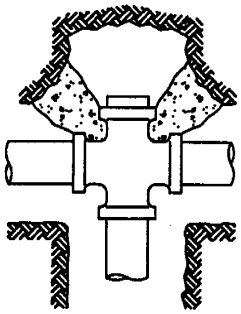


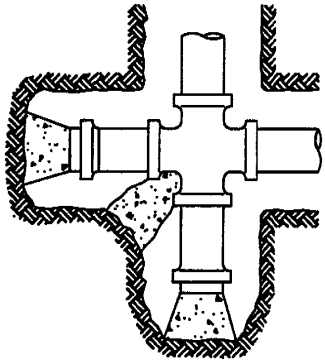
TEE



HORZ. BEND & VERT. BEND UP



CROSS WITH PLUG



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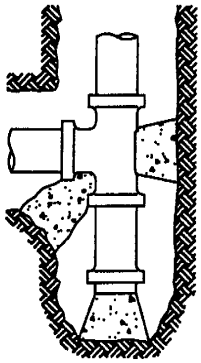
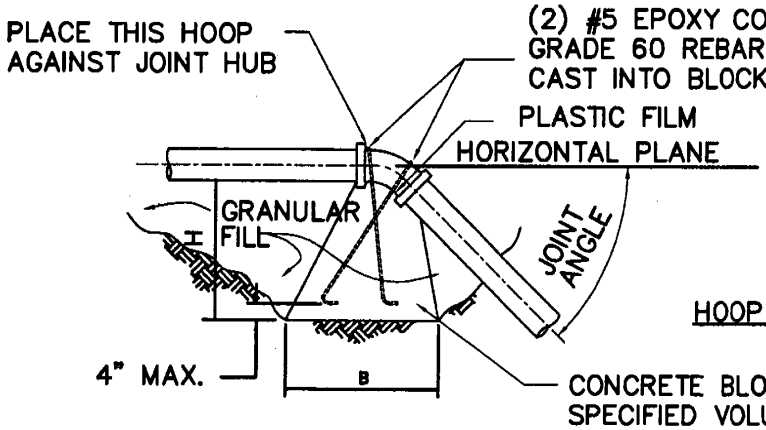
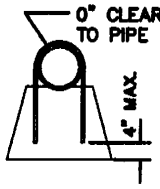


TEE WITH PLUG



VERT. BEND DOWN
(GRAVITY THRUST BLOCK)



HOOP ELEVATION

BAR BENDING DIAGRAM

BASE DIMENSIONS (B) AND HEIGHT (H)
TO BE APPROXIMATELY EQUAL.

FOR REINFORCEMENT, SEE THRUST BLOCK NOTE NO. 10.

WASHINGTON STATE UNIVERSITY
Department of Facilities Development Pullman, Wa. 99164-1150
509-335-9000 FAX 509-335-9304

THRUST BLOCKS

C-603

06/12/97

FITTING SIZE	BEARING AREA OF THRUST BLOCKS IN SQ. FT.				
	TEE, WYE PLUG OR CAP	90°BEND, PLUGGED CROSS OR TEE	45°BEND	REDUCERS 22 1/2° BEND	11 1/4° BEND
4"	1.0	1.4	1.0	--	--
6"	2.1	3.0	1.6	1.0	--
8"	3.8	5.3	2.9	1.5	1.0
10"	5.9	8.4	4.6	2.4	1.2
12"	8.5	12.0	6.6	3.4	1.7
14"	11.5	16.3	8.9	4.6	2.3
16"	15.0	21.3	11.6	6.0	3.0
18"	19.0	27.0	14.6	7.6	3.8
20"	23.5	33.0	18.1	9.4	4.7
24"	34.0	48.0	26.2	13.6	6.8

FITTING SIZE	VOL. OF GRAVITY THRUST BLOCK IN CU. YD.			
	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4"	--	--	--	--
6"	1.3	0.5	--	--
8"	2.3	1.1	0.5	--
10"	3.7	1.8	0.8	--
12"	5.5	2.8	1.2	0.8
14"	3.6	3.9	1.7	1.0
16"	3.9	5.1	2.3	1.2
18"	--	6.3	3.2	1.4
20"	--	7.7	2.3	1.2
24"	--	11.1	5.7	2.6

THRUST BLOCK NOTES:

1. BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI & A SOIL BEARING STRESS OF 2,000 LBS. PER SQ. FT. TO AREAS FOR DIFFERENT TEST PRESSURE & SOIL BEARING STRESSES: FOLLOWING EQUATION: BEARING AREA =(TEST PRESSURE/150) (2000/SOIL BEARING STRESS) (TABLE VALUE).
2. GRAVITY THRUST BLOCK VOLUMES BASED ON TEST PRESSURE OF 150 PSI. THE WEIGHT OF CONCRETE=4050 LBS./CU. YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES USE THE FOLLOWING EQUATION: VOLUME=(TEST PRESSURE/150) (TABLE VALUE).
3. THRUST BLOCKS FOR VERTICAL UP-BENDS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.
4. CONCRETE THRUST BLOCKING SHALL BE NEATLY FORMED AND PLACED AGAINST UNDISTURBED EARTH.
5. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.
6. IF NOT SHOWN ON PLANS, REQUIRED BEARING AREAS AT FITTINGS SHALL BE AS INDICATED ABOVE, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) & ALLOWABLE SOIL BEARING STRESS(ES) STATED IN THE SPECIAL SPECIFICATIONS OR ON THE PLANS.
7. BEARING AREAS & SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS & BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.
8. CONCRETE WILL BE 2500 PSI MIN.
9. WRAP ALL FITTINGS IN 6 MIL POLYETHLYLENE. BOLTS AND FLANGES TO REMAIN CLEAR OF CONCRETE.
10. GRAVITY THRUST BLOCKS HAVING A CONCRETE VOLUME 1 CY. SHALL HAVE #4 @ 18" B.W. WITH 5" COVER FOR ALL SIDES AND BOTTOM OF BLOCK. REINFORCING STEEL SHALL BE GRADE 60.

THRUST BLOCK DETAIL NOTES

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THRUST BLOCK NOTES

C-603

06/12/97

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work included in this section shall consist of furnishing all labor, materials and equipment required for the installation of valve boxes for all buried valves.

PART 2 PRODUCTS

2.01 PRODUCT SPECIFICATION

A. Valve box shall be of sufficient length to permit operation of the valve. Valve box shall be of the extension type with detachable iron lid of at least 6 inches in diameter. The lid shall be marked "WATER" unless shown otherwise on the plans. The inside diameter of the shaft shall be 5 1/4" inches. The cast-iron parts shall conform to the requirements of ASTM A-48.

B. Valve Junction Box: Pipe, Inc., Junction Box Tyler J20-BH.

PART 3 EXECUTION

3.01 INSTALLATION

A. Valve boxes shall be installed for all underground valves. The valve boxes shall be set to position during backfilling operations so they will be in a vertical alignment to the valve operating shaft. The wrench nut shall be uncovered and cleaned of dirt and debris. The lower casting of the unit shall be installed first in such a manner as to be cushioned and to not bear directly upon the body of the valve or upon the pipe. A 4 inch layer of crushed rock or gravel shall be placed under the bottom of the valve box. The upper casting of the unit shall then be placed in proper alignment at such an elevation that its top will be flush with the final grade. The valve box shall be backfilled in 8 inch lifts with each lift being thoroughly compacted.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This section covers the installation of backflow preventer devices for domestic water protection.

1.02 DESIGN REQUIREMENTS

A. General

1. Backflow prevention shall be provided on all domestic water systems serving buildings or structures 3 or more stories or thirty feet in height and/or when any actual or potential pysical connection between a potable water line, vessel, machine containing non-potable fluid exists.

B. Design Considerations

1. Designer shall consider the following:
   a. When arranging backflow assemblies, install two smaller backflow prevention devices in parallel instead of one large one. This keeps the initial cost of construction down as two smaller are less expensive than one large one. Further it facilitates maintenance. Two smaller devices in parallel allow for maintenance to occur on one side of the line and still allow some water service to the building.
   b. Backflows less than two inches shall have two additional shut off valves, two unions, and a strainer for each backflow installed.
   c. An air gap drain for RPBA shall be used and run to the drain.
   d. Backflow Protection Assemblies shall be placed in protected mechanical equipment space.
   e. Backflow assemblies shall not be located in exterior buried vaults or other unprotected below grade structure.
2. Certified backflow prevention will be a requirement for issuance of substantial completion and prior occupancy

1.03 SUBMITTALS

A. Designer shall verify with Owner those submittals which require Owner review. Submittals should include but not be limited to;

1. Product Data
2. Shop Drawings

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. Devices shall meet the requirements of ASSE, AWWA and USC Foundation for Cross Connection Control and Hydraulic research.

2. Backflow preventers shall be from the most recent State of Washington DOH approved list.

1.05 WARRANTY

A. The Designer shall verify with the Owner what special warranties may be required.

B. The Designer shall specify what regularly scheduled Owner maintenance is required for continued validation of the Warranty.

PART 2 PRODUCTS

2.01 MATERIAL

A. Assembly shall be complete backflow devices with resilient seat isolation valves. (Provide schedule for type and sizes.)

2.02 MANUFACTURERS

A. The following manufacturers are the only accepted brands, all other manufacturers shall not be accepted.

1. Febco
2. Watts

PART 3 EXECUTION

3.01 EXAMINATION

A. Specify the installer has reviewed the site and verified conditions are acceptable to begin installation.

B Specify all lines have been flushed in accordance with Division 2 requirements. Obtain signed inspection report from General Contractor, Civil Contractor and WSU Construction Coordinator that main building service has been flushed and is ready for further connection to building system.

3.02 FIELD QUALITY CONTROL

A. Assembly shall be designed and installed in strict accordance with manufacturer's recommendations with proper clearances for testing and servicing.

1. Provide copies of water analysis to WSU Construction Coordinator and WSU Environmental Health Services Department.

a. Notify WSU Construction Coordinator 48 hours in advance of Water analysis testing.

B. Backflow device shall be certified by a State Of Washington Licensed B.A.T. after installation and before use.

C. No backflow device shall be installed more than five feet above finish floor. All devices shall be installed in the mechanical room of the facility they are serving.

D. Backflow prevention devices shall not be installed in vaults below ground level or in any unheated environment.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the installation of Backflow preventer devices for fire system protection.

B. This section shall govern the installation of backflow prevention assemblies for all systems which may are connected to the potable water supply including but not limited to Fire Sprinkler, Laboratory Water and Irrigation Systems.

1.02 DESIGN REQUIREMENTS

A. General

1. Backflow prevention shall be provided on all domestic water systems serving buildings or structures when a fire sprinkler system is installed and connected to the potable water line.

B. Design Considerations

1. Certified backflow prevention will be a requirement for issuance of substantial completion and prior occupancy

1.03 SUBMITTALS

A. Designer shall verify with Owner those submittals which require Owner review. Submittals should include but not be limited to;

1. Product Data
2. Shop Drawings

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. Devices shall meet the requirements of ASSE, AWWA and USC Foundation for Cross Connection Control and Hydraulic research.

2. Backflow preventers shall be from the most recent State of Washington DOH approved list.

1.05 WARRANTY

A. The Designer shall verify with the Owner what special warranties may be required.

B. The Designer shall specify what regularly scheduled Owner maintenance is required for continued validation of the Warranty.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Assembly shall be complete double check backflow devices with resilient seats and raising stem isolation valves. (Provide schedule for type and sizes.)

B. No detector check assemblies will be accepted.

C. Reduced pressure assemblies may be used only when chemicals are to be used in fire system piping.

2.02 MANUFACTURERS

A. The following manufacturers are the only accepted brands, all other manufacturers shall not be accepted.
   1. Febco
   2. Watts

PART 3 - EXECUTION

3.01 EXAMINATION

A. Specify the installer has reviewed the site and verified conditions are acceptable to begin installation.

B Specify all lines have been flushed in accordance with Division 2 requirements. Obtain signed inspection report from General Contractor, Civil Contractor and WSU Construction Coordinator that main building service has been flushed and is ready for further connection to building system.

3.02 FIELD QUALITY CONTROL

A. Assembly shall be designed and installed in strict accordance with manufacturer's recommendations with proper clearances for testing and servicing.
   1. Provide copies of water analysis to WSU Construction Coordinator and WSU Physical Plant Department.
      a. Notify WSU Construction Coordinator 48 hours in advance of Water analysis testing.

B. Backflow prevention assemblies shall be tested and certified by a State Of Washington Licensed Backflow Assembly Tester after installation and prior to use and substantial completion and occupancy.

C. No backflow prevention assembly shall be installed more than five feet above finish floor. All devices shall be installed in the mechanical room of the facility they are serving.

D. Backflow prevention assemblies shall not be installed in vaults below ground level or in any unheated environment.

E. All water faucets and hose bibbs on non-potable water shall have signs posted adjacent to them stating "DANGER UNSAFE WATER DO NOT DRINK" per the WSU Cross Connection Control Program.

F. WSU Physical Plant Life Safety Personnel shall review and approve all installations of backflow prevention assemblies.

END OF SECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Pipe, fittings, and joints.

B. Valves.

C. Piping Accessories.

1.02 REFERENCES

A. Uniform Plumbing Code 1997.

B. Uniform Mechanical Code 1997.

C. ASTM B32 - Solder Metal.

D. ASTM B88 - Seamless Copper Water Tube.

E. AWWA C651 - Standard Methods for the Examination of Water and Waste Water.

F. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.

1.03 QUALIFICATIONS

A. For the actual fabrications, installation, and testing of work under this section use only thoroughly trained and experienced workmen completely familiar with the items required and manufacturer's current recommended methods of installation.

1.04 DIAGRAMS

A. Drawings do not show exact of piping. No extra payments will be allowed where obstructions in work of other trades requires offsets in the piping.

1.05 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Include data on pipe materials, pipe fittings, valves and accessories.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.

C. Deliver and store valves in shipping containers with labeling in place.

D. Deliver and store sealed piping with caps in place.

PART 2 PRODUCTS

2.01 GENERAL

A. The Contractor shall furnish and install the piping and fittings as necessary for completion of the working systems within the intent of the drawings and specifications. The piping plans indicate the general locations. The piping systems may have to be adjusted or offset to avoid conflict with existing or new work. This does not relieve the Contractor from the responsibility for the proper erection of systems of piping in every respect for the purpose intended.

B. Unless otherwise noted all products shall be of domestic manufacture.

2.02 WATER PIPING

A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ASME B16.22 solder wrought copper and screwed adapters. Joints: ASTM B32, solder, Grade 95TA.

2.03 UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: Bronze unions for copper pipe, soldered or screwed joints.

B. Dielectric Connections: Nipples with galvanized threaded ends and water impervious isolation barrier.

2.04 BALL VALVES

A. Bronze body, full port up to 2", standard port above 2", stainless steel ball, teflon seats, TFE packing and stuffing box ring, lever-handle with position stops, FPT connections, rated for 150 SWP minimum.

2.05 ACCEPTABLE MANUFACTURERS

A. Metallic piping: Grinnell, Wheatland, Cyclops, Republic Tube, Tex Tube, Lacleade, National, Youngstown, Wade.

B. Fittings: Grinnell, Elkhart, Mueller, Wade.

C. Ball Valves: Milwaukee, Grinnell, Crane, Jamesbury, Nibco, Powell, Stockham.

D. Substitutions: Under provisions of Section 01600.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly. Sealed piping shall remain clean and capped until installation.

3.02 INSTALLATION

A. Install piping system in accordance with referenced standards.

B. Protect installed work and materials of all trades.

C. Provide dielectric nipples wherever joining dissimilar metals.

D. Use lead-free solder on water piping.

E. Provide unions on each side of valve and at equipment or apparatus connections.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide valve extensions on insulated piping.

H. Install valves with stems upright or horizontal, not inverted.

I. Replacements, in event of damage, immediately make all repairs and replacements necessary to the approval of the WSU Project Manager at no additional cost to the Owner.

3.03 APPLICATION

A. Ball valves: Shut-off and/or isolation of equipment, parts of systems, or vertical risers.

B. Globe or gate valves: Shut-off and/or isolation of steam lines.

3.04 CLEANING

A. The Contractor shall take every precaution to remove grease, dirt, and all other foreign matter from each length of piping before making connections in the field.

B As work progresses, the interior of the pipe shall be cleared of dirt and superfluous materials. Where cleaning is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after joining has been completed.

3.05 FLUSHING

A. After fabrication, flush all piping and prior to connecting into the system's, equipment, control components, or performing pressure tests.

B. Remove strainer screens during flushing except those protecting control components. Clean the screens protecting control components during flushing if necessary and after flushing is completed.

C. Flush all piping a second time and operate all valves.

3.06 TEST OF LINES

A. Do not conceal installed systems prior to acceptance of tests by the WSU Project Manager.

B. Test of waste and vent lines: Check for leaks under full flow conditions.

C. Test of water lines: Line pressure for two hours with no visible leaks or drop in pressure.

D. Provide test documentation including system being tested, test pressure, and sign-off by the WSU Project Manager.

3.07 DISINFECTION OF WATER PIPING

A. Prior to starting work, verify that system is complete, flushed, and clean. Contact WSU Construction Coordinator to coordinate bacteriological testing at least three working days in advance of planned tests.

B. Disinfect water lines per the latest version of AWWA C651 via the continuous feed method using minimum 25 ppm chlorine for not less than 24 hours contact time. Operate all valves several times. After 24 hours water samples taken from the outlet farthest from the point of injection shall contain 10 ppm chlorine. Flush with clean water until residual chlorine is less than 0.2 ppm.

C. Chlorinated water shall be disposed of in accordance with applicable federal, state, and local laws. Chlorinated water shall not be discharged to any storm drain or surface water.

D. Bacteriological Testing: After sterilization and flushing is complete the Contractor shall obtain water samples and submit the samples to a state certified laboratory for bacteriological analysis to determine compliance with State Health Department standards. Samples shall be collected in bottles provided by the laboratory. Analytical results shall be submitted to the WSU / EHS Public Health Supervisor. If pipe system is still contaminated, Contractor shall correct defects and perform additional sterilization, flushing, and testing until satisfactory results are obtained. Sterilization shall not be considered complete until approved by the WSU / EHS Public Health Supervisor.

END OF SECTION

DIVISION 22 – DOMESTIC WATER PIPING

22 11 00 FACILITY WATER DISTRIBUTION
(FINAL VERSION CONVERTED TO INDIVIDUAL CSI SECTION)

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Washington State University (Pullman campus) is served by both high elevation and low elevation water systems. The high elevation source is the North Fairway Reservoir. The low elevation sources are the Observatory Hill Reservoirs.

B. Refer to WSU utility record drawings for known existing conditions.

1.02 SPECIFIC DESIGN REQUIREMENTS

A. Design of the WSU public drinking water system shall meet the requirements of the most current editions of Chapters 246-290 WAC and the most current edition of the Washington State Department of Health (DOH) Water System Design Manual.

B. Service mains shall be sized to meet the larger demands of either the maximum hourly domestic or the combination of maximum day domestic plus fire flow. In all cases, the minimum service main size shall be 12 inches in diameter.

C. Yearly average domestic demands shall be the product of a 60 gallon per capita day usage and projected population densities. Maximum day rates shall be taken at 150 percent of this yearly average and the maximum hourly rate shall be set at 250 percent. System losses and unaccounted for usages shall be taken at 10 percent of the domestic demand.

D. For design purposes, line velocities shall not average more than 5 feet per second. Exceeding this velocity requires approval from WSU Engineering Services.

E. Mains shall be buried 60 inches below finished grade (to the top of the pipe).

F. Gate valves eight (8) inches and larger shall be installed in a standard vault.

G. Minimum size service branch lines from main shall be 6 inches to inside curb line; reductions may be made at that location if approved by WSU Engineering Services.

H. No saddle taps allowed for service connections. Branch lines tees will be used.

I. Reclaim water pipe shall be color-coded purple.

J. Pipe bedding shall be installed per Washington State University (WSU) Standard Drawing C552.

PART 2 - PRODUCTS

2.01 GENERAL

A. Distribution main shall be one of the following (or approved equal):

1. C900 PVC "Blue Brute"

2. For sleeves, use ductile iron.

B. Fittings shall be class 350 ductile iron per the most current and adopted version of AWWA A21.53.

C. Jointing shall be mechanical.

1. Preferred manufacturer: MegaLug

D. Valves:

1. Shall be flanged, iron body, bronze mounted double disc gate; over eight (8) inches, valves to have non-rising stems. Maximum operating pressure shall be not less than 175 psi for valves up to twelve (12) inches.

2. Shall be installed vertically in level lines and shall meet most current and adopted version of AWWA C500 specifications. Flanges shall be faced and drilled, ASA Class 235, for use with full face gaskets.

E. Shells, lugs, bolts, washers, and nuts shall be type 304 stainless steel.

F. Flanges shall be type 304 stainless steel or ductile iron, most current and adopted version of American Society for Testing and Materials (ASTM) ASTM 536-80, test rated at 200 psi, "Roman" Models SST or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install thrust blocks at locations identified in WSU Standards Drawing C602/603, in accordance with the design standards of the most current Water Agencies' Standards Design Guidelines for Water and Sewer Facilities.

B. Provide a Link-Seal assembly at the building penetration.

3.02 DISINFECTION

A. New or repaired public drinking water systems shall be disinfected prior to connection, in accordance with the standards of the most current Uniform Plumbing Code as modified by Chapter 51-56 WAC, and in accordance with the most current version of ANSI/AWWA C651, "Disinfecting Water Mains."

B. For installation of new lines and systems, the Contractor is responsible to ensure all chlorination is performed according to the most current version of ANSI/AWWA C651, and that adequate bacteriological sampling results are obtained from a WA State approved laboratory. Submit written documentation of chlorination and bacteriological sampling to the WSU Construction Manager, for review and approval

by Environmental Health and Safety (EH&S) and the Water Distribution Manager, prior to placing new lines in service.

3.03 TESTING

A. Test pressure shall not be less than 50 psi above static, but no less than 200 psi or more than 200 percent of the working pressure for the class and size of pipe tested.

B. The line shall be filled between valves with all air expelled at high points. Test pressure shall then be applied and maintained for at least 2 hours. Test pressure must be maintained for 5 minutes without pumping.

C. No testing water or chlorinated water may be discharged into the sanitary or storm sewer system in accordance with the most current and adopted version of Washington Administrative Code (WAC) 173-201A. All chlorinated water shall either be treated to remove chlorine prior to discharge into sewers, or discharged into an area which does not impact storm drains or surface waters. If soil is the only contaminant, the wastewater may be discharged into the storm sewer catch basins provided they are protected using Best Management Practices (BMPs), per the requirements of WSU section 33 40 00 (Storm Drainage Utilities).

D. The Contractor shall notify the WSU Construction Manager in writing 48 hours prior to testing. The Contractor shall make all necessary testing and sampling arrangements, making all necessary arrangements with the WA State approved testing laboratory. The Construction Manager shall notify the following as to date and time of flushing and hydrostatic and bacteriological testing:

1. Facilities Services Water Distribution Manager

2. WSU Environmental Health and Safety

3. WSU Fire Department

END OF SECTION

APPENDIX I:

- Item 1 – Existing Facilities Operations 10-Year Plan for Water System Improvements

- Item 2 – Proposed Low & High Zone Maps – Year 2020

- Item 3 - Water Modeling Results: Low Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events

- Item 4 - Water Modeling Results: High Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events

- Item 5 - Water Modeling Results: Low Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events (Includes Transmission line from Well 7 to Observation Hill Reservoir)

- Item 6 - Water Modeling Results: High Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events (Includes Transmission line from Well 8 to Fairway Reservoir)

APPENDIX I

Item 1 – Existing Facilities Operations 10-Year Plan for Water System Improvements

Table 1
10 Year Plan for Water System Improvements
WSU Pullman Campus

Plan Year	Order of Need	Description of Improvement	Buildings Where Deficiencies Are Reduced or Eliminated	Const. Cost	Total Project Cost for Plan Year *
1	1	Construct a pressure reducing valve station, connecting the high and low zones in vicinity of the Observatory Hill reservoirs to allow water to be transferred from the high system to the low system during an emergency. **(Improvement Designation #14 on map Figure 8-1**)**	Holland Library, Fulmer, Owen Library, Bryan Hall, Avery Student Bookstore, Fine Arts, TFRB, Physical Education Building, Commons, Albrook, Kruegel, Boiler Plant, Streit, Perham, Chinook Village, Columbia Village, Rotunda, Van Doren, Memorial Hospital, Stephenson Center, WSU Children's Center, Coman, Gannon, Goldsworthy, McEachern Center, Orton, Rogers, Scott, Stephenson, Wegner. This improvement is one of the most cost effective and important for the low level water system.	$100,000	$140,000
	2	Replace 8" pipe with 1,510 feet of 12" pipe from hydrant L15-2L to Observatory Hill reservoirs. **(Improvement Designation #13 on map Figure 8-1**)**	TFRB,; Phys. Ed Bldg; Smith Gym; Commons; Kruegel; McAllister; Carver Farm; Rotunda; Columbia Village; Holland Library; Fulmer; Owen Library.	$230,000	$322,000
2	3	Replace 800-ft of 8" pipe with 10" pipe in Wilson Rd. from Troy Land to Stadium Way. Install 1,200-ft of 10" pipe in Stadium Way from Wilson Rd. to N. Fairwaay Rd. **(Improvement Designation #6 on map Figure 8-2**)**	Beasley Auditorium; Wilson; Johnson Hall; French Admin, Lighty; Information Technology; Indoor Practice Facility; Todd; Johnson Tower; Compton Union; Safety Building; Abelson; Bookstore.	$360,000	$504,000

* Estimate is based on 2006 costs adjusted for WSU construction.
** See attached maps (Figures 8-1 and 8-2)

Table 1
10 Year Plan for Water System Improvements
WSU Pullman Campus

Plan Year	Order of Priority	Description of Improvement	Buildings Where Deficiencies Are Reduced or Eliminated	Const. Cost	Total Project Cost for Plan Year *
3	4	Install 440 feet of 12" pipes along Library Road and install 140 feet of 8" pipes near Physical Education Building. Time construction to coincide with CP Library Road improvements. **(Improvement Designation #9 on map Figure 8-1**)**	Holland Library; Physical Education Building; Smith Gym	$110,000	$154,000
4	5	Replace existing 8" and 6" mains with 1,480 feet of 8", 2,350 feet of 10", and 1,100 feet of 12" diameter water mains from Well # 8 south to Grimes Way then east to Airport Road. **(Improvement Designation #1 on map Figure 8-2**)**	Food Services; Cattle Feeding Lab & Misc. Outbuildings; Old Feed Facility; McCluskey; Beef Cattle Barn & Misc. Outbuildings; EHS Building; Receiving & Delivery; Storage 143A	$710,000	$994,000
6	6	Replace existing 6" and 8" mains with 710 feet of 8" and 1,160 feet of 10" pipes along Valley Road and Merman Drive; also extend water main to form loop. **(Improvement Designation #2 on map Figure 8-2**)**	Kamiak Apartments; Steptoe Village; Terrace Apts.	$340,000	$476,000
7	7	Install 140 feet of 8" mains from Campus Avenue to Thatuna Road. This eliminates a dead end. **(Improvement Designation #8 on map Figure 8-1**)**	Bryan; Student Bookstore.	$30,000	$210,000
	8	Replace 6" pipe with 630 feet of 8" pipe through the Columbia Village. **(Improvement Designation #12 on map Figure 8-1**)**	Carver Farm; Columbia Village; Chinook Village.	$120,000	

* Estimate is based on 2006 costs adjusted for WSU construction.
** See attached maps (Figures 8-1 and 8-2)

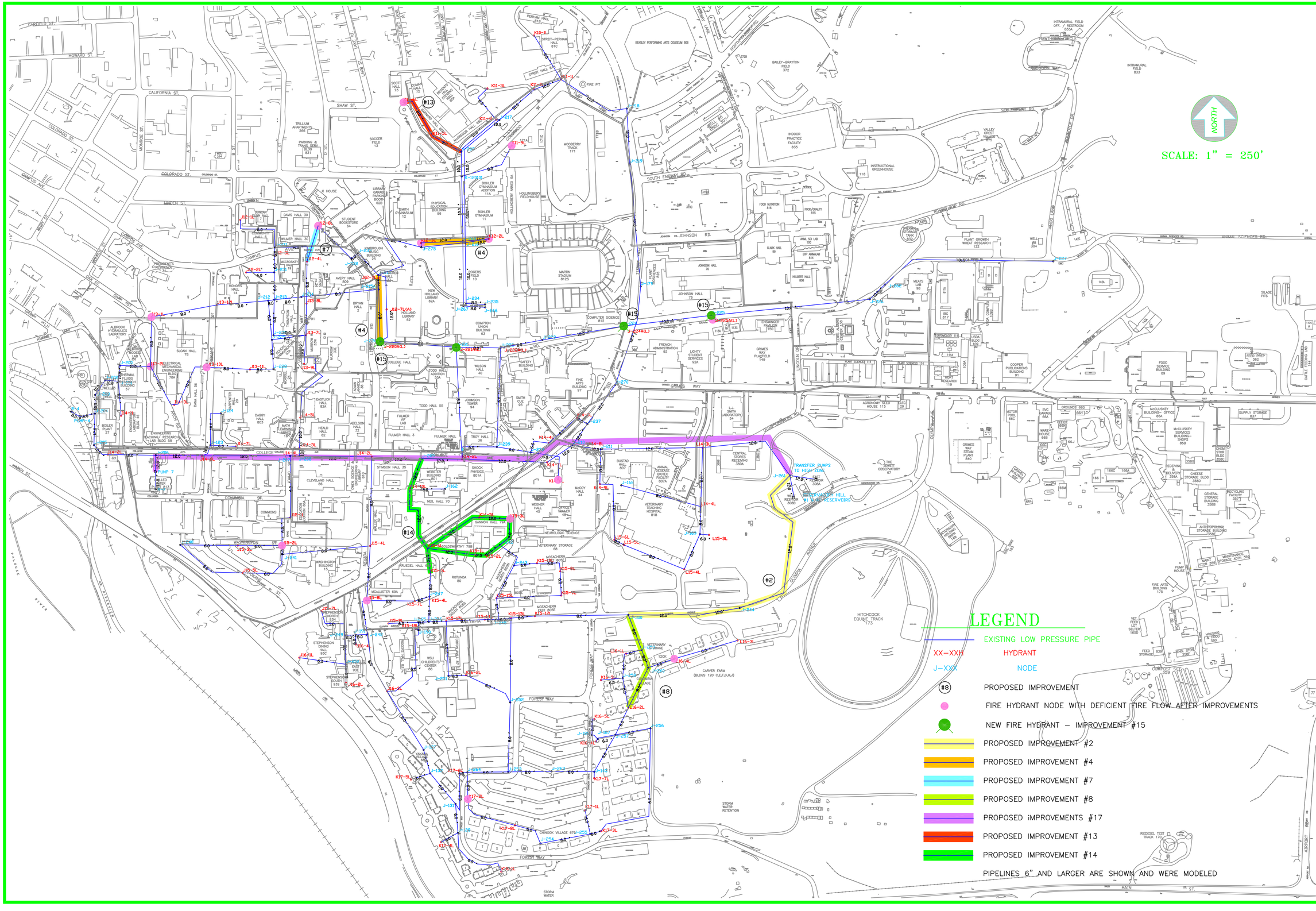
Table 1
10 Year Plan for Water System Improvements
WSU Pullman Campus

Plan Year	Order of Need	Description of Improvement	Buildings Where Deficiencies Are Reduced or Eliminated	Const. Cost	Total Project Cost for Plan Year *
8	9	Replace 6" mains along Airport Road from Grimes Way to County Road with 5,350 feet of 10" and 430 feet of 8" mains. **(Improvement Designation #3 on map Figure 8-2**)**	Farm Shops; Steffen Center; Vet Quarantine Endoparasite Farm; Cattle Feeding Lab & Misc. Outbuildings.	$870,000	$1,218,000
9	10	Replace 6" pipe with 420 feet of 8" pipe to hydrant K10-1L. **(Improvement Designation #11 on map Figure 8-1**)**	Streit Perham Center	$80,000	$112,000
10	11	Replace 6" mains with 1,310 feet of 8" mains along Roundtop Drive. **(Improvement Designation #4 on map Figure 8-2**)**	Nuclear Radiation Center	$160,000	$420,000
	12	Install 160 feet of 8" main from fire hydrant L10-8H to the water main just south of the Student Recreation Center. This eliminates a dead end. **(Improvement Designation #5 on map Figure 8-2**)**	Golf Clubhouse	$30,000	
	13	Replace 6" pipes along Idaho Street with 50 feet of 8" and 550 feet of 10" mains. **(Improvement Designation #10 on map Figure 8-1**)**	Commons	$110,000	
			Total in 2006 $ ----------	$4,550,000	

* Estimate is based on 2006 costs adjusted for WSU construction.
** See attached maps (Figures 8-1 and 8-2)

APPENDIX I

Item 2 – Proposed Low & High Zone Maps Year 2020


SCALE: 1" = 250'
NORTH
LEGEND
EXISTING LOW PRESSURE PIPE
XX–XXH HYDRANT
J–XXX NODE
#8 PROPOSED IMPROVEMENT
FIRE HYDRANT NODE WITH DEFICIENT FIRE FLOW AFTER IMPROVEMENTS
NEW FIRE HYDRANT – IMPROVEMENT #15
PROPOSED IMPROVEMENT #2
PROPOSED IMPROVEMENT #4
PROPOSED IMPROVEMENT #7
PROPOSED IMPROVEMENT #8
PROPOSED iMPROVEMENTS #17
PROPOSED IMPROVEMENT #13
PROPOSED IMPROVEMENT #14
PIPELINES 6" AND LARGER ARE SHOWN AND WERE MODELED
TRANSFER PUMPS TO HIGH ZONE
GRANDVIEW HILL #1 & #2 RESERVOIRS
COLLEGE HILL RESERVOIR
COLLEGE HILL BOOSTER PUMP STATION
PALOUSE RIVER
MAIN ST.
FOREST WAY
COLUMBIA AVENUE
OLYMPIA AVENUE
COLLEGE AVENUE
COLORADO ST.
CAMPUS AVE.
STADIUM WAY
GRIMES WAY
JOHNSON RD.
SOUTH FAIRWAY RD.
NORTH FAIRWAY RD.
ANIMAL SCIENCES RD.
HAMPTON DR.
OLYMPIC DR.
LINCOLN DR.
STATE ST.
MONROE ST.
CANYON AVE.
GARFIELD ST.
HOWARD ST.
SHAW ST.
HAMPTON ST.
ARBORETUM DR.
OBSERVATION DR.
ANIMAL SCIENCES RD.
SILAGE PITS
HITCHCOCK EQUINE TRACK 173
CARVER FARM (BLDGS 120 C,E,F,G,H,J)
STORM WATER RETENTION
RIEDESEL TEST TRACK 170
ANTHROPOLOGY STORAGE BUILDING 358B
GENERAL STORAGE BUILDING 358B
RECYCLING FACILITY 357T
CHEESE STORAGE BLDG 358D
MAINTENANCE STORAGE ADTN 305
MAINT. STOR. 356I
PUMP HOUSE
FIRE ARTS BUILDING 179
VET. FEED STORAGE SILO 165D
FEED STORAGE 835F
ENG. STOR. 359F
HOUSING & FEED 380
COMPOST SITE 359
FEED PREP 362
SUPPLY STORAGE 837
FOOD SERVICE BUILDING 89
McCLUSKEY BUILDING– OFFICE 85A
McCLUSKEY SERVICES BUILDING– SHOPS 85B
CHEM STOR BLDG 358C
RECEIVING & DELIVERY 358A
GROUNDS 660
SVC GARAGE 66A
MADE HOUSE 66B
MOTOR POOL 66C
GRIMES WAY STEAM PLANT 84D
L.J. SMITH LABORATORY 54
AGRONOMY SEED HOUSE 115
CENTRAL STORES RECEIVING 360A
THE DORNEY OBSERVATORY 87
VETERINARY TEACHING HOSPITAL 818
ANIMAL DISEASE BIOTEC FACILITY 807A
BUSTAD HALL 807
WEGNER HALL 45
OFFICE TRAILER 48
McCOY HALL 44
NEUROLOGICAL SCIENCE 67
VETERINARY STORAGE 68
VETERINARY STORAGE
120K
COLUMBIA COURT
CHINOOK VILLAGE 678I–255
YAKIMA VILLAGE 678J
SHOCK PHYSICS 801A
WEBSTER BUILDING 801
NEIL HALL 70
TROY HALL 56
FULMER HALL 3
FULMER HALL
FULMER VIF LAB
STIMSON HALL 35
CLEVELAND HALL 66
COMMONS
COLUMBIA
WASHINGTON
WASHINGTON BUILDING 15
ROTUNDA 80
FORNSELL HALL 16
McCAW HALL 69
McCAW HALL 69A
McCAW HALL 69B
McCAW HALL 69C
McCAW HALL 69D
McCAW HALL 69E
McCAW HALL 69F
McCAW HALL 69G
McCAW HALL 69H
McCAW HALL 69I
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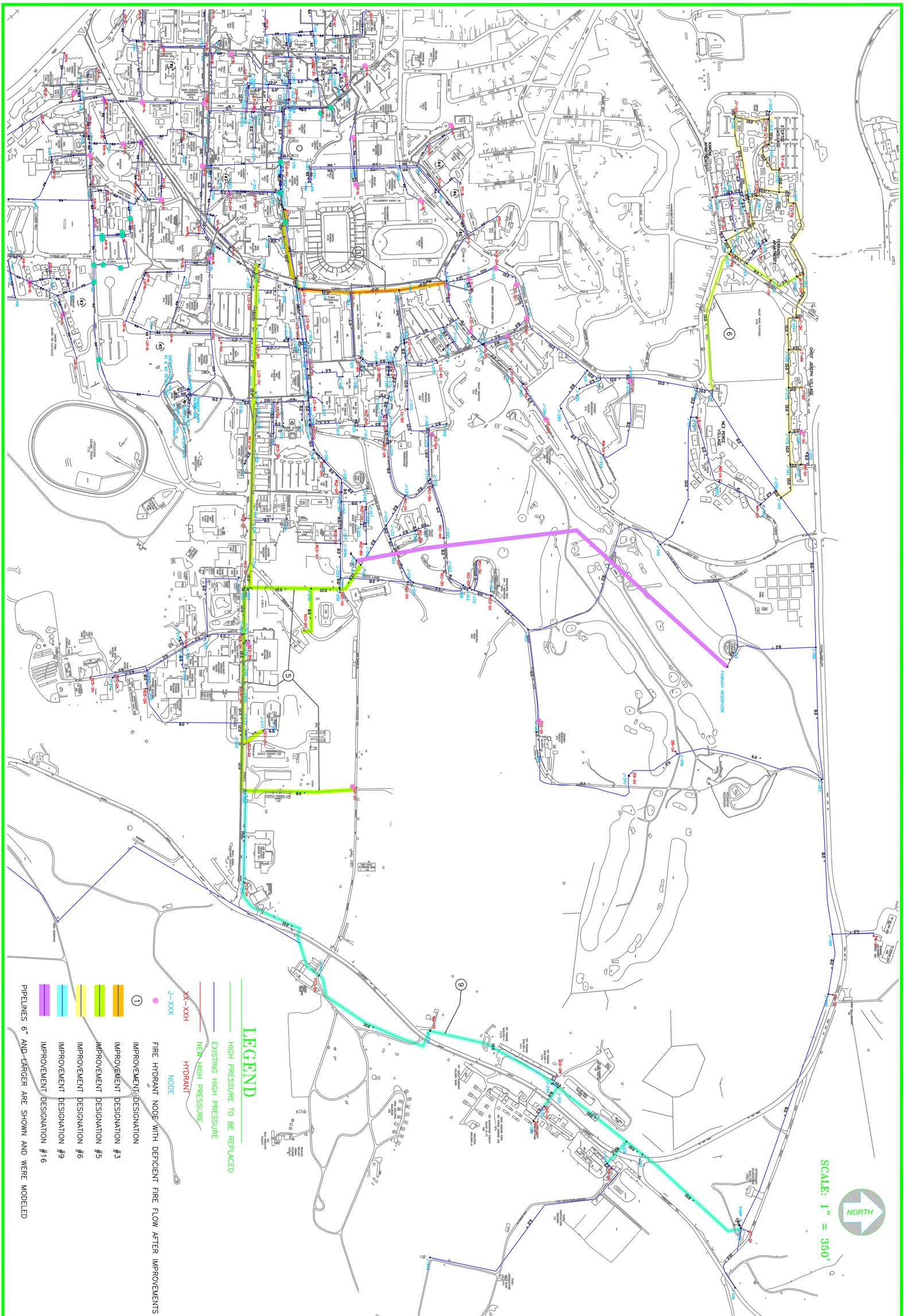
McCAW HALL 69T
McCAW HALL 69U
McCAW HALL 69V
McCAW HALL 69W
McCAW HALL 69X
McCAW HALL 69Y
McCAW HALL 69Z
STEPHENSON DINING HALC 930C
STEPHENSON EAST 930E
STEPHENSON SOUTH 935
WSU CHILDREN'S CENTER 60
STEPHENSON NORTH 930I
ENGINEERING TEACHING/ RESEARCH LAB BLDG 58
ENGINEERING RESEARCH CENTER 57
ELECTRICAL MECHANICAL ENGINEERING BLDG 78
THERMAL FLUIDS LAB 78A
ALBROOK HYDRAULICS LABORATORY 71
SLOAN HALL 78
BOILER PLANT 27
DANA HALL 56
DAGGY HALL 803
MATH LEARNING CENTER 36
HEALD HALL 82
EASTLICK HALL 82A
ABELSON HALL 82B
DANA HALL 36
THOMPSON HALL 24
HULBERT HALL 808
EXP ANIMLAB 814
ANML SCI LAB 100
CLARK HALL 99
JOHNSON HALL 78
PLANT GROWTH WHEAT RESEARCH 122
FOOD NUTRITION 816
FOOD/QUALITY 815
INSTRUCTIONAL GREENHOUSE
INDOOR PRACTICE FACILITY 835
BAILEY–BRAYTON FIELD 372
INTRAMURAL FIELD 833
INTRAMURAL FIELD OFF. / RESTROOM 833A
VALLEY CREST VILLAGE 815
WELL #5 304
WELL #6 305
WELL #7 306
WELL #8 307
MARTIN STADIUM 812S
MOBERRY TRACK 171
HOLLINGBERY FIELDHOUSE 9
HOLLINGBERY ANNEX 9A
BOHLER GYMNASIUM ADDITION 11A
BOHLER GYMNASIUM 11
PHYSICAL EDUCATION BUILDING 96
SMITH GYMNASIUM 12
ROGERS FIELD 10
SOCCER FIELD 13
PARKING & TRANS. SERV. BLDG 831
TRILLIUM APARTMENTS 266
SCOTT HALL 72
HANNA HALL 73
STREET–PERHAM HALL 81C
PERHAM HALL 81B
BEASLEY PERFORMING ARTS COLISEUM 806
FIRE PIT
LIBRARY GARAGE & PARKING BOOTH 628
STUDENT BOOKSTORE 64
K. HOUSE
DAVIS HALL 30
WILMER HALL 30
PRESIDENT'S CHANCELLOR 31
HONORS HALL 14
MORROW HALL 33
THOMPSON HALL 24
AVERY HALL 29
BRYAN HALL 2
NEW HOLLAND LIBRARY 62A
HOLLAND LIBRARY 62
COMPTON UNION BUILDING 63
COMPUTER SCIENCE 812
COLLEGE HALL 4
TODD HALL ADDITION 55A
TODD HALL 55
WILSON HALL 40
SAFETY BUILDING 84
FINE ARTS BUILDING 97
JOHNSON TOWER 94
SMITH CUE 95
FRENCH ADMINISTRATION 92
LIGHTY STUDENT SERVICES 92A
GRIMES WAY PLAYFIELD 149
ENGINEERING PAVILION 100
ENTOMOLOGY 111
USDA BLDG 100
PLANT SCIENCES 114
PLANT SCIENCES 113
HORT RESEARCH 119
COOPER PUBLICATIONS BUILDING 91
MEATS LAB 98
EXP. ANIMAL 814
PLANT SCIENCES 826
JOHNSON HALL 78
ANIMAL SCI LAB 100
WERNER STORAGE TANK 832
WELL #4 303
WELL #3 304
WELL #2 305
WELL #1 306
WELL #9 307
WELL #10 308
WELL #11 309
WELL #12 310
WELL #13 311
WELL #14 312
WELL #15 313
WELL #16 314
WELL #17 315
WELL #18 316
WELL #19 317
WELL #20 318
WELL #21



2015 WATER SYSTEM PLAN UPDATE

PROPOSED HIGH ZONE MAP
YEAR 2020

WASHINGTON STATE UNIVERSITY

Department of Facilities Operations
Main Office
509-335-9003

Pullman, Wa. 99164-1150
FAX 509-335-9070

DRAWN BY: DFT DESIGN BY: AJT

DATE: 07/2015 LOG NO. 00

APPENDIX I

Item 3 – Water Modeling Results: Low Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events

Low Zone 2 hr 2020 MDD FF with Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP-4	2,367.54	-1,025.86	130.42	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP7	2,051.00	-0.64	269.02	2,860.47	622.34	Open	1.00	0.00	0.00

Low Zone 2 hr 2020 MDD FF with Improvements Tank Report

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	969.32	2,629.54	2,647.79	82.95	18.25
2		RES-OBS-2	892.01	2,629.54	2,647.79	82.95	18.25

Low Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	J12-7L	26.20	2,642.47	4,633.28	6,204.35	J12-7L	10.46	2,606.14	4,634.22	4,633.28
2		I13-2L	3,000.00	J12-7L	26.55	2,643.28	4,801.57	7,979.09	J12-7L	-1.75	2,577.96	4,802.89	4,801.57
3		I14-1L	3,000.00	J12-7L	26.82	2,643.89	4,925.12	5,702.84	J12-7L	15.81	2,618.49	4,926.72	4,925.12
4		I14-2L	3,000.00	J12-7L	27.37	2,645.17	5,152.81	11,806.71	J12-7L	-30.09	2,512.55	5,154.20	5,152.81
5		I14-3L	3,000.00	J12-7L	26.44	2,643.03	4,750.16	7,138.91	J12-7L	4.56	2,592.52	4,751.36	4,750.16
6		J12-10L	3,000.00	J12-10L	20.40	2,625.08	3,052.41	3,052.41	J12-10L	20.00	2,624.16	3,052.39	3,052.39
7		J12-11L	3,000.00	L13-1H	31.72	2,626.21	4,337.71	28,669.69	L13-1H	-734.86	857.05	4,337.73	4,337.71
8		J12-1L	3,000.00	J12-1L	-135.38	2,209.11	1,222.20	1,222.81	J12-1L	20.00	2,567.70	1,222.81	1,222.20
9		J12-2L	3,000.00	J12-2L	-37.41	2,419.21	1,903.42	1,902.92	J12-2L	20.00	2,551.70	1,902.91	1,902.91
10		J12-3L	3,000.00	J12-4L	-32.74	2,467.99	1,665.82	1,946.53	J12-4L	11.10	2,569.15	1,666.07	1,665.82
11		J12-4L	3,000.00	J12-4L	-122.29	2,261.31	1,112.49	1,113.54	J12-4L	20.00	2,589.70	1,113.54	1,112.49
12		J12-7L	3,000.00	J12-7L	22.71	2,634.41	3,486.68	3,484.83	J12-7L	20.00	2,628.16	3,484.83	3,484.83
13		J12-9L	3,000.00	J12-9L	-106.02	2,288.32	1,255.37	1,256.12	J12-9L	20.00	2,579.16	1,256.12	1,255.37
14		J13-10L	3,000.00	J12-7L	26.35	2,642.80	4,702.56	5,811.36	J12-7L	13.66	2,613.53	4,703.64	4,702.56
15		J13-11L	3,000.00	J12-7L	26.19	2,642.45	4,623.56	4,643.53	J12-7L	19.90	2,627.94	4,624.44	4,623.56
16		J13-12L	3,000.00	J12-7L	25.94	2,641.87	4,495.96	5,378.49	J12-7L	14.92	2,616.43	4,496.58	4,495.96
17		J13-7L	3,000.00	J12-7L	25.73	2,641.38	4,372.40	5,982.10	J12-7L	9.56	2,604.06	4,372.73	4,372.40
18		J13-8L	3,000.00	J13-8L	-188.41	2,104.70	963.20	963.20	J13-8L	20.00	2,585.70	963.20	963.20
19		J13-9L	3,000.00	J13-9L	28.66	2,602.15	3,574.18	3,573.54	J13-9L	20.00	2,582.16	3,573.54	3,573.54
20		J14-2L	3,000.00	K15-16L	23.47	2,646.16	5,205.35	8,149.93	K15-16L	11.82	2,619.28	5,205.38	5,205.35
21		J14-3L	3,000.00	J12-7L	27.62	2,645.75	5,246.71	8,393.48	J12-7L	-0.86	2,580.02	5,248.16	5,246.71
22		J14-4L	3,000.00	K15-16L	23.57	2,646.39	5,284.36	8,844.20	K15-16L	9.94	2,614.95	5,284.42	5,284.36
23		J14-5L	3,000.00	J12-7L	27.33	2,645.08	5,049.39	7,064.72	J12-7L	7.44	2,599.17	5,050.27	5,049.39
24		J14-6L	3,000.00	J12-7L	27.67	2,645.87	5,213.86	10,166.00	J12-7L	-15.62	2,545.95	5,214.50	5,213.86
25		J14-7L	3,000.00	J14-7L	30.97	2,547.01	3,357.38	3,357.10	J14-7L	20.00	2,521.70	3,357.11	3,357.11
26		J14-8L	3,000.00	J14-8L	37.06	2,589.54	3,880.50	3,879.77	J14-8L	20.00	2,550.16	3,879.76	3,879.76
27		J15-1L	3,000.00	K15-16L	23.49	2,646.22	5,222.35	7,193.17	K15-16L	14.91	2,626.41	5,222.38	5,222.35
28		J15-2L	3,000.00	K15-16L	23.26	2,645.68	5,046.94	5,559.77	K15-16L	18.82	2,635.44	5,046.96	5,046.94
29		J15-3L	3,000.00	J15-3L	32.71	2,529.04	3,363.72	3,363.65	J15-3L	20.00	2,499.70	3,363.65	3,363.65
30		J15-4L	3,000.00	K15-16L	22.89	2,644.83	4,733.15	7,014.31	K15-16L	13.60	2,623.39	4,733.27	4,733.15
31		J15-5L	3,000.00	J15-5L	30.60	2,524.15	3,294.65	3,294.60	J15-5L	20.00	2,499.70	3,294.60	3,294.60
32		J15-7L	3,000.00	J15-7L	-980.04	181.72	687.75	687.79	J15-7L	20.00	2,489.70	687.79	687.75
33		J15-8L	3,000.00	K15-16L	22.09	2,642.97	4,111.58	7,078.26	K15-16L	10.47	2,616.16	4,111.69	4,111.58
34		J15-9L	3,000.00	J15-9L	15.50	2,514.31	2,872.39	2,872.38	J15-9L	20.00	2,524.70	2,872.37	2,872.37
35		J16-1L	3,000.00	J16-1L	32.42	2,498.37	3,294.00	3,293.97	J16-1L	20.00	2,469.70	3,293.97	3,293.97
36		J16-2L	3,000.00	J16-2L	-35.43	2,366.77	2,164.69	2,164.84	J16-2L	20.00	2,494.70	2,164.84	2,164.69
37		J16-3L	3,000.00	K15-16L	21.64	2,641.95	3,814.62	4,797.50	K15-16L	17.38	2,632.10	3,814.68	3,814.62
38		J16-4L	3,000.00	J16-4L	43.32	2,562.97	3,882.48	3,882.09	J16-4L	20.00	2,509.16	3,882.09	3,882.09
39		K-120101	3,000.00	K12-3L	29.58	2,608.81	3,742.05	4,532.55	K12-3L	7.43	2,557.69	3,741.13	3,741.13
40		K10-1L	3,000.00	K10-1L	-87.97	2,350.52	1,150.47	1,151.27	K10-1L	20.00	2,599.70	1,151.27	1,150.47
41		K11-10L	3,000.00	K11-10L	39.41	2,599.96	4,170.89	4,169.96	K11-10L	20.00	2,555.16	4,169.95	4,169.95
42		K11-11L	3,000.00	J12-7L	25.79	2,641.53	4,292.30	4,670.32	J12-7L	17.80	2,623.09	4,292.36	4,292.30
43		K11-12L	3,000.00	J12-7L	26.03	2,642.08	4,375.39	5,025.69	J12-7L	16.13	2,619.23	4,375.47	4,375.39
44		K11-1L	3,000.00	K10-1L	31.78	2,626.88	4,403.14	5,179.12	K10-1L	11.33	2,579.70	4,398.77	4,398.77
45		K11-2L	3,000.00	K10-1L	32.15	2,627.73	4,474.28	5,357.49	K10-1L	10.25	2,577.19	4,474.30	4,474.28
46		K11-3L	3,000.00	K11-3L	-28.80	2,473.07	1,744.38	1,743.62	K11-3L	20.00	2,585.70	1,743.62	1,743.62
47		K11-4L	3,000.00	J12-7L	26.06	2,642.15	4,386.04	5,465.83	J12-7L	13.25	2,612.58	4,386.13	4,386.04
48		K11-5L	3,000.00	K12-3L	33.65	2,618.19	4,244.08	5,017.60	K12-3L	9.07	2,561.48	4,241.82	4,241.82
49		K11-6L	3,000.00	K12-3L	33.76	2,618.46	4,261.60	4,696.42	K12-3L	14.08	2,573.05	4,259.29	4,259.29
50		K11-9L	3,000.00	K11-9L	14.22	2,550.82	2,776.64	2,776.59	K11-9L	20.00	2,564.16	2,776.58	2,776.58
51		K12-2L	3,000.00	K12-2L	20.48	2,586.81	3,026.06	3,027.94	K12-2L	20.00	2,585.70	3,027.93	3,026.06

Low Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
52		K12-3L	3,000.00	K12-3L	18.98	2,584.34	2,942.16	2,942.17	K12-3L	20.00	2,586.70	2,942.15	2,942.15
53		K12-4L	3,000.00	K12-4L	19.46	2,566.91	2,977.49	2,976.31	K12-4L	20.00	2,568.16	2,976.30	2,976.30
54		K14-10L	3,000.00	K15-10L	25.24	2,637.79	4,204.68	6,714.32	K15-10L	2.25	2,584.73	4,204.77	4,204.68
55		K14-2L	3,000.00	J12-7L	28.25	2,647.20	5,566.88	7,412.05	J12-7L	9.70	2,604.39	5,567.78	5,566.88
56		K14-3L	3,000.00	K14-3L	28.84	2,596.09	3,563.30	3,563.17	K14-3L	20.00	2,575.70	3,563.17	3,563.17
57		K14-4L	3,000.00	K14-4L	-22.49	2,473.63	1,938.19	1,937.82	K14-4L	20.00	2,571.70	1,937.82	1,937.82
58		K14-5L	3,000.00	K15-10L	24.18	2,635.36	3,884.80	6,783.53	K15-10L	-2.60	2,573.54	3,884.85	3,884.80
59		K14-7L	3,000.00	J12-7L	28.62	2,648.06	5,782.20	8,587.90	J12-7L	3.32	2,589.67	5,782.91	5,782.20
60		K14-8L	3,000.00	J12-7L	29.21	2,649.41	6,442.32	8,457.58	J12-7L	9.77	2,604.56	6,444.74	6,442.32
61		K14-9L	3,000.00	L15-5L	25.81	2,625.11	3,761.60	4,135.34	L15-5L	16.83	2,604.38	3,762.17	3,761.60
62		K15-10L	3,000.00	K15-10L	-3.70	2,571.00	1,597.60	1,597.61	K15-10L	20.00	2,625.70	1,597.60	1,597.60
63		K15-11L	3,000.00	K15-11L	6.12	2,603.13	1,615.86	1,615.87	K15-11L	20.00	2,635.16	1,615.87	1,615.86
64		K15-12L	3,000.00	K15-16L	17.70	2,632.84	2,409.22	3,574.36	K15-16L	15.19	2,627.05	2,411.04	2,409.22
65		K15-13L	3,000.00	K15-16L	19.14	2,636.16	2,716.23	4,036.09	K15-16L	15.46	2,627.67	2,717.27	2,716.23
66		K15-14L	3,000.00	K15-16L	20.04	2,638.25	3,015.59	4,674.85	K15-16L	14.47	2,625.39	3,015.66	3,015.59
67		K15-15L	3,000.00	K15-10L	16.50	2,617.62	2,550.51	3,415.68	K15-10L	12.80	2,609.09	2,550.47	2,550.47
68		K15-16L	3,000.00	K15-16L	3.92	2,601.04	1,397.40	1,397.35	K15-16L	20.00	2,638.16	1,397.34	1,397.34
69		K15-17L	3,000.00	K15-16L	20.71	2,639.79	3,315.89	5,527.48	K15-16L	12.56	2,620.99	3,313.53	3,313.53
70		K15-18L	3,000.00	K15-18L	6.56	2,515.15	2,599.09	2,599.10	K15-18L	20.00	2,546.16	2,599.10	2,599.09
71		K15-1L	3,000.00	K15-10L	24.08	2,635.11	3,854.45	6,726.06	K15-10L	-2.48	2,573.82	3,854.50	3,854.45
72		K15-2L	3,000.00	K15-10L	24.01	2,634.95	3,834.59	6,708.07	K15-10L	-2.60	2,573.54	3,834.64	3,834.59
73		K15-3L	3,000.00	K15-10L	24.07	2,635.08	3,851.53	6,060.77	K15-10L	3.84	2,588.41	3,851.57	3,851.53
74		K15-4L	3,000.00	K15-16L	21.56	2,641.75	3,743.61	7,121.00	K15-16L	7.74	2,609.87	3,743.65	3,743.61
75		K15-5L	3,000.00	K15-16L	21.83	2,642.39	3,924.52	7,489.86	K15-16L	7.55	2,609.43	3,924.57	3,924.52
76		K15-6L	3,000.00	K15-10L	24.39	2,635.84	3,945.00	7,523.13	K15-10L	-9.36	2,557.94	3,945.05	3,945.00
77		K15-7L	3,000.00	K15-16L	21.69	2,642.07	3,830.67	6,884.59	K15-16L	9.48	2,613.87	3,830.71	3,830.67
78		K15-8L	3,000.00	K15-8L	4.61	2,598.63	1,593.07	1,593.11	K15-8L	20.00	2,634.16	1,593.10	1,593.07
79		K15-9L	3,000.00	K15-9L	7.95	2,601.89	1,888.15	1,888.33	K15-9L	20.00	2,629.70	1,888.33	1,888.15
80		K16-2L	3,000.00	K16-2L	16.63	2,559.93	2,852.93	2,852.95	K16-2L	20.00	2,567.70	2,852.95	2,852.93
81		K16-3L	3,000.00	L16-1L	6.46	2,576.44	2,215.24	2,456.26	L16-1L	16.22	2,598.97	2,215.78	2,215.24
82		K16-4L	3,000.00	K16-5L	-95.84	2,312.81	1,256.10	1,352.58	K16-5L	15.72	2,570.28	1,257.11	1,256.10
83		K16-5L	3,000.00	K16-5L	-137.37	2,216.96	1,098.49	1,099.03	K16-5L	20.00	2,580.16	1,099.03	1,098.49
84		K17-1L	3,000.00	K17-1L	-104.75	2,235.78	1,563.58	1,564.01	K17-1L	20.00	2,523.70	1,564.01	1,563.58
85		K17-2L	3,000.00	K16-5L	6.71	2,549.49	2,432.74	2,591.01	K16-5L	16.50	2,572.08	2,433.64	2,432.74
86		K17-3L	3,000.00	K16-5L	-25.25	2,475.72	1,793.11	1,995.54	K16-5L	13.68	2,565.58	1,794.88	1,793.11
87		K17-4L	3,000.00	K17-4L	-55.48	2,315.50	2,005.17	2,005.42	K17-4L	20.00	2,489.70	2,005.42	2,005.17
88		K17-5L	3,000.00	K17-5L	-6.67	2,428.14	2,507.98	2,508.09	K17-5L	20.00	2,489.70	2,508.09	2,507.98
89		K17-6L	3,000.00	K16-5L	15.25	2,569.20	2,756.05	3,017.54	K16-5L	14.90	2,568.38	2,756.18	2,756.05
90		K17-7L	3,000.00	K16-5L	-39.08	2,443.81	1,639.22	1,654.43	K16-5L	19.55	2,579.11	1,640.81	1,639.22
91		K17-8L	3,000.00	K17-8L	-37.17	2,391.76	2,020.59	2,021.03	K17-8L	20.00	2,523.70	2,021.03	2,020.59
92		K18-1L	3,000.00	K18-1L	-142.21	2,125.34	1,520.05	1,520.25	K18-1L	20.00	2,499.70	1,520.25	1,520.04
93		L13-1H	3,000.00	L13-1H	-23.83	2,498.00	1,638.42	1,638.50	L13-1H	20.00	2,599.16	1,638.51	1,638.42
94		L13-2H	3,000.00	L13-2H	-25.28	2,494.66	1,621.80	1,622.06	L13-2H	20.00	2,599.16	1,622.06	1,621.80
95		L14-3L	3,000.00	L15-4L	34.70	2,645.62	8,039.24	8,718.21	L15-4L	16.81	2,604.33	8,033.80	8,033.80
96		L14-4L	3,000.00	L14-4L	18.06	2,605.21	2,836.38	2,836.38	L14-4L	20.00	2,609.70	2,836.38	2,836.38
97		L15-3L	3,000.00	L15-3L	2.77	2,569.92	2,073.67	2,073.39	L15-3L	20.00	2,609.70	2,073.39	2,073.39
98		L15-4L	3,000.00	L15-4L	14.77	2,599.63	2,592.07	2,592.01	L15-4L	20.00	2,611.70	2,592.01	2,592.01
99		L15-5L	3,000.00	L15-5L	16.76	2,604.22	2,727.43	2,727.37	L15-5L	20.00	2,611.70	2,727.37	2,727.37
100		L15-6L	3,000.00	L15-5L	17.60	2,606.16	2,791.65	2,797.02	L15-5L	19.94	2,611.56	2,791.61	2,791.61
101		L15-7L	3,000.00	L15-7L	10.41	2,606.01	2,036.70	2,036.79	L15-7L	20.00	2,628.16	2,036.79	2,036.70
102		L16-1L	3,000.00	L16-1L	1.24	2,564.40	2,039.29	2,039.67	L16-1L	20.00	2,607.70	2,039.67	2,039.29

Low Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure (psi)	Critical Fire Node Head (ft)	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant (gpm)	Critical Available Node ID	Critical Available Node Pressure (psi)	Critical Available Node Head (ft)	Adjusted Available Flow (gpm)	Design Flow (gpm)
103		L16-2L	3,000.00	L16-2L	3.57	2,546.77	2,336.76	2,336.59	L16-2L	20.00	2,584.70	2,336.59	2,336.59
104		L16-3L	3,000.00	L16-3L	-151.06	2,194.91	998.69	998.69	L16-3L	20.00	2,589.70	998.69	998.69
105		L16-4L	3,000.00	L16-3L	-43.00	2,444.29	1,537.96	1,537.40	L16-3L	20.00	2,589.70	1,537.40	1,537.40

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,670.09	4.74	0.15	7.59	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-85.95	0.98	0.12	0.91	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	145.17	1.65	0.51	2.41	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	192.68	1.23	0.15	1.00	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-192.68	0.55	0.03	0.14	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-221.63	1.41	0.12	1.30	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-221.63	1.41	0.43	1.30	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	404.61	2.58	0.06	3.96	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	404.61	2.58	0.50	3.97	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	436.59	2.79	0.46	4.56	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,670.09	4.74	0.23	7.60	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	221.42	2.51	0.37	5.27	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	528.83	3.38	0.52	6.51	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-104.36	0.67	0.15	0.32	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	516.78	1.47	0.76	0.87	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-1,481.34	4.20	2.37	6.09	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	5.50	0.06	0.00	0.01	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-43.00	0.27	0.02	0.06	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	-4.27	0.03	0.00	0.00	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-56.97	0.65	0.10	0.43	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	34.60	0.39	0.03	0.17	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	1,300.36	3.69	1.35	4.78	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.11	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	73.61	0.30	0.00	0.05	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-83.31	0.34	0.02	0.07	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	24.90	0.28	0.03	0.09	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-847.47	2.40	0.61	2.16	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	15.20	0.17	0.00	0.04	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	15.20	0.17	0.03	0.04	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-61.09	0.69	0.25	0.49	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-41.69	0.27	0.00	0.06	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	1,039.73	2.95	1.52	3.16	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-101.27	1.15	0.32	1.24	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-130.37	1.48	0.27	1.98	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	1,039.73	2.95	0.79	3.16	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-120.67	1.37	0.38	1.71	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-101.27	1.15	0.06	1.24	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-1,383.35	3.92	0.75	5.36	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-140.07	1.59	0.91	2.26	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-33.30	0.38	0.05	0.16	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-23.60	0.27	0.02	0.08	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	526.48	1.49	0.37	0.90	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-1,383.35	3.92	0.11	5.36	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	633.18	4.04	1.09	9.09	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	565.28	3.61	1.03	7.37	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	317.11	2.02	0.58	2.53	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	317.11	2.02	0.19	2.52	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	109.35	0.31	0.01	0.05	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-1,162.20	3.30	2.25	3.88	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	109.35	0.31	0.01	0.05	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	141.17	0.40	0.02	0.08	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-76.25	0.87	0.26	0.73	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-85.95	0.98	0.13	0.91	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	39.99	0.45	0.09	0.22	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	39.99	0.45	0.06	0.22	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	49.69	0.56	0.11	0.33	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	803.05	3.28	0.48	4.76	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	49.69	0.56	0.09	0.33	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-443.20	1.26	0.25	0.65	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	443.20	2.83	0.87	4.69	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	211.45	1.35	0.32	1.19	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	211.45	1.35	0.45	1.19	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	192.05	1.23	0.60	1.00	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	211.45	1.35	0.40	1.19	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	211.45	1.35	0.04	1.19	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	211.45	1.35	0.34	1.19	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	201.75	1.29	0.10	1.09	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-1,354.25	3.84	3.09	5.15	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-114.77	1.30	0.27	1.56	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.41	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	392.12	1.11	0.41	0.52	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	382.42	1.08	0.20	0.50	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-122.12	0.35	0.01	0.06	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-411.52	1.17	0.25	0.57	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	411.52	1.17	0.09	0.57	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	34.60	0.39	0.06	0.17	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	783.65	3.20	0.91	4.55	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	34.60	0.39	0.03	0.17	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	109.79	1.25	0.11	1.44	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	109.79	1.25	0.34	1.44	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-141.17	0.40	0.00	0.08	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-141.17	0.40	0.01	0.08	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	425.12	2.71	1.26	4.35	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.01	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	425.12	2.71	1.56	4.35	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	425.12	2.71	1.52	4.35	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-544.04	3.47	0.27	6.87	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	399.00	2.55	0.70	3.86	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	812.75	5.19	0.87	14.43	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-504.07	3.22	2.38	5.96	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-287.51	1.84	0.17	2.11	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	566.73	1.61	0.64	1.03	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-357.31	1.46	0.25	1.06	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	411.52	1.17	0.26	0.57	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	401.82	1.14	0.22	0.54	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	216.56	0.61	0.05	0.17	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	279.56	1.78	0.86	2.00	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	822.45	3.36	0.20	4.97	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	123.84	0.79	0.09	0.44	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-832.16	2.36	0.15	2.09	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	220.21	2.50	0.99	5.22	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	106.23	1.21	0.28	1.35	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	179.05	0.73	0.05	0.30	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-179.05	0.73	0.15	0.30	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	179.05	0.73	0.05	0.30	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	179.05	0.73	0.01	0.30	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-841.86	2.39	0.71	2.14	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-96.53	0.62	0.05	0.28	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-128.62	1.46	0.39	1.93	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.11	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-841.86	2.39	0.57	2.14	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-146.03	0.93	0.41	0.60	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	46.23	0.52	0.07	0.29	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-55.93	0.63	0.25	0.41	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	372.72	1.06	0.13	0.47	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	2,008.90	5.70	2.84	10.70	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-353.32	1.00	0.02	0.43	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-260.02	2.95	0.35	7.09	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	309.71	3.51	1.47	9.81	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	290.31	1.85	1.07	2.14	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-171.28	1.09	0.19	0.81	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-461.59	2.95	1.67	5.06	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,989.50	5.64	5.76	10.51	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-239.96	1.53	0.33	1.51	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-201.16	1.28	0.34	1.09	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	119.49	1.36	0.69	1.68	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	109.35	0.31	0.02	0.05	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	309.71	1.27	0.28	0.82	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	240.82	2.73	1.05	6.16	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	793.35	3.24	0.42	4.65	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	2,860.47	8.11	1.92	20.59	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-969.37	2.75	0.33	2.78	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-891.96	2.53	0.33	2.38	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,860.47	8.11	2.02	20.59	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	0.00	0.00	0.00	0.00	Closed	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-495.79	2.03	0.09	1.95	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-51.39	0.58	0.18	0.35	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	381.02	4.32	1.72	14.41	Open	0
201		P113	J72	J70	229.97	8.00	120.00	381.02	2.43	0.82	3.55	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-381.02	1.56	0.17	1.20	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	268.11	0.76	0.00	0.25	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-221.25	1.41	0.17	1.30	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-230.95	1.47	0.10	1.40	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	201.85	1.29	0.37	1.09	Open	0
209		P23	J24	J22	147.66	8.00	120.00	192.15	1.23	0.15	1.00	Open	0
210		P25	J22	J20	76.49	8.00	120.00	182.45	1.16	0.07	0.91	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	633.18	4.04	1.39	9.09	Open	0
214		P33	J18	J20	237.74	8.00	120.00	392.53	2.51	0.89	3.75	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.70	0.11	0.00	0.01	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217		P39	J36	J16	251.95	8.00	120.00	141.52	0.90	0.14	0.57	Open	0
218		P41	J16	J14	364.77	8.00	120.00	131.82	0.84	0.18	0.50	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-367.01	1.50	0.11	1.12	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-518.23	2.12	0.87	2.11	Open	0
223		P51	K11-5L	J14	78.82	12.00	120.00	-122.12	0.35	0.00	0.06	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	63.91	0.26	0.00	0.05	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-73.61	0.30	0.00	0.06	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-180.98	1.16	0.24	0.89	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-211.55	1.35	0.04	1.19	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	358.53	1.46	0.28	1.07	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	358.53	1.46	0.34	1.07	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	358.53	2.29	0.77	3.17	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	358.53	2.29	0.42	3.17	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	358.53	4.07	2.14	12.87	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.41	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	304.83	12.00	110.00	308.32	0.87	0.12	0.39	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	-0.05	0.00	0.00	0.00	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	0.05	0.00	0.00	0.00	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP-4	2,367.54	-1,025.86	129.93	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP7	2,051.00	-0.64	268.54	2,865.58	621.24	Open	1.00	0.00	0.00

Low Zone 3 hr 2020 MDD FF with Improvements Tank Report

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	971.98	2,629.54	2,646.58	77.45	17.04
2		RES-OBS-2	894.45	2,629.54	2,646.58	77.45	17.04

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	J12-7L	25.69	2,641.28	4,531.81	6,181.69	J12-7L	10.13	2,605.39	4,532.78	4,531.81
2		I13-2L	3,000.00	J12-7L	26.04	2,642.09	4,698.90	7,955.25	J12-7L	-2.02	2,577.35	4,700.29	4,698.90
3		I14-1L	3,000.00	J12-7L	26.30	2,642.71	4,822.06	5,685.41	J12-7L	15.42	2,617.59	4,823.77	4,822.06
4		I14-2L	3,000.00	J12-7L	26.86	2,643.98	5,049.71	11,785.15	J12-7L	-30.32	2,512.04	5,051.27	5,049.71
5		I14-3L	3,000.00	J12-7L	25.93	2,641.84	4,647.78	7,116.33	J12-7L	4.26	2,591.82	4,649.04	4,647.78
6		J12-10L	3,000.00	J12-10L	19.89	2,623.90	2,987.19	2,985.09	J12-10L	20.00	2,624.16	2,985.06	2,985.06
7		J12-11L	3,000.00	L13-1H	31.21	2,625.03	4,289.69	28,666.05	L13-1H	-734.94	856.86	4,289.71	4,289.69
8		J12-1L	3,000.00	J12-1L	-135.89	2,207.93	1,212.95	1,213.60	J12-1L	20.00	2,567.70	1,213.60	1,212.95
9		J12-2L	3,000.00	J12-2L	-37.92	2,418.03	1,891.04	1,890.53	J12-2L	20.00	2,551.70	1,890.53	1,890.53
10		J12-3L	3,000.00	J12-4L	-33.25	2,466.81	1,648.42	1,931.09	J12-4L	11.10	2,569.15	1,648.77	1,648.42
11		J12-4L	3,000.00	J12-4L	-122.80	2,260.13	1,102.31	1,102.31	J12-4L	20.00	2,589.70	1,102.31	1,102.31
12		J12-7L	3,000.00	J12-7L	22.20	2,633.23	3,401.42	3,400.01	J12-7L	20.00	2,628.16	3,400.01	3,400.01
13		J12-9L	3,000.00	J12-9L	-106.53	2,287.15	1,244.34	1,245.15	J12-9L	20.00	2,579.16	1,245.15	1,244.34
14		J13-10L	3,000.00	J12-7L	25.83	2,641.62	4,600.53	5,786.80	J12-7L	13.33	2,612.76	4,601.66	4,600.53
15		J13-11L	3,000.00	J12-7L	25.68	2,641.27	4,522.33	4,617.71	J12-7L	19.53	2,627.08	4,523.23	4,522.33
16		J13-12L	3,000.00	J12-7L	25.43	2,640.68	4,396.25	5,352.72	J12-7L	14.59	2,615.67	4,396.85	4,396.25
17		J13-7L	3,000.00	J12-7L	25.22	2,640.19	4,275.62	5,935.80	J12-7L	9.42	2,603.74	4,275.95	4,275.62
18		J13-8L	3,000.00	J13-8L	-188.92	2,103.53	954.23	954.23	J13-8L	20.00	2,585.70	954.23	954.23
19		J13-9L	3,000.00	J13-9L	28.15	2,600.97	3,543.04	3,542.44	J13-9L	20.00	2,582.16	3,542.44	3,542.44
20		J14-2L	3,000.00	K15-16L	22.95	2,644.96	4,953.75	8,100.69	K15-16L	11.48	2,618.50	4,957.91	4,953.75
21		J14-3L	3,000.00	K15-16L	23.08	2,645.27	5,060.72	8,352.23	K15-16L	11.19	2,617.83	5,060.78	5,060.72
22		J14-4L	3,000.00	K15-16L	23.05	2,645.19	5,036.67	8,802.25	K15-16L	9.59	2,614.13	5,036.70	5,036.67
23		J14-5L	3,000.00	J12-7L	26.82	2,643.90	4,949.25	7,022.96	J12-7L	7.27	2,598.77	4,950.25	4,949.25
24		J14-6L	3,000.00	J12-7L	27.16	2,644.68	5,114.01	10,136.18	J12-7L	-15.80	2,545.53	5,114.71	5,114.01
25		J14-7L	3,000.00	J14-7L	30.46	2,545.83	3,341.78	3,341.52	J14-7L	20.00	2,521.70	3,341.52	3,341.52
26		J14-8L	3,000.00	J14-8L	36.55	2,588.35	3,857.18	3,856.48	J14-8L	20.00	2,550.16	3,856.47	3,856.47
27		J15-1L	3,000.00	K15-16L	22.98	2,645.02	4,977.91	7,162.24	K15-16L	14.49	2,625.45	4,977.92	4,977.91
28		J15-2L	3,000.00	K15-16L	22.74	2,644.48	4,802.32	5,536.51	K15-16L	18.37	2,634.39	4,802.35	4,802.32
29		J15-3L	3,000.00	J15-3L	32.20	2,527.86	3,349.83	3,349.77	J15-3L	20.00	2,499.70	3,349.77	3,349.77
30		J15-4L	3,000.00	K15-16L	22.37	2,643.63	4,494.89	6,982.72	K15-16L	13.20	2,622.46	4,495.15	4,494.89
31		J15-5L	3,000.00	J15-5L	30.08	2,522.97	3,281.01	3,280.97	J15-5L	20.00	2,499.70	3,280.97	3,280.97
32		J15-7L	3,000.00	J15-7L	-980.56	180.53	685.03	685.07	J15-7L	20.00	2,489.70	685.07	685.03
33		J15-8L	3,000.00	K15-16L	21.56	2,641.77	3,872.79	7,048.75	K15-16L	10.08	2,615.27	3,872.84	3,872.79
34		J15-9L	3,000.00	J15-9L	14.98	2,513.12	2,857.25	2,857.23	J15-9L	20.00	2,524.70	2,857.23	2,857.23
35		J16-1L	3,000.00	J16-1L	31.91	2,497.17	3,282.30	3,282.26	J16-1L	20.00	2,469.70	3,282.27	3,282.27
36		J16-2L	3,000.00	J16-2L	-35.95	2,365.57	2,155.68	2,155.84	J16-2L	20.00	2,494.70	2,155.84	2,155.68
37		J16-3L	3,000.00	K15-16L	21.12	2,640.74	3,583.42	4,774.93	K15-16L	16.93	2,631.07	3,583.46	3,583.42
38		J16-4L	3,000.00	K15-16L	21.34	2,641.25	3,720.54	3,864.77	K15-16L	19.69	2,637.43	3,720.60	3,720.54
39		K-120101	3,000.00	K12-3L	29.07	2,607.63	3,706.56	4,503.45	K12-3L	7.43	2,557.69	3,705.68	3,705.68
40		K10-1L	3,000.00	K10-1L	-88.48	2,349.33	1,136.08	1,136.94	K10-1L	20.00	2,599.70	1,136.94	1,136.08
41		K11-10L	3,000.00	K11-10L	38.90	2,598.78	4,144.55	4,143.61	K11-10L	20.00	2,555.16	4,143.60	4,143.60
42		K11-11L	3,000.00	J12-7L	25.28	2,640.35	4,200.54	4,640.59	J12-7L	17.49	2,622.35	4,200.61	4,200.54
43		K11-12L	3,000.00	J12-7L	25.52	2,640.90	4,282.90	4,992.18	J12-7L	15.85	2,618.58	4,282.99	4,282.90
44		K11-1L	3,000.00	K10-1L	31.26	2,625.69	4,348.95	5,137.39	K10-1L	11.33	2,579.70	4,349.00	4,348.95
45		K11-2L	3,000.00	K10-1L	31.63	2,626.54	4,423.79	5,317.75	K10-1L	10.23	2,577.14	4,423.80	4,423.79
46		K11-3L	3,000.00	K11-3L	-29.32	2,471.88	1,726.70	1,725.84	K11-3L	20.00	2,585.70	1,725.84	1,725.84
47		K11-4L	3,000.00	J12-7L	25.55	2,640.97	4,293.48	5,429.75	J12-7L	13.01	2,612.02	4,293.57	4,293.48
48		K11-5L	3,000.00	K12-3L	33.13	2,617.00	4,204.87	4,986.59	K12-3L	9.05	2,561.42	4,202.62	4,202.62
49		K11-6L	3,000.00	K12-3L	33.25	2,617.28	4,222.27	4,667.05	K12-3L	14.00	2,572.84	4,219.97	4,219.97
50		K11-9L	3,000.00	K11-9L	13.71	2,549.64	2,755.81	2,755.76	K11-9L	20.00	2,564.16	2,755.76	2,755.76

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
51		K12-2L	3,000.00	K12-2L	19.97	2,585.63	2,998.30	2,998.19	K12-2L	20.00	2,585.70	2,998.19	2,998.19
52		K12-3L	3,000.00	K12-3L	18.46	2,583.15	2,912.52	2,912.50	K12-3L	20.00	2,586.70	2,912.49	2,912.49
53		K12-4L	3,000.00	K12-4L	18.95	2,565.73	2,956.04	2,953.68	K12-4L	20.00	2,568.16	2,953.68	2,953.68
54		K14-10L	3,000.00	K15-16L	21.73	2,642.16	3,975.41	6,671.44	K15-16L	12.11	2,619.95	3,975.45	3,975.41
55		K14-2L	3,000.00	K15-16L	23.28	2,645.73	5,313.57	7,351.07	K15-16L	15.16	2,626.98	5,313.80	5,313.57
56		K14-3L	3,000.00	K14-3L	28.32	2,594.90	3,532.43	3,532.42	K14-3L	20.00	2,575.70	3,532.42	3,532.42
57		K14-4L	3,000.00	K14-4L	-23.01	2,472.44	1,921.98	1,921.57	K14-4L	20.00	2,571.70	1,921.57	1,921.57
58		K14-5L	3,000.00	K15-16L	21.38	2,641.33	3,732.38	6,745.76	K15-16L	10.55	2,616.36	3,732.43	3,732.38
59		K14-7L	3,000.00	J12-7L	28.11	2,646.87	5,675.02	8,532.65	J12-7L	3.25	2,589.49	5,675.94	5,675.02
60		K14-8L	3,000.00	J12-7L	28.70	2,648.24	6,325.88	8,387.81	J12-7L	9.70	2,604.39	6,328.75	6,325.88
61		K14-9L	3,000.00	L15-5L	25.29	2,623.92	3,698.66	4,086.66	L15-5L	16.74	2,604.17	3,699.02	3,698.66
62		K15-10L	3,000.00	K15-10L	-4.22	2,569.80	1,557.48	1,557.48	K15-10L	20.00	2,625.70	1,557.47	1,557.47
63		K15-11L	3,000.00	K15-11L	5.61	2,601.94	1,544.74	1,544.74	K15-11L	20.00	2,635.16	1,544.74	1,544.74
64		K15-12L	3,000.00	K15-16L	17.17	2,631.64	2,266.19	3,503.63	K15-16L	14.99	2,626.59	2,266.14	2,266.14
65		K15-13L	3,000.00	K15-16L	18.61	2,634.96	2,540.52	3,970.55	K15-16L	15.21	2,627.09	2,540.55	2,540.52
66		K15-14L	3,000.00	K15-16L	19.52	2,637.04	2,802.80	4,626.67	K15-16L	14.15	2,624.65	2,803.69	2,802.80
67		K15-15L	3,000.00	K15-10L	15.98	2,616.41	2,480.93	3,371.35	K15-10L	12.71	2,608.87	2,480.92	2,480.92
68		K15-16L	3,000.00	K15-16L	3.40	2,599.85	1,319.44	1,319.28	K15-16L	20.00	2,638.16	1,319.26	1,319.26
69		K15-17L	3,000.00	K15-16L	20.18	2,638.58	3,086.97	5,486.57	K15-16L	12.22	2,620.20	3,086.72	3,086.72
70		K15-18L	3,000.00	K15-18L	6.05	2,513.95	2,582.52	2,582.55	K15-18L	20.00	2,546.16	2,582.56	2,582.52
71		K15-1L	3,000.00	K15-16L	21.36	2,641.30	3,722.82	6,687.12	K15-16L	10.74	2,616.78	3,722.86	3,722.82
72		K15-2L	3,000.00	K15-16L	21.35	2,641.28	3,716.65	6,669.18	K15-16L	10.78	2,616.87	3,716.69	3,716.65
73		K15-3L	3,000.00	K15-16L	21.36	2,641.30	3,721.90	6,018.46	K15-16L	13.32	2,622.73	3,721.95	3,721.90
74		K15-4L	3,000.00	K15-16L	21.03	2,640.54	3,519.36	7,085.08	K15-16L	7.41	2,609.10	3,519.39	3,519.36
75		K15-5L	3,000.00	K15-16L	21.31	2,641.19	3,693.01	7,453.54	K15-16L	7.21	2,608.65	3,693.06	3,693.01
76		K15-6L	3,000.00	K15-16L	21.41	2,641.40	3,751.87	7,485.59	K15-16L	7.49	2,609.29	3,751.92	3,751.87
77		K15-7L	3,000.00	K15-16L	21.17	2,640.86	3,602.87	6,852.94	K15-16L	9.11	2,613.02	3,602.91	3,602.87
78		K15-8L	3,000.00	K15-8L	4.09	2,597.44	1,527.47	1,527.45	K15-8L	20.00	2,634.16	1,527.44	1,527.44
79		K15-9L	3,000.00	K15-9L	7.43	2,600.70	1,828.42	1,828.60	K15-9L	20.00	2,629.70	1,828.60	1,828.42
80		K16-2L	3,000.00	K16-2L	16.11	2,558.73	2,829.67	2,829.72	K16-2L	20.00	2,567.70	2,829.71	2,829.67
81		K16-3L	3,000.00	L16-1L	5.94	2,575.24	2,180.44	2,443.95	L16-1L	15.90	2,598.23	2,180.99	2,180.44
82		K16-4L	3,000.00	K16-5L	-96.36	2,311.61	1,244.17	1,341.74	K16-5L	15.70	2,570.25	1,245.17	1,244.17
83		K16-5L	3,000.00	K16-5L	-137.89	2,215.76	1,088.01	1,088.52	K16-5L	20.00	2,580.16	1,088.52	1,088.01
84		K17-1L	3,000.00	K17-1L	-105.27	2,234.58	1,555.51	1,555.94	K17-1L	20.00	2,523.70	1,555.93	1,555.51
85		K17-2L	3,000.00	K16-5L	6.19	2,548.28	2,408.77	2,578.15	K16-5L	16.27	2,571.56	2,409.74	2,408.77
86		K17-3L	3,000.00	K16-5L	-25.77	2,474.52	1,777.75	1,987.11	K16-5L	13.44	2,565.03	1,777.74	1,777.74
87		K17-4L	3,000.00	K17-4L	-56.00	2,314.30	1,997.04	1,997.28	K17-4L	20.00	2,489.70	1,997.28	1,997.04
88		K17-5L	3,000.00	K17-5L	-7.19	2,426.94	2,497.66	2,497.77	K17-5L	20.00	2,489.70	2,497.77	2,497.66
89		K17-6L	3,000.00	K16-5L	14.73	2,567.99	2,728.33	3,001.54	K16-5L	14.70	2,567.92	2,728.54	2,728.33
90		K17-7L	3,000.00	K16-5L	-39.60	2,442.61	1,625.27	1,641.23	K16-5L	19.47	2,578.94	1,625.28	1,625.27
91		K17-8L	3,000.00	K17-8L	-37.69	2,390.55	2,010.08	2,010.54	K17-8L	20.00	2,523.70	2,010.54	2,010.08
92		K18-1L	3,000.00	K18-1L	-142.73	2,124.14	1,513.52	1,513.73	K18-1L	20.00	2,499.70	1,513.73	1,513.52
93		L13-1H	3,000.00	L13-1H	-24.34	2,496.82	1,616.47	1,616.96	L13-1H	20.00	2,599.16	1,616.97	1,616.47
94		L13-2H	3,000.00	L13-2H	-25.79	2,493.47	1,600.23	1,600.87	L13-2H	20.00	2,599.16	1,600.88	1,600.23
95		L14-3L	3,000.00	L15-4L	34.18	2,644.43	7,926.99	8,619.83	L15-4L	16.78	2,604.27	7,919.99	7,919.99
96		L14-4L	3,000.00	L14-4L	17.54	2,604.02	2,791.33	2,791.33	L14-4L	20.00	2,609.70	2,791.34	2,791.33
97		L15-3L	3,000.00	L15-3L	2.25	2,568.73	2,039.87	2,039.54	L15-3L	20.00	2,609.70	2,039.54	2,039.54
98		L15-4L	3,000.00	L15-4L	14.25	2,598.44	2,548.42	2,548.35	L15-4L	20.00	2,611.70	2,548.35	2,548.35
99		L15-5L	3,000.00	L15-5L	16.24	2,603.02	2,681.39	2,681.32	L15-5L	20.00	2,611.70	2,681.32	2,681.32
100		L15-6L	3,000.00	L15-5L	17.08	2,604.96	2,744.65	2,751.12	L15-5L	19.93	2,611.53	2,744.59	2,744.59

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
101		L15-7L	3,000.00	L15-7L	9.89	2,604.81	1,972.72	1,972.83	L15-7L	20.00	2,628.16	1,972.83	1,972.72
102		L16-1L	3,000.00	L16-1L	0.72	2,563.20	2,007.24	2,007.59	L16-1L	20.00	2,607.70	2,007.59	2,007.24
103		L16-2L	3,000.00	L16-2L	3.05	2,545.58	2,313.19	2,313.02	L16-2L	20.00	2,584.70	2,313.03	2,313.03
104		L16-3L	3,000.00	L16-3L	-151.58	2,193.71	987.63	987.62	L16-3L	20.00	2,589.70	987.62	987.62
105		L16-4L	3,000.00	L16-3L	-43.52	2,443.10	1,521.12	1,520.51	L16-3L	20.00	2,589.70	1,520.51	1,520.51

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,673.19	4.75	0.15	7.63	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-86.12	0.98	0.12	0.92	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	145.48	1.65	0.51	2.42	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	192.98	1.23	0.15	1.01	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-192.98	0.55	0.03	0.14	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-222.10	1.42	0.12	1.31	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-222.10	1.42	0.43	1.31	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	405.38	2.59	0.06	3.97	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	405.38	2.59	0.50	3.98	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	437.51	2.79	0.46	4.58	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,673.19	4.75	0.23	7.63	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	221.89	2.52	0.37	5.29	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	530.00	3.38	0.52	6.54	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-104.82	0.67	0.15	0.33	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	518.41	1.47	0.76	0.87	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-1,484.21	4.21	2.38	6.11	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	5.54	0.06	0.00	0.01	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-42.96	0.27	0.02	0.06	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	-4.51	0.03	0.00	0.00	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-57.17	0.65	0.10	0.43	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	34.64	0.39	0.03	0.17	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	1,302.95	3.70	1.36	4.80	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	73.90	0.30	0.00	0.07	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-83.60	0.34	0.02	0.07	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	24.94	0.28	0.03	0.09	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-849.27	2.41	0.61	2.17	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	15.24	0.17	0.00	0.04	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	15.24	0.17	0.03	0.04	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-61.22	0.69	0.25	0.49	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-41.82	0.27	0.00	0.06	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	1,042.12	2.96	1.52	3.17	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-101.51	1.15	0.32	1.24	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-130.62	1.48	0.28	1.98	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	1,042.12	2.96	0.79	3.17	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-120.92	1.37	0.38	1.72	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.71	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-101.51	1.15	0.06	1.24	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-1,386.82	3.93	0.75	5.39	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-140.32	1.59	0.91	2.26	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-33.26	0.38	0.05	0.16	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-23.56	0.27	0.02	0.08	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	528.11	1.50	0.37	0.90	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-1,386.82	3.93	0.11	5.38	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	634.81	4.05	1.10	9.13	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	566.91	3.62	1.03	7.40	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	317.80	2.03	0.58	2.53	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	317.80	2.03	0.19	2.54	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	109.56	0.31	0.01	0.05	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-1,165.15	3.31	2.26	3.90	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	109.56	0.31	0.01	0.05	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	141.43	0.40	0.02	0.08	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-76.42	0.87	0.26	0.73	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-86.12	0.98	0.13	0.92	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	40.08	0.45	0.09	0.22	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	40.08	0.45	0.07	0.22	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	49.78	0.56	0.11	0.33	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	804.49	3.29	0.48	4.78	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	49.78	0.56	0.09	0.33	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-443.98	1.26	0.25	0.65	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	443.98	2.83	0.87	4.71	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	211.97	1.35	0.32	1.20	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	211.97	1.35	0.46	1.20	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	192.57	1.23	0.60	1.00	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	211.97	1.35	0.40	1.20	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	211.97	1.35	0.04	1.19	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	211.97	1.35	0.34	1.20	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	202.27	1.29	0.10	1.10	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-1,357.72	3.85	3.11	5.18	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-114.95	1.30	0.27	1.57	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	393.19	1.12	0.42	0.52	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	383.49	1.09	0.20	0.50	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-122.40	0.35	0.01	0.06	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-412.60	1.17	0.25	0.57	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	412.60	1.17	0.09	0.57	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	34.64	0.39	0.06	0.17	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	785.09	3.21	0.91	4.56	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	34.64	0.39	0.03	0.17	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	110.01	1.25	0.11	1.44	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	110.01	1.25	0.34	1.44	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-141.43	0.40	0.00	0.08	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-141.43	0.40	0.01	0.08	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	425.90	2.72	1.26	4.36	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.02	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	425.90	2.72	1.57	4.36	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	425.90	2.72	1.53	4.36	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-545.05	3.48	0.28	6.88	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	399.78	2.55	0.70	3.88	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	814.19	5.20	0.87	14.48	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-505.03	3.22	2.39	5.98	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-288.04	1.84	0.17	2.11	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	567.80	1.61	0.64	1.03	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-358.10	1.46	0.25	1.07	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	412.59	1.17	0.26	0.57	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	402.89	1.14	0.22	0.55	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	216.99	0.62	0.05	0.17	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	280.16	1.79	0.87	2.01	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	823.89	3.37	0.20	4.99	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	124.01	0.79	0.09	0.44	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-833.61	2.36	0.15	2.10	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	220.64	2.50	1.00	5.24	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	106.47	1.21	0.29	1.36	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	179.27	0.73	0.05	0.30	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-179.27	0.73	0.15	0.30	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	179.27	0.73	0.05	0.30	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	179.27	0.73	0.01	0.30	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-843.31	2.39	0.71	2.14	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-96.77	0.62	0.05	0.28	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-128.84	1.46	0.39	1.93	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.10	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-843.31	2.39	0.57	2.14	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-146.45	0.93	0.41	0.60	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	46.41	0.53	0.07	0.29	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-56.11	0.64	0.25	0.41	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	373.79	1.06	0.14	0.48	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	2,012.57	5.71	2.84	10.74	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-354.39	1.01	0.02	0.43	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-260.51	2.96	0.36	7.12	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	310.28	3.52	1.48	9.85	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	290.88	1.86	1.08	2.15	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-171.56	1.10	0.19	0.81	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-462.45	2.95	1.68	5.08	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,993.17	5.65	5.78	10.54	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-240.35	1.53	0.33	1.51	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-201.55	1.29	0.34	1.09	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	119.71	1.36	0.69	1.69	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	109.56	0.31	0.02	0.05	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	310.28	1.27	0.29	0.82	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	241.29	2.74	1.05	6.18	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	794.79	3.25	0.42	4.67	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	2,865.58	8.13	1.93	20.66	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-972.03	2.76	0.33	2.79	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-894.40	2.54	0.33	2.39	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,865.58	8.13	2.03	20.66	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	0.00	0.00	0.00	0.00	Closed	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-496.69	2.03	0.09	1.95	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-51.52	0.58	0.19	0.35	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	381.74	4.33	1.72	14.45	Open	0
201		P113	J72	J70	229.97	8.00	120.00	381.74	2.44	0.82	3.56	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-381.74	1.56	0.17	1.20	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	268.64	0.76	0.00	0.25	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-221.81	1.42	0.18	1.30	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-231.51	1.48	0.10	1.41	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	202.41	1.29	0.37	1.10	Open	0
209		P23	J24	J22	147.66	8.00	120.00	192.71	1.23	0.15	1.00	Open	0
210		P25	J22	J20	76.49	8.00	120.00	183.01	1.17	0.07	0.91	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	634.81	4.05	1.39	9.13	Open	0
214		P33	J18	J20	237.74	8.00	120.00	393.60	2.51	0.90	3.77	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.70	0.11	0.00	0.02	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217	P39	J36	J16	251.95	8.00	120.00	141.80	0.91	0.14	0.57	Open	0
218	P41	J16	J14	364.77	8.00	120.00	132.10	0.84	0.18	0.50	Open	0
219	P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220	P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221	P47	J34	J36	96.54	10.00	120.00	-367.80	1.50	0.11	1.12	Open	0
222	P49	J36	J-216	411.83	10.00	120.00	-519.30	2.12	0.87	2.12	Open	0
223	P51	K11-5L	J14	78.82	12.00	120.00	-122.40	0.35	0.00	0.06	Open	0
224	P53	J-217	J38	40.11	10.00	120.00	64.20	0.26	0.00	0.04	Open	0
225	P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226	P57	K11-4L	J40	50.14	10.00	120.00	-73.90	0.30	0.00	0.05	Open	0
227	P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228	P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229	P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230	P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231	P67	J46	J14-2L	267.66	8.00	120.00	-181.27	1.16	0.24	0.90	Open	0
232	P71	J26	J48	30.72	8.00	120.00	-212.11	1.35	0.04	1.20	Open	0
233	P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234	P75	I13-2L	I14-3L	261.95	10.00	120.00	359.19	1.47	0.28	1.07	Open	0
235	P77	I14-3L	J13-10L	320.82	10.00	120.00	359.19	1.47	0.34	1.07	Open	0
236	P79	J13-10L	J13-11L	244.28	8.00	120.00	359.19	2.29	0.78	3.18	Open	0
237	P81	J13-11L	J-228	132.88	8.00	120.00	359.19	2.29	0.42	3.18	Open	0
238	P83	J-228	J-229	166.40	6.00	120.00	359.19	4.08	2.15	12.91	Open	0
239	P85	J12-3L	J-271	46.04	6.00	120.00	19.40	0.22	0.00	0.06	Open	0
240	P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241	P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242	P91	J-220	J-215	304.83	12.00	110.00	308.87	0.88	0.12	0.39	Open	0
243	P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244	P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245	P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246	WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	-0.05	0.00	0.00	0.00	Open	0
247	WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	0.05	0.00	0.00	0.00	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP-4	2,367.54	-1,025.86	128.62	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP7	2,051.00	-0.65	267.24	2,879.34	618.27	Open	1.00	0.00	0.00

Low Zone 4 hr 2020 MDD FF with Improvements Tank Report

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	979.16	2,629.54	2,643.34	62.73	13.80
2		RES-OBS-2	901.06	2,629.54	2,643.34	62.73	13.80

Low Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	I13-1L	3,000.00	J12-7L	24.31	2,638.11	4,241.36	6,120.57	J12-7L	9.26	2,603.36	4,242.28	4,241.36
2	I13-2L	3,000.00	J12-7L	24.66	2,638.92	4,405.66	7,890.96	J12-7L	-2.73	2,575.70	4,407.15	4,405.66
3	I14-1L	3,000.00	K15-16L	21.79	2,642.29	4,457.40	5,638.39	K15-16L	17.77	2,633.00	4,458.11	4,457.40
4	I14-2L	3,000.00	K15-16L	21.77	2,642.25	4,412.65	11,727.13	K15-16L	-0.02	2,591.95	4,414.99	4,412.65
5	I14-3L	3,000.00	J12-7L	24.55	2,638.67	4,355.21	7,055.43	J12-7L	3.45	2,589.96	4,356.53	4,355.21
6	J12-10L	3,000.00	J12-10L	18.52	2,620.74	2,794.56	2,794.02	J12-10L	20.00	2,624.16	2,794.02	2,794.02
7	J12-11L	3,000.00	L13-1H	29.83	2,621.85	4,157.85	28,656.32	L13-1H	-735.16	856.34	4,157.86	4,157.85
8	J12-1L	3,000.00	J12-1L	-137.25	2,204.78	1,187.92	1,188.67	J12-1L	20.00	2,567.70	1,188.67	1,187.92
9	J12-2L	3,000.00	J12-2L	-39.28	2,414.88	1,857.50	1,857.12	J12-2L	20.00	2,551.70	1,857.12	1,857.12
10	J12-3L	3,000.00	J12-4L	-34.61	2,463.66	1,601.17	1,889.22	J12-4L	11.10	2,569.15	1,601.79	1,601.17
11	J12-4L	3,000.00	J12-4L	-124.16	2,256.98	1,071.89	1,071.89	J12-4L	20.00	2,589.70	1,071.89	1,071.89
12	J12-7L	3,000.00	J12-7L	20.83	2,630.07	3,159.12	3,158.77	J12-7L	20.00	2,628.16	3,158.77	3,158.77
13	J12-9L	3,000.00	J12-9L	-107.89	2,284.00	1,214.43	1,215.44	J12-9L	20.00	2,579.16	1,215.43	1,214.43
14	J13-10L	3,000.00	J12-7L	24.46	2,638.44	4,308.76	5,720.46	J12-7L	12.44	2,610.70	4,309.90	4,308.76
15	J13-11L	3,000.00	J12-7L	24.31	2,638.09	4,232.60	4,547.74	J12-7L	18.54	2,624.79	4,233.45	4,232.60
16	J13-12L	3,000.00	J12-7L	24.05	2,637.51	4,110.69	5,283.01	J12-7L	13.70	2,613.63	4,111.15	4,110.69
17	J13-7L	3,000.00	J12-7L	23.84	2,637.03	3,999.01	5,809.53	J12-7L	9.06	2,602.90	3,999.27	3,999.01
18	J13-8L	3,000.00	J13-8L	-190.29	2,100.38	929.90	929.90	J13-8L	20.00	2,585.70	929.90	929.90
19	J13-9L	3,000.00	J13-9L	26.78	2,597.81	3,458.21	3,457.72	J13-9L	20.00	2,582.16	3,457.72	3,457.72
20	J14-2L	3,000.00	K15-16L	21.56	2,641.75	4,201.05	7,967.04	K15-16L	10.58	2,616.41	4,201.06	4,201.05
21	J14-3L	3,000.00	K15-16L	21.69	2,642.06	4,305.48	8,240.54	K15-16L	10.21	2,615.56	4,307.05	4,305.48
22	J14-4L	3,000.00	K15-16L	21.66	2,641.98	4,279.69	8,688.72	K15-16L	8.63	2,611.93	4,283.85	4,279.69
23	J14-5L	3,000.00	K15-16L	21.73	2,642.16	4,369.55	6,909.57	K15-16L	14.43	2,625.29	4,370.66	4,369.55
24	J14-6L	3,000.00	K15-16L	21.71	2,642.11	4,370.25	10,055.77	K15-16L	5.05	2,603.66	4,368.84	4,368.84
25	J14-7L	3,000.00	J14-7L	29.09	2,542.68	3,299.58	3,299.36	J14-7L	20.00	2,521.70	3,299.37	3,299.37
26	J14-8L	3,000.00	J14-8L	35.18	2,585.18	3,793.95	3,793.32	J14-8L	20.00	2,550.16	3,793.31	3,793.31
27	J15-1L	3,000.00	K15-16L	21.58	2,641.81	4,234.84	7,078.62	K15-16L	13.39	2,622.89	4,234.87	4,234.84
28	J15-2L	3,000.00	K15-16L	21.35	2,641.26	4,045.21	5,473.71	K15-16L	17.15	2,631.58	4,045.32	4,045.21
29	J15-3L	3,000.00	J15-3L	30.83	2,524.69	3,312.36	3,312.31	J15-3L	20.00	2,499.70	3,312.31	3,312.31
30	J15-4L	3,000.00	K15-16L	20.98	2,640.42	3,734.35	6,897.30	K15-16L	12.12	2,619.98	3,734.48	3,734.35
31	J15-5L	3,000.00	J15-5L	28.71	2,519.80	3,244.22	3,244.18	J15-5L	20.00	2,499.70	3,244.18	3,244.18
32	J15-7L	3,000.00	J15-7L	-981.95	177.34	677.71	677.75	J15-7L	20.00	2,489.70	677.75	677.71
33	J15-8L	3,000.00	K15-16L	20.17	2,638.55	3,113.28	6,969.06	K15-16L	9.04	2,612.87	3,112.85	3,112.85
34	J15-9L	3,000.00	K15-16L	19.24	2,636.40	2,561.88	2,816.40	K15-16L	19.57	2,637.16	2,561.77	2,561.77
35	J16-1L	3,000.00	K15-16L	19.94	2,638.03	2,963.80	3,250.74	K15-16L	19.53	2,637.07	2,963.80	2,963.80
36	J16-2L	3,000.00	J16-2L	-37.34	2,362.38	2,131.42	2,131.61	J16-2L	20.00	2,494.70	2,131.61	2,131.42
37	J16-3L	3,000.00	K15-16L	19.72	2,637.52	2,825.03	4,713.91	K15-16L	15.73	2,628.30	2,823.12	2,823.12
38	J16-4L	3,000.00	K15-16L	19.94	2,638.03	2,963.80	3,818.02	K15-16L	18.40	2,634.47	2,963.79	2,963.79
39	K-120101	3,000.00	K12-3L	27.69	2,604.45	3,609.63	4,424.52	K12-3L	7.43	2,557.69	3,608.83	3,608.83
40	K10-1L	3,000.00	K10-1L	-89.87	2,346.14	1,096.87	1,097.91	K10-1L	20.00	2,599.70	1,097.91	1,096.87
41	K11-10L	3,000.00	J12-7L	23.94	2,637.26	3,952.98	4,072.19	J12-7L	19.40	2,626.77	3,953.08	3,952.98
42	K11-11L	3,000.00	J12-7L	23.91	2,637.19	3,941.05	4,560.01	J12-7L	16.63	2,620.38	3,941.13	3,941.05
43	K11-12L	3,000.00	J12-7L	24.15	2,637.74	4,021.43	4,901.22	J12-7L	15.09	2,616.83	4,021.54	4,021.43
44	K11-1L	3,000.00	K10-1L	29.88	2,622.50	4,212.29	5,023.67	K10-1L	11.33	2,579.70	4,212.27	4,212.27
45	K11-2L	3,000.00	J12-7L	24.63	2,638.85	4,203.22	5,209.66	J12-7L	14.43	2,615.30	4,203.40	4,203.22
46	K11-3L	3,000.00	K11-3L	-30.70	2,468.70	1,678.40	1,677.46	K11-3L	20.00	2,585.70	1,677.45	1,677.45
47	K11-4L	3,000.00	J12-7L	24.18	2,637.81	4,031.83	5,331.85	J12-7L	12.36	2,610.53	4,031.94	4,031.83
48	K11-5L	3,000.00	J12-7L	24.05	2,637.50	3,986.08	4,902.49	J12-7L	14.84	2,616.26	3,986.18	3,986.08
49	K11-6L	3,000.00	J12-7L	24.04	2,637.48	3,983.67	4,587.44	J12-7L	16.74	2,620.63	3,983.77	3,983.67
50	K11-9L	3,000.00	K11-9L	12.33	2,546.46	2,699.45	2,699.43	K11-9L	20.00	2,564.16	2,699.44	2,699.44
51	K12-2L	3,000.00	K12-2L	18.59	2,582.45	2,916.56	2,916.55	K12-2L	20.00	2,585.70	2,916.54	2,916.54

Low Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
52		K12-3L	3,000.00	K12-3L	17.09	2,579.97	2,831.31	2,831.21	K12-3L	20.00	2,586.70	2,831.21	2,831.21
53		K12-4L	3,000.00	K12-4L	17.57	2,562.56	2,892.11	2,892.10	K12-4L	20.00	2,568.16	2,892.09	2,892.09
54		K14-10L	3,000.00	K15-16L	20.34	2,638.94	3,227.31	6,555.02	K15-16L	11.18	2,617.79	3,225.92	3,225.92
55		K14-2L	3,000.00	K15-16L	21.89	2,642.52	4,536.18	7,184.62	K15-16L	14.26	2,624.91	4,536.20	4,536.18
56		K14-3L	3,000.00	K14-3L	26.94	2,591.71	3,448.13	3,448.33	K14-3L	20.00	2,575.70	3,448.33	3,448.13
57		K14-4L	3,000.00	K14-4L	-24.39	2,469.25	1,877.87	1,877.34	K14-4L	20.00	2,571.70	1,877.34	1,877.34
58		K14-5L	3,000.00	K15-16L	19.98	2,638.11	2,987.95	6,643.40	K15-16L	9.60	2,614.16	2,988.04	2,987.95
59		K14-7L	3,000.00	K15-16L	22.19	2,643.21	5,071.88	8,382.63	K15-16L	12.68	2,621.27	5,072.01	5,071.88
60		K14-8L	3,000.00	K15-16L	22.32	2,643.50	5,744.65	8,197.60	K15-16L	15.45	2,627.66	5,745.88	5,744.65
61		K14-9L	3,000.00	L15-5L	23.91	2,620.72	3,526.67	3,953.75	L15-5L	16.49	2,603.60	3,526.74	3,526.67
62		K15-10L	3,000.00	K15-10L	-5.61	2,566.58	1,445.45	1,445.47	K15-10L	20.00	2,625.70	1,445.46	1,445.45
63		K15-11L	3,000.00	K15-11L	4.22	2,598.74	1,337.43	1,337.26	K15-11L	20.00	2,635.16	1,337.26	1,337.26
64		K15-12L	3,000.00	K15-16L	15.78	2,628.42	1,842.51	3,310.48	K15-16L	14.45	2,625.35	1,842.48	1,842.48
65		K15-13L	3,000.00	K15-16L	17.22	2,631.74	2,036.24	3,788.16	K15-16L	14.53	2,625.54	2,036.13	2,036.13
66		K15-14L	3,000.00	K15-16L	18.12	2,633.81	2,211.71	4,495.08	K15-16L	13.29	2,622.67	2,211.49	2,211.49
67		K15-15L	3,000.00	K15-10L	14.58	2,613.19	2,290.60	3,248.92	K15-10L	12.45	2,608.28	2,290.53	2,290.53
68		K15-16L	3,000.00	K15-16L	2.01	2,596.65	1,082.87	1,082.86	K15-16L	20.00	2,638.16	1,082.85	1,082.85
69		K15-17L	3,000.00	K15-16L	18.78	2,635.35	2,388.25	5,375.28	K15-16L	11.30	2,618.09	2,387.99	2,387.99
70		K15-18L	3,000.00	K15-18L	4.66	2,510.75	2,537.82	2,537.94	K15-18L	20.00	2,546.16	2,537.94	2,537.82
71		K15-1L	3,000.00	K15-16L	19.97	2,638.08	2,978.68	6,581.53	K15-16L	9.80	2,614.61	2,978.68	2,978.68
72		K15-2L	3,000.00	K15-16L	19.96	2,638.06	2,972.72	6,563.74	K15-16L	9.83	2,614.70	2,972.71	2,972.71
73		K15-3L	3,000.00	K15-16L	19.97	2,638.08	2,977.76	5,903.42	K15-16L	12.36	2,620.53	2,977.78	2,977.76
74		K15-4L	3,000.00	K15-16L	19.64	2,637.32	2,774.45	6,987.88	K15-16L	6.51	2,607.02	2,774.36	2,774.36
75		K15-5L	3,000.00	K15-16L	19.92	2,637.97	2,947.90	7,355.29	K15-16L	6.30	2,606.54	2,947.83	2,947.83
76		K15-6L	3,000.00	K15-16L	20.01	2,638.18	3,005.36	7,383.99	K15-16L	6.59	2,607.20	3,007.25	3,005.36
77		K15-7L	3,000.00	K15-16L	19.78	2,637.64	2,859.97	6,767.40	K15-16L	8.13	2,610.76	2,858.89	2,858.89
78		K15-8L	3,000.00	K15-8L	2.70	2,594.24	1,337.08	1,336.46	K15-8L	20.00	2,634.16	1,336.44	1,336.44
79		K15-9L	3,000.00	K15-16L	12.92	2,621.81	1,590.00	1,659.86	K15-16L	19.74	2,637.55	1,590.72	1,590.00
80		K16-2L	3,000.00	K15-16L	18.26	2,634.13	2,249.17	2,766.95	K15-16L	18.81	2,635.41	2,248.93	2,248.93
81		K16-3L	3,000.00	L16-1L	4.55	2,572.04	2,084.82	2,410.74	L16-1L	15.05	2,596.27	2,085.37	2,084.82
82		K16-4L	3,000.00	K16-5L	-97.76	2,308.39	1,211.72	1,312.34	K16-5L	15.66	2,570.14	1,212.69	1,211.72
83		K16-5L	3,000.00	K16-5L	-139.29	2,212.54	1,059.47	1,059.89	K16-5L	20.00	2,580.16	1,059.89	1,059.47
84		K17-1L	3,000.00	K17-1L	-106.67	2,231.36	1,533.72	1,534.16	K17-1L	20.00	2,523.70	1,534.15	1,533.72
85		K17-2L	3,000.00	K15-16L	18.59	2,634.91	2,337.06	2,543.47	K15-16L	19.57	2,637.17	2,336.78	2,336.78
86		K17-3L	3,000.00	K16-5L	-27.17	2,471.30	1,731.24	1,964.41	K16-5L	12.80	2,563.54	1,731.23	1,731.23
87		K17-4L	3,000.00	K17-4L	-57.39	2,311.09	1,975.11	1,975.37	K17-4L	20.00	2,489.70	1,975.37	1,975.11
88		K17-5L	3,000.00	K17-5L	-8.58	2,423.73	2,469.87	2,470.00	K17-5L	20.00	2,489.70	2,470.00	2,469.87
89		K17-6L	3,000.00	K15-16L	18.69	2,635.14	2,367.02	2,958.39	K15-16L	18.78	2,635.34	2,366.76	2,366.76
90		K17-7L	3,000.00	K16-5L	-41.00	2,439.39	1,583.07	1,605.46	K16-5L	19.27	2,578.48	1,583.07	1,583.07
91		K17-8L	3,000.00	K17-8L	-39.09	2,387.34	1,981.75	1,982.23	K17-8L	20.00	2,523.70	1,982.23	1,981.75
92		K18-1L	3,000.00	K18-1L	-144.12	2,120.92	1,495.94	1,496.15	K18-1L	20.00	2,499.70	1,496.15	1,495.94
93		L13-1H	3,000.00	L13-1H	-25.72	2,493.64	1,558.53	1,558.51	L13-1H	20.00	2,599.16	1,558.51	1,558.51
94		L13-2H	3,000.00	L13-2H	-27.17	2,490.29	1,543.38	1,543.37	L13-2H	20.00	2,599.16	1,543.36	1,543.36
95		L14-3L	3,000.00	K15-16L	22.66	2,644.30	7,094.25	8,350.09	K15-16L	18.32	2,634.27	7,097.55	7,094.25
96		L14-4L	3,000.00	L14-4L	16.15	2,600.82	2,667.26	2,667.22	L14-4L	20.00	2,609.70	2,667.22	2,667.22
97		L15-3L	3,000.00	L15-3L	0.86	2,565.53	1,946.59	1,946.09	L15-3L	20.00	2,609.70	1,946.09	1,946.09
98		L15-4L	3,000.00	L15-4L	12.87	2,595.24	2,427.94	2,427.78	L15-4L	20.00	2,611.70	2,427.78	2,427.78
99		L15-5L	3,000.00	L15-5L	14.86	2,599.82	2,554.42	2,554.29	L15-5L	20.00	2,611.70	2,554.29	2,554.29
100		L15-6L	3,000.00	L15-5L	15.70	2,601.76	2,614.72	2,624.33	L15-5L	19.90	2,611.46	2,614.59	2,614.59
101		L15-7L	3,000.00	L15-7L	8.49	2,601.60	1,791.20	1,791.35	L15-7L	20.00	2,628.16	1,791.35	1,791.20
102		L16-1L	3,000.00	L16-1L	-0.67	2,559.99	1,919.20	1,919.38	L16-1L	20.00	2,607.70	1,919.38	1,919.20

Low Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
103		L16-2L	3,000.00	K15-16L	17.34	2,632.02	2,211.36	2,248.88	K15-16L	19.89	2,637.90	2,211.37	2,211.36
104		L16-3L	3,000.00	L16-3L	-152.97	2,190.51	957.44	957.43	L16-3L	20.00	2,589.70	957.43	957.43
105		L16-4L	3,000.00	L16-4L	-44.91	2,439.89	1,475.23	1,474.44	L16-4L	20.00	2,589.70	1,474.44	1,474.44

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,681.53	4.77	0.15	7.70	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-86.58	0.98	0.12	0.93	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	146.30	1.66	0.51	2.45	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	193.81	1.24	0.15	1.01	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-193.81	0.55	0.03	0.14	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-223.37	1.43	0.13	1.32	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-223.37	1.43	0.43	1.32	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	407.47	2.60	0.06	4.02	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	407.47	2.60	0.50	4.02	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	439.97	2.81	0.46	4.63	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,681.53	4.77	0.23	7.70	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	223.17	2.53	0.37	5.35	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	533.15	3.40	0.53	6.61	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-106.08	0.68	0.16	0.33	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	522.82	1.48	0.77	0.88	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-1,491.94	4.23	2.41	6.17	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	5.65	0.06	0.00	0.01	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-42.85	0.27	0.02	0.06	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	-5.18	0.03	0.00	0.00	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-57.73	0.66	0.10	0.44	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	34.75	0.39	0.03	0.17	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	1,309.91	3.72	1.37	4.85	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	74.67	0.31	0.00	0.07	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-84.37	0.34	0.02	0.07	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	25.05	0.28	0.03	0.09	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-854.13	2.42	0.61	2.20	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	15.35	0.17	0.00	0.04	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	15.35	0.17	0.03	0.04	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-61.59	0.70	0.26	0.49	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-42.19	0.27	0.00	0.06	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	1,048.59	2.97	1.54	3.21	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-102.18	1.16	0.32	1.26	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-131.28	1.49	0.28	2.00	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	1,048.59	2.97	0.80	3.21	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-121.58	1.38	0.39	1.74	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-102.18	1.16	0.06	1.26	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-1,396.19	3.96	0.76	5.45	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-140.98	1.60	0.92	2.28	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-33.15	0.38	0.05	0.16	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-23.45	0.27	0.02	0.08	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	532.52	1.51	0.37	0.92	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-1,396.19	3.96	0.11	5.46	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	639.22	4.08	1.11	9.25	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	571.32	3.65	1.05	7.51	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	319.67	2.04	0.59	2.56	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	319.67	2.04	0.19	2.56	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	110.12	0.31	0.01	0.05	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-1,173.11	3.33	2.29	3.95	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	110.12	0.31	0.01	0.05	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	142.15	0.40	0.02	0.08	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-76.88	0.87	0.26	0.74	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-86.58	0.98	0.13	0.93	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	40.30	0.46	0.09	0.23	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	40.30	0.46	0.07	0.22	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	50.00	0.57	0.11	0.33	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	808.37	3.30	0.48	4.82	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	50.00	0.57	0.09	0.34	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-446.08	1.27	0.25	0.66	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	446.08	2.85	0.88	4.75	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	213.38	1.36	0.33	1.21	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	213.38	1.36	0.46	1.21	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	193.98	1.24	0.61	1.02	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	213.38	1.36	0.41	1.21	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	213.38	1.36	0.04	1.21	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	213.38	1.36	0.34	1.21	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	203.68	1.30	0.10	1.11	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-1,367.09	3.88	3.15	5.25	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-115.45	1.31	0.27	1.58	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.41	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	396.10	1.12	0.42	0.53	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	386.40	1.10	0.21	0.51	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-123.17	0.35	0.01	0.06	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-415.50	1.18	0.26	0.58	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	415.50	1.18	0.09	0.58	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	34.75	0.39	0.06	0.17	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	788.97	3.22	0.92	4.61	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	34.75	0.39	0.03	0.17	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	110.59	1.25	0.11	1.46	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	110.59	1.25	0.34	1.46	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-142.15	0.40	0.00	0.08	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-142.15	0.40	0.01	0.08	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	428.01	2.73	1.28	4.40	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.02	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	428.01	2.73	1.58	4.40	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	428.01	2.73	1.54	4.40	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-547.77	3.50	0.28	6.95	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	401.86	2.56	0.70	3.92	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	818.07	5.22	0.88	14.60	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-507.60	3.24	2.41	6.03	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-289.46	1.85	0.17	2.13	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	570.70	1.62	0.65	1.04	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-360.23	1.47	0.26	1.08	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	415.50	1.18	0.26	0.58	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	405.80	1.15	0.22	0.55	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	218.14	0.62	0.05	0.18	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	281.76	1.80	0.88	2.03	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	827.77	3.38	0.20	5.04	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	124.48	0.79	0.09	0.45	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-837.49	2.38	0.15	2.12	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	221.80	2.52	1.00	5.29	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	107.10	1.22	0.29	1.37	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	179.89	0.73	0.05	0.30	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-179.89	0.73	0.15	0.30	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	179.89	0.73	0.05	0.30	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	179.89	0.73	0.01	0.30	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-847.19	2.40	0.71	2.16	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-97.40	0.62	0.05	0.28	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-129.46	1.47	0.39	1.95	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.11	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-847.19	2.40	0.57	2.16	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-147.58	0.94	0.42	0.61	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	46.88	0.53	0.07	0.30	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-56.58	0.64	0.25	0.42	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	376.70	1.07	0.14	0.48	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	2,022.45	5.74	2.87	10.83	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-357.30	1.01	0.02	0.44	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-261.81	2.97	0.36	7.19	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	311.82	3.54	1.49	9.94	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	292.42	1.87	1.09	2.17	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-172.33	1.10	0.19	0.82	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-464.74	2.97	1.69	5.12	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	2,003.05	5.68	5.83	10.64	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-241.37	1.54	0.33	1.52	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-202.57	1.29	0.34	1.10	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	120.29	1.37	0.70	1.70	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	110.12	0.31	0.02	0.05	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	311.82	1.27	0.29	0.83	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	242.57	2.75	1.06	6.24	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	798.67	3.26	0.42	4.71	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	2,879.34	8.17	1.95	20.84	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-979.21	2.78	0.34	2.83	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-901.00	2.56	0.34	2.42	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,879.34	8.17	2.05	20.84	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	0.00	0.00	0.00	0.00	Closed	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-499.10	2.04	0.09	1.97	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-51.89	0.59	0.19	0.36	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	383.66	4.35	1.74	14.59	Open	0
201		P113	J72	J70	229.97	8.00	120.00	383.66	2.45	0.83	3.59	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-383.66	1.57	0.17	1.21	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	270.06	0.77	0.00	0.25	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-223.32	1.43	0.18	1.32	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-233.02	1.49	0.10	1.43	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	203.92	1.30	0.37	1.11	Open	0
209		P23	J24	J22	147.66	8.00	120.00	194.22	1.24	0.15	1.02	Open	0
210		P25	J22	J20	76.49	8.00	120.00	184.52	1.18	0.07	0.93	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	639.22	4.08	1.41	9.25	Open	0
214		P33	J18	J20	237.74	8.00	120.00	396.50	2.53	0.91	3.82	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.71	0.11	0.00	0.02	Open	0

Low Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217		P39	J36	J16	251.95	8.00	120.00	142.57	0.91	0.14	0.57	Open	0
218		P41	J16	J14	364.77	8.00	120.00	132.87	0.85	0.18	0.50	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-369.93	1.51	0.11	1.13	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-522.20	2.13	0.88	2.14	Open	0
223		P51	K11-5L	J14	78.82	12.00	120.00	-123.17	0.35	0.00	0.06	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	64.97	0.27	0.00	0.04	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-74.67	0.31	0.00	0.06	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-182.03	1.16	0.24	0.90	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-213.62	1.36	0.04	1.22	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	360.97	1.47	0.28	1.08	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	360.97	1.47	0.35	1.08	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	360.97	2.30	0.78	3.21	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	360.97	2.30	0.43	3.21	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	360.97	4.10	2.17	13.03	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.41	0.22	0.00	0.05	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	304.83	12.00	110.00	310.34	0.88	0.12	0.39	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	-0.05	0.00	0.00	0.00	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	0.05	0.00	0.00	0.00	Open	0

APPENDIX I

Item 4 – Water Modeling Results: High Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events

High Zone 2 hr 2020 MDD FF with Improvements Pump Report

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP5	2,205.70	131.22	227.49	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP6	2,134.00	27.97	253.68	0.00	0.00	Closed	0.00	0.00	0.00
3		PUMP8	1,956.00	-0.41	350.12	3,423.07	808.98	Open	1.00	32.61	0.00
4		TRANSF	2,629.54	7.57	33.88	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 2 hr 2020 MDD FF with Improvements Tank Report

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		EL-OBS-HILL-TANK	1,060.55	2,691.54	2,705.40	69.30	13.86
2		FAIRWAYTANK	918.55	2,679.54	2,707.51	87.41	27.97
3		OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-42.23	2,506.07	1,531.92	1,808.90	M12-8H	10.66	2,628.15	1,531.90	1,531.90
2	J12-5H	3,000.00	J12-5H	-185.00	2,129.58	1,184.54	1,185.58	J12-5H	20.00	2,602.70	1,185.58	1,184.54
3	J12-6H	3,000.00	J12-6H	-216.77	2,048.73	1,147.09	1,147.93	J12-6H	20.00	2,595.16	1,147.92	1,147.09
4	J12-8H	3,000.00	J12-8H	-250.66	1,973.51	1,067.23	1,067.96	J12-8H	20.00	2,598.16	1,067.97	1,067.23
5	J13-1H	3,000.00	J13-4H	-10.92	2,554.34	2,115.47	2,409.44	J13-4H	10.52	2,603.82	2,115.46	2,115.46
6	J13-2H	3,000.00	J13-2H	-44.54	2,470.74	1,745.01	1,745.00	J13-2H	20.00	2,619.70	1,744.98	1,744.98
7	J13-3H	3,000.00	J13-3H	-86.21	2,366.58	1,501.00	1,501.02	J13-3H	20.00	2,611.70	1,501.01	1,501.00
8	J13-4H	3,000.00	J13-4H	-12.78	2,550.06	2,084.55	2,084.54	J13-4H	20.00	2,625.70	2,084.54	2,084.54
9	J13-5H	3,000.00	J13-5H	-13.49	2,548.40	2,073.16	2,073.16	J13-5H	20.00	2,625.70	2,073.15	2,073.15
10	J13-6H	3,000.00	J13-4H	-9.38	2,557.88	2,142.12	2,254.44	J13-4H	16.53	2,617.68	2,142.10	2,142.10
11	J14-1H	3,000.00	J13-4H	-5.19	2,567.55	2,220.32	2,477.78	J13-4H	12.23	2,607.76	2,220.27	2,220.27
12	J7-1H	3,000.00	K7-7H	27.64	2,648.34	3,443.04	4,261.74	K7-7H	4.18	2,594.19	3,443.37	3,443.04
13	J7-2H	3,000.00	K7-7H	27.49	2,647.99	3,432.46	3,644.11	K7-7H	16.10	2,621.69	3,432.76	3,432.46
14	K10-2H	3,000.00	M9-1H	34.93	2,684.16	4,730.59	5,068.01	M9-1H	16.20	2,640.93	4,730.69	4,730.59
15	K12-1H	3,000.00	K12-1H	-82.50	2,334.60	1,755.61	1,756.06	K12-1H	20.00	2,571.16	1,756.06	1,755.61
16	K13-1H	3,000.00	K13-1H	48.55	2,651.04	4,361.31	4,360.93	K13-1H	20.00	2,585.16	4,360.95	4,360.95
17	K13-2H	3,000.00	K13-2H	23.38	2,650.50	3,211.21	3,210.87	K13-2H	20.00	2,642.70	3,210.85	3,210.85
18	K13-3H	3,000.00	K13-3H	-21.24	2,538.53	1,911.96	1,911.95	K13-3H	20.00	2,633.70	1,911.95	1,911.95
19	K13-4H	3,000.00	K13-4H	-5.28	2,587.80	2,075.95	2,075.92	K13-4H	20.00	2,646.16	2,075.92	2,075.92
20	K14-1H	3,000.00	K14-1H	-26.48	2,499.44	2,017.81	2,017.80	K14-1H	20.00	2,606.70	2,017.78	2,017.78
21	K14-6H	3,000.00	K14-6H	-171.02	2,136.32	1,351.95	1,352.42	K14-6H	20.00	2,577.16	1,352.42	1,351.95
22	K7-1H	3,000.00	K7-7H	27.45	2,647.88	3,429.02	3,553.18	K7-7H	17.73	2,625.45	3,429.32	3,429.02
23	K7-2H	3,000.00	K7-7H	27.79	2,648.68	3,453.62	3,940.68	K7-7H	10.86	2,609.61	3,453.96	3,453.62
24	K7-3H	3,000.00	K7-3H	-16.85	2,504.66	2,248.67	2,248.72	K7-3H	20.00	2,589.70	2,248.71	2,248.67
25	K7-4H	3,000.00	K7-7H	31.30	2,656.78	3,736.34	4,827.92	K7-7H	0.42	2,585.51	3,737.66	3,736.34
26	K7-5H	3,000.00	K7-5H	0.65	2,537.04	2,552.82	2,552.84	K7-5H	20.00	2,581.70	2,552.84	2,552.82
27	K7-6H	3,000.00	K7-6H	25.76	2,633.99	3,275.34	3,275.45	K7-6H	20.00	2,620.70	3,275.43	3,275.34
28	K7-7H	3,000.00	K7-7H	26.38	2,645.43	3,356.36	3,356.55	K7-7H	20.00	2,630.70	3,356.54	3,356.36
29	K7-8H	3,000.00	K7-8H	-20.43	2,473.39	2,284.83	2,284.88	K7-8H	20.00	2,566.70	2,284.87	2,284.83
30	K7-9H	3,000.00	K7-9H	-49.31	2,413.75	1,971.81	1,971.83	K7-9H	20.00	2,573.70	1,971.83	1,971.81
31	K8-1H	3,000.00	K8-1H	-53.09	2,387.02	2,009.24	2,009.28	K8-1H	20.00	2,555.70	2,009.28	2,009.24
32	K8-2H	3,000.00	K7-7H	30.17	2,654.16	3,637.78	4,339.12	K7-7H	7.53	2,601.91	3,638.65	3,637.78
33	L10-1H	3,000.00	L10-8H	47.16	2,664.39	4,745.19	4,863.25	L10-8H	17.71	2,596.41	4,745.20	4,745.19
34	L10-2H	3,000.00	L10-2H	45.52	2,661.59	4,583.19	4,583.23	L10-2H	20.00	2,602.70	4,583.20	4,583.19
35	L10-4H	3,000.00	L10-8H	-105.67	2,311.66	1,492.93	1,516.29	L10-8H	18.62	2,598.51	1,493.19	1,492.93
36	L10-5H	3,000.00	L10-8H	-51.27	2,437.20	1,827.00	1,891.95	L10-8H	16.82	2,594.36	1,827.56	1,827.00
37	L10-6H	3,000.00	M9-1H	33.56	2,681.00	4,481.87	5,051.45	M9-1H	13.13	2,633.85	4,481.97	4,481.87
38	L10-7H	3,000.00	M9-1H	34.44	2,683.03	4,640.34	4,932.73	M9-1H	16.67	2,642.02	4,640.46	4,640.34
39	L10-8H	3,000.00	L10-8H	-226.30	2,033.28	1,123.11	1,123.02	L10-8H	20.00	2,601.70	1,123.02	1,123.02
40	L11-1H	3,000.00	K13-4H	36.21	2,683.57	4,770.13	4,874.29	K13-4H	18.78	2,643.33	4,770.31	4,770.13
41	L11-2H	3,000.00	K13-4H	35.85	2,682.73	4,686.38	5,538.66	K13-4H	9.11	2,621.02	4,686.53	4,686.38
42	L11-3H	3,000.00	K13-4H	36.15	2,683.44	4,755.46	5,269.81	K13-4H	13.67	2,631.54	4,755.64	4,755.46
43	L11-4H	3,000.00	L11-4H	-134.99	2,225.46	1,482.10	1,481.94	L11-4H	20.00	2,583.16	1,481.94	1,481.94
44	L11-5H	3,000.00	L11-5H	-23.58	2,507.59	2,117.71	2,117.26	L11-5H	20.00	2,608.16	2,117.25	2,117.25
45	L11-6H	3,000.00	L11-6H	49.70	2,653.71	4,564.77	4,561.29	L11-6H	20.00	2,585.16	4,561.27	4,561.27
46	L12-3H	3,000.00	M12-5H	34.12	2,661.28	3,862.27	3,950.22	M12-5H	18.32	2,624.81	3,862.31	3,862.27
47	L12-4H	3,000.00	K13-4H	34.36	2,679.30	4,395.91	5,518.14	K13-4H	4.40	2,610.15	4,395.98	4,395.91

High Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
48		L12-6H	3,000.00	L12-6H	38.59	2,649.60	3,985.06	3,983.72	L12-6H	20.00	2,606.70	3,983.72	3,983.72
49		L12-7H	3,000.00	L12-7H	45.74	2,661.09	4,548.13	4,548.19	L12-7H	20.00	2,601.70	4,548.17	4,548.13
50		L12-8H	3,000.00	L12-8H	27.11	2,628.12	3,310.25	3,309.83	L12-8H	20.00	2,611.70	3,309.84	3,309.84
51		L13-10H	3,000.00	L13-10H	36.22	2,619.58	3,580.26	3,580.00	L13-10H	20.00	2,582.16	3,580.00	3,580.00
52		L13-11H	3,000.00	M12-8H	43.46	2,703.85	6,906.38	7,074.14	M12-8H	18.52	2,646.29	6,906.97	6,906.38
53		L13-12H	3,000.00	L13-12H	48.57	2,667.08	4,741.37	4,742.20	L13-12H	20.00	2,601.16	4,742.21	4,741.37
54		L13-1H	3,000.00	K13-4H	33.19	2,676.60	4,201.08	5,030.88	K13-4H	8.16	2,618.84	4,201.12	4,201.08
55		L13-2H	3,000.00	K13-4H	31.84	2,673.49	4,022.88	5,195.50	K13-4H	2.01	2,604.63	4,022.91	4,022.88
56		L13-3H	3,000.00	M12-8H	34.47	2,683.10	4,427.37	4,580.33	M12-8H	18.08	2,645.28	4,427.40	4,427.37
57		L13-4H	3,000.00	M12-8H	29.34	2,671.24	3,737.21	4,285.33	M12-8H	11.59	2,630.29	3,734.79	3,734.79
58		L13-5H	3,000.00	M12-8H	35.09	2,684.52	4,504.77	5,496.02	M12-8H	6.97	2,619.62	4,501.27	4,501.27
59		L13-6H	3,000.00	K13-4H	33.84	2,678.09	4,285.67	4,326.58	K13-4H	19.47	2,644.94	4,285.70	4,285.67
60		L13-7H	3,000.00	M12-8H	41.18	2,698.58	6,012.21	6,749.85	M12-8H	12.32	2,631.97	6,012.65	6,012.21
61		L13-8H	3,000.00	L13-8H	57.93	2,681.24	5,807.66	5,807.64	L13-8H	20.00	2,593.70	5,807.66	5,807.66
62		L13-9H	3,000.00	L13-9H	38.27	2,649.86	3,945.53	3,943.77	L13-9H	20.00	2,607.70	3,943.78	3,943.78
63		L14-2H	3,000.00	L14-2H	-39.03	2,461.92	1,958.87	1,956.90	L14-2H	20.00	2,598.16	1,956.92	1,956.92
64		L14-3H	3,000.00	L14-3H	-13.91	2,532.90	2,193.14	2,190.95	L14-3H	20.00	2,611.16	2,190.96	2,190.96
65		L7-1H	3,000.00	K7-7H	30.65	2,655.27	3,678.45	3,884.33	K7-7H	16.53	2,622.69	3,679.49	3,678.45
66		L7-2H	3,000.00	L7-2H	25.62	2,612.66	3,210.37	3,210.41	L7-2H	20.00	2,599.70	3,210.40	3,210.37
67		L7-3H	3,000.00	K7-7H	29.30	2,652.16	3,566.95	3,580.98	K7-7H	19.77	2,630.16	3,567.57	3,566.95
68		L7-4H	3,000.00	L7-4H	27.13	2,618.15	3,280.85	3,280.93	L7-4H	20.00	2,601.70	3,280.91	3,280.85
69		L7-5H	3,000.00	L7-5H	20.94	2,618.87	3,036.91	3,038.46	L7-5H	20.00	2,616.70	3,038.44	3,036.91
70		L8-1H	3,000.00	L8-1H	34.78	2,645.82	3,771.06	3,771.60	L8-1H	20.00	2,611.70	3,771.60	3,771.06
71		L9-1H	3,000.00	M9-1H	29.55	2,671.73	3,860.96	4,124.10	M9-1H	16.68	2,642.04	3,860.92	3,860.92
72		M11-1H	3,000.00	M11-3H	29.74	2,688.17	4,166.14	4,645.90	M11-3H	14.92	2,653.98	4,166.29	4,166.14
73		M11-2H	3,000.00	M11-2H	22.47	2,635.40	3,107.14	3,107.01	M11-2H	20.00	2,629.70	3,107.01	3,107.01
74		M11-3H	3,000.00	M11-3H	-119.84	2,342.96	1,031.81	1,032.19	M11-3H	20.00	2,665.70	1,032.18	1,031.81
75		M11-4H	3,000.00	M11-3H	-23.45	2,565.41	1,651.79	2,089.53	M11-3H	7.99	2,637.97	1,651.79	1,651.79
76		M11-5H	3,000.00	M11-3H	15.87	2,656.17	2,724.20	2,969.91	M11-3H	16.33	2,657.24	2,724.69	2,724.20
77		M11-6H	3,000.00	M11-6H	0.82	2,559.43	2,517.88	2,518.18	M11-6H	20.00	2,603.70	2,518.18	2,517.88
78		M12-1H	3,000.00	M12-1H	29.73	2,654.16	3,549.81	3,546.67	M12-1H	20.00	2,631.70	3,546.65	3,546.65
79		M12-2H	3,000.00	M12-8H	-16.56	2,565.32	1,843.70	2,120.92	M12-8H	12.53	2,632.45	1,843.67	1,843.67
80		M12-3H	3,000.00	M12-8H	-49.05	2,490.34	1,472.11	1,649.00	M12-8H	13.90	2,635.62	1,472.09	1,472.09
81		M12-4H	3,000.00	M12-4H	26.75	2,675.27	3,512.62	3,509.26	M12-4H	20.00	2,659.70	3,509.25	3,509.25
82		M12-5H	3,000.00	M12-5H	15.88	2,619.20	2,832.41	2,832.54	M12-5H	20.00	2,628.70	2,832.54	2,832.41
83		M12-6H	3,000.00	M12-8H	-42.23	2,506.07	1,531.92	1,749.74	M12-8H	12.75	2,632.97	1,531.90	1,531.90
84		M12-7H	3,000.00	M12-8H	-69.68	2,442.73	1,326.45	1,344.23	M12-8H	19.34	2,648.18	1,326.44	1,326.44
85		M12-8H	3,000.00	M12-8H	-96.05	2,381.87	1,190.74	1,190.73	M12-8H	20.00	2,649.70	1,190.73	1,190.73
86		M13-1H	3,000.00	M13-1H	54.20	2,684.62	5,684.40	5,684.66	M13-1H	20.00	2,605.70	5,684.65	5,684.40
87		M13-2H	3,000.00	M13-2H	50.13	2,688.24	5,523.21	5,523.86	M13-2H	20.00	2,618.70	5,523.84	5,523.21
88		M13-3H	3,000.00	M13-3H	23.72	2,613.27	3,134.23	3,134.21	M13-3H	20.00	2,604.70	3,134.20	3,134.20
89		M13-4H	3,000.00	M13-4H	-133.37	2,271.20	1,227.39	1,227.39	M13-4H	20.00	2,625.16	1,227.39	1,227.39
90		M13-5H	3,000.00	M12-8H	10.95	2,628.81	2,557.60	2,961.94	M12-8H	11.79	2,630.75	2,556.20	2,556.20
91		M14-1H	3,000.00	M14-1H	18.94	2,613.72	2,961.34	2,961.34	M14-1H	20.00	2,616.16	2,961.34	2,961.34
92		M14-2H	3,000.00	M14-2H	26.00	2,624.00	3,236.88	3,236.80	M14-2H	20.00	2,610.16	3,236.81	3,236.81
93		M14-3H	3,000.00	M14-3H	22.91	2,623.48	3,115.79	3,115.87	M14-3H	20.00	2,616.76	3,115.88	3,115.79
94		M6-1H	3,000.00	M6-1H	29.83	2,624.39	3,408.05	3,408.17	M6-1H	20.00	2,601.70	3,408.16	3,408.05

High Zone 2 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
95		M7-1H	3,000.00	M7-1H	30.04	2,621.87	3,405.65	3,405.77	M7-1H	20.00	2,598.70	3,405.77	3,405.65
96		M7-2H	3,000.00	M7-2H	9.15	2,588.65	2,652.02	2,652.04	M7-2H	20.00	2,613.70	2,652.03	2,652.02
97		M8-1H	3,000.00	M8-1H	-18.89	2,537.96	2,026.05	2,026.05	M8-1H	20.00	2,627.70	2,026.05	2,026.05
98		M8-2H	3,000.00	M8-2H	31.77	2,665.31	3,839.30	3,839.44	M8-2H	20.00	2,638.16	3,839.42	3,839.30
99		M8-3H	3,000.00	M8-3H	31.11	2,664.29	3,779.49	3,779.58	M8-3H	20.00	2,638.66	3,779.57	3,779.49
100		M8-4H	3,000.00	O10-1H	30.19	2,697.21	4,695.83	4,855.67	O10-1H	18.95	2,671.27	4,695.90	4,695.83
101		M8-5H	3,000.00	M8-5H	36.97	2,678.31	4,564.37	4,566.44	M8-5H	20.00	2,639.16	4,566.43	4,564.37
102		M9-1H	3,000.00	M9-1H	17.72	2,644.44	2,869.11	2,869.16	M9-1H	20.00	2,649.70	2,869.15	2,869.11
103		N10-1H	3,000.00	N10-1H	-36.10	2,534.24	1,541.79	1,542.76	N10-1H	20.00	2,663.70	1,542.76	1,541.79
104		N11-1H	3,000.00	N11-1H	18.95	2,667.27	2,923.24	2,923.05	N11-1H	20.00	2,669.70	2,923.04	2,923.04
105		N11-2H	3,000.00	M11-3H	-35.28	2,538.12	1,526.66	1,538.97	M11-3H	19.66	2,664.91	1,526.66	1,526.66
106		N11-3H	3,000.00	M11-3H	-29.28	2,551.96	1,585.49	1,868.19	M11-3H	12.05	2,647.34	1,585.50	1,585.49
107		N12-1H	3,000.00	N11-1H	35.48	2,705.43	5,421.53	5,772.56	N11-1H	16.32	2,661.21	5,422.43	5,421.53
108		N13-1H	3,000.00	N11-1H	41.38	2,719.05	6,128.12	6,655.88	N11-1H	14.61	2,657.26	6,130.02	6,128.12
109		N13-2H	3,000.00	N13-2H	41.95	2,692.35	5,030.71	5,031.88	N13-2H	20.00	2,641.70	5,031.88	5,030.71
110		N13-3H	3,000.00	N13-3H	48.06	2,657.45	4,386.80	4,386.82	N13-3H	20.00	2,592.70	4,386.83	4,386.80
111		N14-1H	3,000.00	N14-1H	56.34	2,678.57	5,342.07	5,342.41	N14-1H	20.00	2,594.70	5,342.41	5,342.07
112		N14-2H	3,000.00	N14-2H	2.93	2,564.31	2,532.75	2,531.00	N14-2H	20.00	2,603.70	2,531.01	2,531.01
113		N14-3H	3,000.00	O12-1H	45.72	2,685.05	5,084.58	5,181.54	O12-1H	18.43	2,622.09	5,085.03	5,084.58
114		N15-1H	3,000.00	N15-1H	-83.95	2,364.80	1,602.29	1,602.30	N15-1H	20.00	2,604.70	1,602.30	1,602.29
115		N15-2H	3,000.00	N15-2H	12.51	2,585.42	2,771.96	2,771.30	N15-2H	20.00	2,602.70	2,771.31	2,771.31
116		N15-3H	3,000.00	N15-3H	-26.34	2,495.76	2,072.74	2,072.72	N15-3H	20.00	2,602.70	2,072.72	2,072.72
117		O10-1H	3,000.00	O10-1H	-102.07	2,391.97	956.65	956.66	O10-1H	20.00	2,673.70	956.67	956.65
118		O12-1H	3,000.00	O12-1H	3.74	2,588.16	2,458.64	2,458.43	O12-1H	20.00	2,625.70	2,458.43	2,458.43
119		O13-1H	3,000.00	O12-1H	42.70	2,678.10	4,664.37	5,452.45	O12-1H	5.34	2,591.86	4,664.60	4,664.37
120		O13-2H	3,000.00	O12-1H	42.70	2,678.10	4,664.36	5,386.36	O12-1H	6.66	2,594.92	4,664.59	4,664.36
121		O8-1H	3,000.00	O8-1H	-125.19	2,332.08	946.24	946.24	O8-1H	20.00	2,667.16	946.25	946.24
122		O9-1H	3,000.00	O9-1H	-123.01	2,343.10	885.57	885.57	O9-1H	20.00	2,673.16	885.58	885.57
123		P13-1H	3,000.00	O12-1H	40.01	2,671.88	4,368.91	5,553.35	O12-1H	-4.39	2,569.42	4,369.18	4,368.91
124		P13-2H	3,000.00	O12-1H	40.96	2,674.08	4,492.91	5,263.05	O12-1H	5.13	2,591.38	4,493.34	4,492.91
125		P6-1H	3,000.00	P6-1H	-19.18	2,525.27	2,119.96	2,120.41	P6-1H	20.00	2,615.70	2,120.41	2,119.96
126		P6-2H	3,000.00	P6-2H	-135.19	2,280.55	1,184.33	1,184.13	P6-2H	20.00	2,638.70	1,184.13	1,184.13
127		Q10-1H	3,000.00	Q10-1H	37.78	2,579.19	3,473.39	3,472.75	Q10-1H	20.00	2,538.16	3,472.75	3,472.75
128		Q10-2H	3,000.00	Q10-2H	-13.44	2,463.51	2,448.83	2,449.74	Q10-2H	20.00	2,540.70	2,449.75	2,448.83
129		Q10-3H	3,000.00	Q10-3H	31.88	2,562.12	3,287.30	3,287.24	Q10-3H	20.00	2,534.70	3,287.24	3,287.24
130		Q11-1H	3,000.00	P6-2H	35.26	2,673.90	4,262.31	4,621.97	P6-2H	14.50	2,626.00	4,262.40	4,262.31
131		R7-1H	3,000.00	R7-1H	13.68	2,549.11	2,848.76	2,848.59	R7-1H	20.00	2,563.70	2,848.60	2,848.60
132		R9-1H	3,000.00	R9-1H	9.34	2,521.08	2,780.84	2,780.60	R9-1H	20.00	2,545.70	2,780.61	2,780.61

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-571.85	1.62	1.44	1.23	Open
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.49	0.23	0.00	0.04	Open
4		P-100	J-239	J-238	960.70	8.00	110.00	-28.94	0.18	0.03	0.04	Open
5		P-101	J-245	J-238	149.26	8.00	110.00	34.06	0.22	0.01	0.05	Open
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7		P-103	J-233	J-158	215.33	8.00	110.00	103.24	0.66	0.08	0.37	Open
8		P-104	J-255	J-122	328.78	8.00	110.00	-14.53	0.09	0.00	0.01	Open
9		P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10		P-106	J-157	J-170	353.94	8.00	110.00	87.88	0.56	0.10	0.28	Open
11		P-108	J-168	J72	163.38	8.00	110.00	8.06	0.05	0.00	0.00	Open
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13		P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14		P-113	J76	J-244	237.08	8.00	110.00	11.71	0.07	0.00	0.01	Open
15		P-114	J-244	J-131	21.10	12.00	110.00	6.59	0.02	0.00	0.00	Open
16		P-115	J-131	J-255	34.41	8.00	110.00	-3.65	0.02	0.00	0.00	Open
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18		P-117	J-168	J74	63.55	12.00	110.00	-13.19	0.04	0.00	0.00	Open
19		P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20		P-119	J-201	J-170	17.29	12.00	110.00	-21.97	0.06	0.00	0.00	Open
21		P-12	J-114	J-115	298.01	10.00	110.00	173.23	0.71	0.10	0.33	Open
22		P-120	J-241	J-201	61.98	6.00	110.00	-11.73	0.13	0.00	0.03	Open
23		P-121	J-158	J-157	92.45	8.00	110.00	98.12	0.63	0.03	0.34	Open
24		P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26		P-124	J-236	J42	42.81	8.00	110.00	-1,075.91	6.87	1.22	28.50	Open
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28		P-127	J-211	J-181	330.78	8.00	110.00	-655.13	4.18	3.76	11.37	Open
29		P-128	J-212	J-190	143.39	12.00	110.00	-201.07	0.57	0.03	0.18	Open
30		P-129	J-231	J-150	227.08	8.00	110.00	-221.28	1.41	0.35	1.52	Open
31		P-130	J-141	J-205	202.64	8.00	110.00	143.44	0.92	0.14	0.68	Open
32		P-131	J-115	J-205	245.54	8.00	110.00	151.54	0.97	0.19	0.76	Open
33		P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34		P-133	J-153	J-152	97.97	12.00	110.00	199.70	0.57	0.02	0.17	Open
35		P-134	J-192	J-191	110.45	8.00	110.00	179.21	1.14	0.11	1.03	Open
36		P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.97	1.08	0.02	0.92	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.34	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.58	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-326.76	1.33	0.25	1.06	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	160.24	1.02	0.11	0.84	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-340.42	0.97	0.09	0.47	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-335.30	0.95	0.10	0.46	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-205.92	1.31	0.23	1.33	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-195.68	1.25	0.03	1.21	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-211.04	1.35	0.08	1.39	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	147.36	0.94	0.10	0.72	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	178.35	1.14	0.15	1.02	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	268.00	1.71	0.74	2.17	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	73.08	0.47	0.06	0.20	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-152.48	0.97	0.11	0.76	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-84.52	0.54	0.04	0.26	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	185.85	1.19	0.02	1.11	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-444.56	1.82	0.45	1.87	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-464.16	2.96	1.32	6.01	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	165.36	1.06	0.09	0.89	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-180.72	1.15	0.02	1.04	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	148.56	0.95	0.01	0.73	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-606.39	2.48	2.20	3.32	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	289.86	1.85	0.56	2.51	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	136.22	0.87	0.02	0.63	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-313.45	2.00	0.14	2.91	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,646.75	4.67	2.97	8.70	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.01	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-321.64	1.31	0.29	1.03	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-328.81	2.10	0.15	3.18	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,287.22	3.65	0.14	5.52	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-344.17	2.20	0.49	3.45	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,636.51	4.64	0.45	8.60	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-323.69	2.07	0.61	3.08	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.69	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-236.64	1.51	0.04	1.72	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-226.40	1.45	0.01	1.60	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-670.49	4.28	0.26	11.87	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	665.37	4.25	1.56	11.70	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	12.00	110.00	178.55	0.51	0.16	0.14	Open
100		P-196	J28	J26	390.87	12.00	110.00	14.70	0.04	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	173.43	1.11	0.02	0.97	Open
102		P-198	J-249	J-254	108.97	12.00	110.00	142.71	0.40	0.01	0.09	Open
103		P-199	J-254	J-177	467.39	12.00	110.00	137.59	0.39	0.04	0.09	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-454.80	1.86	0.25	1.95	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	12.00	110.00	-32.00	0.09	0.00	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	96.63	0.39	0.00	0.10	Open
110		P-205	J-206	J-207	208.07	12.00	110.00	39.77	0.11	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-73.90	0.47	0.19	0.20	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	-10.90	0.03	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	-0.66	0.00	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	575.66	2.35	1.68	3.02	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	-5.78	0.02	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-536.32	1.52	0.05	1.09	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.02	Open
122		P-216	J-293	J-294	1,100.07	12.00	110.00	403.19	1.14	0.71	0.64	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	12.00	110.00	382.71	1.09	0.41	0.58	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	312.97	1.28	0.24	0.98	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	12.00	110.00	398.07	1.13	0.03	0.62	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.01	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	12.00	110.00	362.23	1.03	0.55	0.53	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	257.57	1.05	0.09	0.68	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	16.73	0.19	0.03	0.05	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	6.49	0.07	0.00	0.01	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	12.00	110.00	15.36	0.04	0.00	0.00	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-286.00	1.17	0.56	0.83	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-339.08	3.85	5.64	13.64	Open
146		P-242	J-230	N13-2H	414.06	12.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	141.34	0.90	0.50	0.66	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.01	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-369.80	4.20	0.91	16.01	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	364.68	4.14	6.85	15.60	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.77	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-344.20	3.91	1.99	14.02	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	453.92	2.90	0.11	5.76	Open
159		P-253	J-342	J-277	166.27	12.00	110.00	10.24	0.03	0.00	0.00	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	12.00	110.00	-65.92	0.19	0.02	0.02	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	22.52	0.26	0.07	0.09	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	17.40	0.20	0.01	0.06	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	362.88	1.03	0.39	0.53	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	433.92	1.23	0.32	0.74	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	454.40	1.29	0.11	0.80	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-44.31	0.50	0.11	0.31	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.00	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	59.67	0.68	0.02	0.55	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	341.74	2.18	4.30	3.41	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-64.79	0.74	0.13	0.64	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-190.83	0.54	0.01	0.16	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.61	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	8.00	110.00	5.76	0.04	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-311.44	1.99	4.60	2.87	Open
186		P-281	J-273	J-318	140.95	6.00	110.00	-4.48	0.05	0.00	0.00	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.01	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.24	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.48	0.23	0.02	0.08	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.01	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.01	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	18.28	0.12	0.02	0.02	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.25	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.37	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.61	0.69	0.00	0.57	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	139.76	1.59	1.36	2.64	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-125.36	0.36	0.03	0.07	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.48	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-195.95	0.56	0.05	0.17	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-154.98	1.76	0.24	3.20	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-149.86	1.70	0.21	3.01	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	144.88	1.64	0.18	2.82	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-150.00	1.70	0.06	3.01	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.00	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.25	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-163.93	1.86	0.04	3.56	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.13	0.06	0.00	0.00	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-51.86	0.33	0.03	0.10	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.01	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	12.00	110.00	25.60	0.07	0.00	0.00	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.07	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.01	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-21.14	0.06	0.00	0.00	Open
237		P-330	J-266	J-313	206.46	12.00	110.00	-0.74	0.00	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	12.00	110.00	-26.88	0.08	0.00	0.00	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	12.00	110.00	9.50	0.03	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	12.00	110.00	4.38	0.01	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	75.27	0.48	0.01	0.21	Open
248		P-340	J-287	J-206	239.33	12.00	110.00	54.38	0.15	0.00	0.02	Open
249		P-341	J-178	J-287	70.36	12.00	110.00	59.51	0.17	0.00	0.02	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.72	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.84	0.41	0.01	0.21	Open

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	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253	P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.00	Open
254	P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255	P-347	J-111	J-284	43.43	6.00	110.00	21.85	0.25	0.00	0.08	Open
256	P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257	P-349	J-265	J-264	236.64	12.00	110.00	-10.24	0.03	0.00	0.00	Open
258	P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259	P-350	J-265	J-265A	252.43	12.00	110.00	5.12	0.01	0.00	0.00	Open
260	P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261	P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262	P-353	J-281	J-282	60.97	6.00	110.00	-40.13	0.46	0.02	0.26	Open
263	P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264	P-355	J-123	J50	205.02	6.00	110.00	-29.89	0.34	0.03	0.15	Open
265	P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266	P-357	J-285	J-306	386.52	6.00	110.00	11.61	0.13	0.01	0.03	Open
267	P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268	P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269	P-361	J-295	J-295A	196.76	12.00	110.00	435.69	1.24	0.15	0.74	Open
270	P-361A	J-295A	J-239	291.39	12.00	110.00	430.57	1.22	0.21	0.72	Open
271	P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272	P-363	J-336	J-345	166.85	10.00	110.00	367.35	1.50	0.22	1.31	Open
273	P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274	P-369	J-278	J-295	165.68	12.00	110.00	440.81	1.25	0.13	0.76	Open
275	P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276	P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277	P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.00	Open
278	P-371	J-358	J64	110.10	8.00	110.00	-1,065.67	6.80	3.08	28.00	Open
279	P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280	P-374	J-350	J-153	30.43	12.00	110.00	-130.48	0.37	0.00	0.08	Open
281	P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282	P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283	P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284	P-378J	J-378	J-299	400.51	6.00	110.00	-165.22	1.87	1.44	3.60	Open
285	P-379	J-119	J-359	917.88	8.00	110.00	73.23	0.47	0.18	0.20	Open
286	P-38	J-183	J-186	1,090.53	8.00	110.00	338.66	2.16	3.65	3.35	Open
287	P-380	J-119	J-359	917.88	8.00	110.00	73.23	0.47	0.18	0.20	Open
288	P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	246.25	1.57	0.56	1.86	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	241.13	1.54	0.19	1.79	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	12.00	110.00	408.31	1.16	0.80	0.66	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	351.82	2.25	2.30	3.60	Open
301		P-390	J-315	J46	657.48	12.00	110.00	357.75	1.01	0.34	0.51	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-2.04	0.02	0.00	0.00	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-7.16	0.08	0.00	0.01	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-12.28	0.08	0.01	0.01	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	346.86	2.21	1.73	3.50	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	445.93	1.27	0.06	0.78	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-531.20	1.51	0.41	1.07	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	351.99	2.25	7.32	3.60	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	680.73	4.34	0.83	12.21	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.57	0.42	0.01	0.16	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	891.33	5.69	7.69	20.11	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	261.61	1.67	1.14	2.08	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.24	0.07	0.00	0.01	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,662.11	4.72	4.89	8.85	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.08	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.20	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.33	0.36	0.00	0.14	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.84	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.84	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.01	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,249.64	6.38	7.68	15.50	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,667.23	4.73	0.13	8.89	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,708.20	4.85	1.35	9.31	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,703.08	4.83	3.46	9.26	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,254.76	6.40	3.63	15.57	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-266.73	1.70	0.19	2.15	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-331.89	1.36	0.26	1.09	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,111.98	7.10	8.63	30.30	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	701.22	4.48	6.18	12.90	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	696.10	4.44	1.81	12.72	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.72	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.02	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-405.64	2.59	1.30	4.68	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363		P-9	J-113	J-104	183.55	10.00	110.00	-347.25	1.42	0.22	1.18	Open
364		P-90	J-133	J-134	116.30	8.00	110.00	225.77	1.44	0.18	1.58	Open
365		P-93	J-209	J-247	44.60	8.00	110.00	-256.49	1.64	0.09	2.00	Open
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367		P-95	J-221	J-162	263.63	8.00	110.00	359.56	2.30	0.99	3.74	Open
368		P-96	J-163	J-162	264.20	8.00	110.00	-354.44	2.26	0.96	3.65	Open
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370		P-98	J-172	J-163	39.90	8.00	110.00	-349.32	2.23	0.14	3.55	Open
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,060.55	6.77	2.34	27.75	Open
373		P-J106	J-252	J-106	417.04	8.00	110.00	180.81	1.15	0.44	1.05	Open
374		P-J286	J-363	J-286	10.63	6.00	110.00	80.15	0.91	0.01	0.96	Open
375		P-J335	J-335	J-286	287.42	6.00	110.00	-75.03	0.85	0.24	0.83	Open
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.00	Open
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,423.07	21.85	11.49	243.08	Open
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,423.07	21.85	17.94	243.08	Open
393		P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,526.62	7.17	5.33	19.22	Open
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395		P126	J-242	J-376	11.13	8.00	110.00	459.04	2.93	0.07	5.88	Open
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397	P128	J-344	J-393	9.32	12.00	110.00	-115.12	0.33	0.00	0.05	Open
398	P130	J10	J14	116.51	10.00	110.00	280.88	1.15	0.09	0.80	Open
399	P132	J14	M8-2H	217.35	8.00	110.00	80.74	0.52	0.05	0.24	Open
400	P134	M8-2H	M8-3H	242.94	8.00	110.00	80.74	0.52	0.06	0.24	Open
401	P136	M8-3H	J16	275.97	8.00	110.00	80.74	0.52	0.06	0.24	Open
402	P138	J16	J12	16.19	10.00	110.00	270.64	1.11	0.01	0.75	Open
403	P140	J16	M8-4H	42.30	10.00	110.00	-195.03	0.80	0.02	0.40	Open
404	P142	M8-4H	M8-5H	267.68	10.00	110.00	-195.03	0.80	0.11	0.41	Open
405	P144	M8-5H	J14	116.30	10.00	110.00	-195.03	0.80	0.05	0.41	Open
406	P146	J12	J-102	126.72	10.00	110.00	265.52	1.08	0.09	0.72	Open
407	P148	J20	J22	6.79	12.00	110.00	-31.38	0.09	0.00	0.00	Open
408	P150	J22	J-161	73.04	8.00	110.00	-36.50	0.23	0.00	0.05	Open
409	P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.01	Open
410	P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.00	Open
411	P156	J32	J40	349.41	12.00	110.00	10.77	0.03	0.00	0.00	Open
412	P158	J30	J28	652.66	12.00	110.00	24.94	0.07	0.00	0.00	Open
413	P160	J-313	J32	17.72	6.00	110.00	21.01	0.24	0.00	0.07	Open
414	P162	J30	J-207	49.17	12.00	110.00	-15.78	0.04	0.00	0.00	Open
415	P164	J30	J36	31.14	12.00	110.00	-13.74	0.04	0.00	0.00	Open
416	P166	J36	J-207	18.03	12.00	110.00	-18.86	0.05	0.00	0.00	Open
417	P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418	P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419	P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420	P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421	P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422	P178	J44	J-236	15.32	8.00	110.00	-1,070.79	6.83	0.43	28.26	Open
423	P180	J42	J-190	51.62	8.00	110.00	-1,081.03	6.90	1.48	28.75	Open
424	P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425	P184	J48	J46	1,260.92	6.00	110.00	60.80	0.69	0.71	0.57	Open
426	P186	J46	J-366	444.59	12.00	110.00	413.43	1.17	0.30	0.67	Open
427	P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428	P190	J40	J38	318.75	12.00	110.00	5.65	0.02	0.00	0.00	Open
429	P192	J38	J30	286.67	12.00	110.00	0.53	0.00	0.00	0.00	Open
430	P194	J50	J-281	85.58	6.00	110.00	-35.01	0.40	0.02	0.21	Open
431	P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432	P198	J52	J54	266.38	8.00	110.00	20.49	0.13	0.00	0.02	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.43	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.31	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.00	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,677.47	4.76	0.31	9.00	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,065.67	6.80	8.25	28.00	Open
445		P224	J-344	J-106	395.17	12.00	110.00	249.76	0.71	0.10	0.26	Open
446		P226	J-106	J-104	393.05	12.00	110.00	425.44	1.21	0.28	0.71	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.85	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.71	0.04	0.00	0.01	Open
449		P232	J74	J-241	28.57	12.00	110.00	-1.49	0.00	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	14.87	0.04	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	29.14	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-22.51	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-11.70	0.03	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-34.21	0.10	0.00	0.01	Open
456		P246	J78	J84	490.51	12.00	110.00	14.87	0.04	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	1.36	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	6.63	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	6.63	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	8.24	0.09	0.00	0.02	Open
461		P256	J78	J76	5.94	12.00	110.00	-49.08	0.14	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	60.79	0.39	0.00	0.14	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.00	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.01	Open

High Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-918.55	5.86	3.91	21.26	Open

High Zone 3 hr 2020 MDD FF with Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP5	2,205.70	131.22	225.28	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP6	2,134.00	27.97	251.39	0.00	0.00	Closed	0.00	0.00	0.00
3	PUMP8	1,956.00	-0.49	348.10	3,442.17	804.49	Open	1.00	32.43	0.00
4	TRANSF	2,629.54	7.57	32.00	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 3 hr 2020 MDD FF with ImprovementsTank Report

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	1,036.81	2,691.54	2,701.15	48.05	9.61
2	FAIRWAYTANK	961.39	2,679.54	2,701.15	67.53	21.61
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		J-M12-6H	3,000.00	M12-8H	-44.39	2,501.09	1,458.06	1,745.97	M12-8H	10.66	2,628.15	1,458.05	1,458.05
2		J12-5H	3,000.00	J12-5H	-187.17	2,124.59	1,149.33	1,150.36	J12-5H	20.00	2,602.70	1,150.36	1,149.33
3		J12-6H	3,000.00	J12-6H	-218.93	2,043.73	1,115.24	1,116.03	J12-6H	20.00	2,595.16	1,116.03	1,115.24
4		J12-8H	3,000.00	J12-8H	-252.83	1,968.51	1,036.53	1,037.26	J12-8H	20.00	2,598.16	1,037.26	1,036.53
5		J13-1H	3,000.00	J13-4H	-13.08	2,549.35	2,041.26	2,346.04	J13-4H	10.43	2,603.62	2,041.25	2,041.25
6		J13-2H	3,000.00	J13-2H	-46.71	2,465.74	1,687.04	1,687.05	J13-2H	20.00	2,619.70	1,687.03	1,687.03
7		J13-3H	3,000.00	J13-3H	-88.38	2,361.58	1,453.63	1,453.64	J13-3H	20.00	2,611.70	1,453.62	1,453.62
8		J13-4H	3,000.00	J13-4H	-14.94	2,545.06	2,011.36	2,011.35	J13-4H	20.00	2,625.70	2,011.35	2,011.35
9		J13-5H	3,000.00	J13-5H	-15.66	2,543.40	2,000.36	2,000.36	J13-5H	20.00	2,625.70	2,000.36	2,000.36
10		J13-6H	3,000.00	J13-4H	-11.55	2,552.88	2,067.03	2,188.74	J13-4H	16.34	2,617.26	2,067.02	2,067.02
11		J14-1H	3,000.00	J13-4H	-7.36	2,562.56	2,142.59	2,423.20	J13-4H	11.74	2,606.62	2,142.57	2,142.57
12		J7-1H	3,000.00	K7-7H	25.27	2,642.86	3,311.21	4,169.57	K7-7H	3.76	2,593.21	3,311.35	3,311.21
13		J7-2H	3,000.00	K7-7H	25.12	2,642.51	3,301.05	3,536.39	K7-7H	15.77	2,620.93	3,301.18	3,301.05
14		K10-2H	3,000.00	M9-1H	32.64	2,678.86	4,512.53	4,948.48	M9-1H	15.27	2,638.78	4,512.63	4,512.53
15		K12-1H	3,000.00	K12-1H	-84.67	2,329.60	1,718.95	1,719.38	K12-1H	20.00	2,571.16	1,719.38	1,718.95
16		K13-1H	3,000.00	K13-1H	46.35	2,645.98	4,270.24	4,269.40	K13-1H	20.00	2,585.16	4,269.39	4,269.39
17		K13-2H	3,000.00	K13-2H	21.22	2,645.51	3,077.54	3,077.52	K13-2H	20.00	2,642.70	3,077.49	3,077.49
18		K13-3H	3,000.00	K13-3H	-23.40	2,533.53	1,838.23	1,838.22	K13-3H	20.00	2,633.70	1,838.22	1,838.22
19		K13-4H	3,000.00	K13-4H	-7.45	2,582.81	1,980.11	1,980.09	K13-4H	20.00	2,646.16	1,980.08	1,980.08
20		K14-1H	3,000.00	K14-1H	-28.64	2,494.44	1,960.85	1,960.86	K14-1H	20.00	2,606.70	1,960.84	1,960.84
21		K14-6H	3,000.00	K14-6H	-173.18	2,131.32	1,320.56	1,321.03	K14-6H	20.00	2,577.16	1,321.03	1,320.56
22		K7-1H	3,000.00	K7-7H	25.07	2,642.40	3,297.69	3,446.17	K7-7H	17.35	2,624.58	3,297.82	3,297.69
23		K7-2H	3,000.00	K7-7H	25.42	2,643.20	3,321.36	3,835.20	K7-7H	10.59	2,608.97	3,321.51	3,321.36
24		K7-3H	3,000.00	K7-3H	-19.22	2,499.18	2,191.20	2,191.23	K7-3H	20.00	2,589.70	2,191.23	2,191.20
25		K7-4H	3,000.00	K7-7H	28.93	2,651.30	3,592.72	4,721.09	K7-7H	0.24	2,585.09	3,593.47	3,592.72
26		K7-5H	3,000.00	K7-5H	-1.72	2,531.56	2,492.33	2,492.35	K7-5H	20.00	2,581.70	2,492.35	2,492.33
27		K7-6H	3,000.00	K7-6H	23.39	2,628.51	3,164.55	3,164.62	K7-6H	20.00	2,620.70	3,164.58	3,164.55
28		K7-7H	3,000.00	K7-7H	24.01	2,639.94	3,227.94	3,228.06	K7-7H	20.00	2,630.70	3,228.02	3,227.94
29		K7-8H	3,000.00	K7-8H	-22.80	2,467.91	2,235.55	2,235.60	K7-8H	20.00	2,566.70	2,235.60	2,235.55
30		K7-9H	3,000.00	K7-9H	-51.68	2,408.27	1,926.53	1,926.53	K7-9H	20.00	2,573.70	1,926.53	1,926.53
31		K8-1H	3,000.00	K8-1H	-55.46	2,381.54	1,968.43	1,968.46	K8-1H	20.00	2,555.70	1,968.46	1,968.43
32		K8-2H	3,000.00	K7-7H	27.79	2,648.68	3,498.14	4,245.86	K7-7H	6.97	2,600.63	3,498.62	3,498.14
33		L10-1H	3,000.00	M9-1H	32.89	2,679.45	4,560.73	4,754.53	M9-1H	17.97	2,645.01	4,560.82	4,560.73
34		L10-2H	3,000.00	L10-2H	43.35	2,656.60	4,469.21	4,469.25	L10-2H	20.00	2,602.70	4,469.23	4,469.21
35		L10-4H	3,000.00	L10-8H	-107.83	2,306.67	1,451.55	1,476.81	L10-8H	18.54	2,598.33	1,451.67	1,451.55
36		L10-5H	3,000.00	L10-8H	-53.44	2,432.21	1,777.96	1,845.27	L10-8H	16.79	2,594.28	1,778.46	1,777.96
37		L10-6H	3,000.00	M9-1H	31.26	2,675.69	4,272.67	4,922.78	M9-1H	12.46	2,632.29	4,272.76	4,272.67
38		L10-7H	3,000.00	M9-1H	32.14	2,677.72	4,425.18	4,809.33	M9-1H	15.79	2,639.99	4,425.27	4,425.18
39		L10-8H	3,000.00	L10-8H	-228.46	2,028.29	1,090.63	1,090.49	L10-8H	20.00	2,601.70	1,090.49	1,090.49
40		L11-1H	3,000.00	K13-4H	34.12	2,678.74	4,580.69	4,766.19	K13-4H	17.88	2,641.27	4,580.88	4,580.69
41		L11-2H	3,000.00	K13-4H	33.75	2,677.90	4,500.36	5,419.48	K13-4H	8.53	2,619.68	4,500.51	4,500.36
42		L11-3H	3,000.00	K13-4H	34.07	2,678.63	4,567.83	5,148.56	K13-4H	13.05	2,630.12	4,568.03	4,567.83
43		L11-4H	3,000.00	L11-4H	-137.12	2,220.54	1,447.10	1,447.25	L11-4H	20.00	2,583.16	1,447.25	1,447.10
44		L11-5H	3,000.00	L11-5H	-25.71	2,502.67	2,060.25	2,058.98	L11-5H	20.00	2,608.16	2,059.00	2,059.00
45		L11-6H	3,000.00	L11-6H	47.54	2,648.72	4,465.77	4,462.41	L11-6H	20.00	2,585.16	4,462.39	4,462.39
46		L12-3H	3,000.00	M12-5H	31.95	2,656.28	3,745.59	3,851.10	M12-5H	18.04	2,624.18	3,745.62	3,745.59
47		L12-4H	3,000.00	K13-4H	32.22	2,674.36	4,217.75	5,389.65	K13-4H	4.13	2,609.52	4,217.81	4,217.75
48		L12-6H	3,000.00	L12-6H	36.43	2,644.61	3,879.29	3,877.78	L12-6H	20.00	2,606.70	3,877.78	3,877.78
49		L12-7H	3,000.00	L12-7H	43.57	2,656.10	4,436.77	4,436.84	L12-7H	20.00	2,601.70	4,436.82	4,436.77
50		L12-8H	3,000.00	L12-8H	24.95	2,623.13	3,218.41	3,218.22	L12-8H	20.00	2,611.70	3,218.21	3,218.21
51		L13-10H	3,000.00	L13-10H	34.02	2,614.52	3,507.39	3,507.15	L13-10H	20.00	2,582.16	3,507.14	3,507.14

High Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
52		L13-11H	3,000.00	M12-8H	41.07	2,698.32	6,637.50	6,914.03	M12-8H	17.71	2,644.40	6,637.24	6,637.24
53		L13-12H	3,000.00	L13-12H	46.36	2,662.00	4,627.91	4,626.83	L13-12H	20.00	2,601.16	4,626.84	4,626.84
54		L13-1H	3,000.00	K13-4H	31.03	2,671.61	4,029.32	4,907.98	K13-4H	7.83	2,618.06	4,029.36	4,029.32
55		L13-2H	3,000.00	K13-4H	29.68	2,668.49	3,856.72	5,069.06	K13-4H	1.91	2,604.42	3,856.74	3,856.72
56		L13-3H	3,000.00	M12-8H	32.39	2,678.29	4,250.98	4,464.65	M12-8H	17.40	2,643.70	4,251.02	4,250.98
57		L13-4H	3,000.00	M12-8H	27.19	2,666.28	3,580.98	4,171.31	M12-8H	11.25	2,629.50	3,579.26	3,579.26
58		L13-5H	3,000.00	M12-8H	32.88	2,679.43	4,311.65	5,368.67	M12-8H	6.58	2,618.72	4,311.65	4,311.65
59		L13-6H	3,000.00	K13-4H	31.66	2,673.06	4,110.60	4,218.48	K13-4H	18.65	2,643.04	4,110.62	4,110.60
60		L13-7H	3,000.00	M12-8H	38.95	2,693.43	5,775.45	6,610.44	M12-8H	11.72	2,630.58	5,775.35	5,775.35
61		L13-8H	3,000.00	L13-8H	55.74	2,676.18	5,682.84	5,682.87	L13-8H	20.00	2,593.70	5,682.84	5,682.84
62		L13-9H	3,000.00	L13-9H	36.11	2,644.88	3,844.95	3,843.49	L13-9H	20.00	2,607.70	3,843.48	3,843.48
63		L14-2H	3,000.00	L14-2H	-41.22	2,456.86	1,913.27	1,911.98	L14-2H	20.00	2,598.16	1,911.99	1,911.99
64		L14-3H	3,000.00	L14-3H	-15.91	2,528.28	2,138.47	2,136.67	L14-3H	20.00	2,611.16	2,136.68	2,136.68
65		L7-1H	3,000.00	K7-7H	28.27	2,649.79	3,537.20	3,794.86	K7-7H	15.74	2,620.87	3,537.78	3,537.20
66		L7-2H	3,000.00	L7-2H	23.24	2,607.18	3,123.12	3,123.16	L7-2H	20.00	2,599.70	3,123.17	3,123.12
67		L7-3H	3,000.00	K7-7H	26.93	2,646.68	3,430.33	3,485.01	K7-7H	19.08	2,628.58	3,430.65	3,430.33
68		L7-4H	3,000.00	L7-4H	24.75	2,612.67	3,189.83	3,189.89	L7-4H	20.00	2,601.70	3,189.86	3,189.83
69		L7-5H	3,000.00	L7-5H	18.56	2,613.38	2,942.58	2,940.26	L7-5H	20.00	2,616.70	2,940.23	2,940.23
70		L8-1H	3,000.00	L8-1H	32.40	2,640.32	3,657.06	3,657.41	L8-1H	20.00	2,611.70	3,657.41	3,657.06
71		L9-1H	3,000.00	M9-1H	27.27	2,666.47	3,670.57	3,971.51	M9-1H	16.41	2,641.41	3,670.54	3,670.54
72		M11-1H	3,000.00	M11-3H	27.49	2,682.99	3,929.58	4,534.40	M11-3H	13.87	2,651.54	3,929.67	3,929.58
73		M11-2H	3,000.00	M11-2H	20.38	2,630.58	3,016.69	3,016.69	M11-2H	20.00	2,629.70	3,016.69	3,016.69
74		M11-3H	3,000.00	M11-3H	-122.15	2,337.63	968.34	968.73	M11-3H	20.00	2,665.70	968.73	968.34
75		M11-4H	3,000.00	M11-3H	-25.76	2,560.09	1,550.14	2,020.28	M11-3H	7.61	2,637.10	1,550.13	1,550.13
76		M11-5H	3,000.00	M11-3H	13.59	2,650.91	2,557.88	2,894.73	M11-3H	15.18	2,654.57	2,558.75	2,557.88
77		M11-6H	3,000.00	M11-6H	-1.31	2,554.51	2,456.24	2,456.49	M11-6H	20.00	2,603.70	2,456.49	2,456.24
78		M12-1H	3,000.00	M12-1H	27.61	2,649.26	3,437.45	3,435.31	M12-1H	20.00	2,631.70	3,435.29	3,435.29
79		M12-2H	3,000.00	M12-8H	-18.72	2,560.34	1,756.46	2,045.31	M12-8H	12.50	2,632.40	1,756.43	1,756.43
80		M12-3H	3,000.00	M12-8H	-51.21	2,485.35	1,400.82	1,595.95	M12-8H	13.52	2,634.75	1,400.80	1,400.80
81		M12-4H	3,000.00	M12-4H	24.65	2,670.43	3,359.15	3,357.36	M12-4H	20.00	2,659.70	3,357.36	3,357.36
82		M12-5H	3,000.00	M12-5H	13.74	2,614.25	2,738.56	2,738.65	M12-5H	20.00	2,628.70	2,738.65	2,738.56
83		M12-6H	3,000.00	M12-8H	-44.39	2,501.09	1,458.07	1,688.63	M12-8H	12.62	2,632.66	1,458.05	1,458.05
84		M12-7H	3,000.00	M12-8H	-71.84	2,437.74	1,261.48	1,280.59	M12-8H	19.32	2,648.14	1,261.46	1,261.46
85		M12-8H	3,000.00	M12-8H	-98.21	2,376.88	1,132.76	1,132.72	M12-8H	20.00	2,649.70	1,132.72	1,132.72
86		M13-1H	3,000.00	M13-1H	52.00	2,679.55	5,554.82	5,554.86	M13-1H	20.00	2,605.70	5,554.87	5,554.82
87		M13-2H	3,000.00	M13-2H	47.90	2,683.09	5,389.55	5,390.29	M13-2H	20.00	2,618.70	5,390.29	5,389.55
88		M13-3H	3,000.00	M13-3H	21.54	2,608.26	3,056.43	3,056.44	M13-3H	20.00	2,604.70	3,056.43	3,056.43
89		M13-4H	3,000.00	M13-4H	-135.53	2,266.22	1,184.85	1,184.85	M13-4H	20.00	2,625.16	1,184.85	1,184.85
90		M13-5H	3,000.00	M12-8H	8.79	2,623.83	2,441.03	2,863.21	M12-8H	11.76	2,630.68	2,438.70	2,438.70
91		M14-1H	3,000.00	M14-1H	16.71	2,608.56	2,878.46	2,878.42	M14-1H	20.00	2,616.16	2,878.43	2,878.43
92		M14-2H	3,000.00	M14-2H	23.76	2,618.84	3,148.37	3,148.41	M14-2H	20.00	2,610.16	3,148.42	3,148.37
93		M14-3H	3,000.00	M14-3H	20.68	2,618.32	3,026.96	3,026.96	M14-3H	20.00	2,616.76	3,026.96	3,026.96
94		M6-1H	3,000.00	M6-1H	27.45	2,618.90	3,313.66	3,313.74	M6-1H	20.00	2,601.70	3,313.72	3,313.66
95		M7-1H	3,000.00	M7-1H	27.66	2,616.38	3,313.82	3,313.88	M7-1H	20.00	2,598.70	3,313.87	3,313.82
96		M7-2H	3,000.00	M7-2H	6.76	2,583.14	2,569.16	2,569.17	M7-2H	20.00	2,613.70	2,569.17	2,569.16
97		M8-1H	3,000.00	M8-1H	-21.27	2,532.46	1,949.95	1,949.91	M8-1H	20.00	2,627.70	1,949.91	1,949.91
98		M8-2H	3,000.00	M8-2H	29.31	2,659.64	3,679.46	3,679.52	M8-2H	20.00	2,638.16	3,679.53	3,679.46
99		M8-3H	3,000.00	M8-3H	28.64	2,658.61	3,620.98	3,621.01	M8-3H	20.00	2,638.66	3,621.02	3,620.98
100		M8-4H	3,000.00	O10-1H	27.78	2,691.65	4,339.80	4,650.96	O10-1H	17.99	2,669.06	4,339.84	4,339.80
101		M8-5H	3,000.00	M8-5H	34.51	2,672.65	4,369.05	4,370.29	M8-5H	20.00	2,639.16	4,370.28	4,369.05
102		M9-1H	3,000.00	M9-1H	15.43	2,639.16	2,731.79	2,731.97	M9-1H	20.00	2,649.70	2,731.96	2,731.79

High Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant	Critical Available Node	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
103		N10-1H	3,000.00	N10-1H	-38.40	2,528.91	1,451.40	1,452.31	N10-1H	20.00	2,663.70	1,452.32	1,451.40
104		N11-1H	3,000.00	N11-1H	16.83	2,662.37	2,763.09	2,761.05	N11-1H	20.00	2,669.70	2,761.07	2,761.07
105		N11-2H	3,000.00	M11-3H	-37.59	2,532.79	1,434.84	1,450.26	M11-3H	19.60	2,664.77	1,434.85	1,434.84
106		N11-3H	3,000.00	M11-3H	-31.59	2,546.64	1,489.06	1,794.66	M11-3H	11.77	2,646.70	1,489.07	1,489.05
107		N12-1H	3,000.00	N11-1H	33.28	2,700.34	5,205.17	5,626.29	N11-1H	15.85	2,660.12	5,206.28	5,205.17
108		N13-1H	3,000.00	N11-1H	39.18	2,713.97	5,914.25	6,524.39	N11-1H	13.96	2,655.76	5,917.49	5,914.25
109		N13-2H	3,000.00	N13-2H	39.75	2,687.29	4,881.48	4,883.37	N13-2H	20.00	2,641.70	4,883.39	4,881.48
110		N13-3H	3,000.00	N13-3H	45.86	2,652.38	4,296.66	4,296.71	N13-3H	20.00	2,592.70	4,296.70	4,296.66
111		N14-1H	3,000.00	N14-1H	54.15	2,673.51	5,236.57	5,236.98	N14-1H	20.00	2,594.70	5,236.96	5,236.57
112		N14-2H	3,000.00	N14-2H	0.74	2,559.24	2,469.86	2,469.14	N14-2H	20.00	2,603.70	2,469.13	2,469.13
113		N14-3H	3,000.00	O12-1H	43.50	2,679.94	4,946.42	5,084.29	O12-1H	17.84	2,620.72	4,946.48	4,946.42
114		N15-1H	3,000.00	N15-1H	-86.16	2,359.70	1,558.71	1,558.72	N15-1H	20.00	2,604.70	1,558.72	1,558.71
115		N15-2H	3,000.00	N15-2H	10.31	2,580.33	2,701.69	2,700.95	N15-2H	20.00	2,602.70	2,700.95	2,700.95
116		N15-3H	3,000.00	N15-3H	-28.54	2,490.67	2,021.01	2,021.00	N15-3H	20.00	2,602.70	2,021.00	2,021.00
117		O10-1H	3,000.00	O10-1H	-104.42	2,386.55	867.81	867.82	O10-1H	20.00	2,673.70	867.83	867.81
118		O12-1H	3,000.00	O12-1H	1.54	2,583.10	2,386.12	2,384.08	O12-1H	20.00	2,625.70	2,384.06	2,384.06
119		O13-1H	3,000.00	O12-1H	40.49	2,672.99	4,536.13	5,368.44	O12-1H	4.87	2,590.77	4,536.41	4,536.13
120		O13-2H	3,000.00	O12-1H	40.49	2,672.99	4,536.13	5,295.49	O12-1H	6.29	2,594.06	4,536.42	4,536.13
121		O8-1H	3,000.00	O8-1H	-127.54	2,326.65	869.30	869.30	O8-1H	20.00	2,667.16	869.31	869.30
122		O9-1H	3,000.00	O9-1H	-125.37	2,337.67	802.33	802.35	O9-1H	20.00	2,673.16	802.36	802.33
123		P13-1H	3,000.00	O12-1H	37.85	2,666.89	4,246.53	5,485.11	O12-1H	-4.98	2,568.04	4,246.80	4,246.53
124		P13-2H	3,000.00	O12-1H	38.84	2,669.18	4,368.26	5,195.52	O12-1H	4.39	2,589.67	4,368.64	4,368.26
125		P6-1H	3,000.00	P6-1H	-21.41	2,520.13	2,057.33	2,057.82	P6-1H	20.00	2,615.70	2,057.81	2,057.33
126		P6-2H	3,000.00	P6-2H	-137.45	2,275.33	1,135.56	1,135.41	P6-2H	20.00	2,638.70	1,135.40	1,135.40
127		Q10-1H	3,000.00	Q10-1H	35.65	2,574.27	3,418.28	3,417.99	Q10-1H	20.00	2,538.16	3,417.99	3,417.99
128		Q10-2H	3,000.00	Q10-2H	-15.58	2,458.59	2,410.60	2,411.35	Q10-2H	20.00	2,540.70	2,411.36	2,410.60
129		Q10-3H	3,000.00	Q10-3H	29.75	2,557.20	3,236.38	3,236.37	Q10-3H	20.00	2,534.70	3,236.37	3,236.37
130		Q11-1H	3,000.00	P6-2H	32.92	2,668.52	4,100.13	4,558.64	P6-2H	13.19	2,622.98	4,100.21	4,100.13
131		R7-1H	3,000.00	R7-1H	11.56	2,544.22	2,797.97	2,797.79	R7-1H	20.00	2,563.70	2,797.80	2,797.80
132		R9-1H	3,000.00	R9-1H	7.21	2,516.18	2,737.06	2,736.86	R9-1H	20.00	2,545.70	2,736.86	2,736.86

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-597.70	1.70	1.57	1.33	Open
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.50	0.23	0.00	0.04	Open
4		P-100	J-239	J-238	960.70	8.00	110.00	-29.87	0.19	0.04	0.04	Open
5		P-101	J-245	J-238	149.26	8.00	110.00	34.99	0.22	0.01	0.05	Open
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7		P-103	J-233	J-158	215.33	8.00	110.00	103.24	0.66	0.08	0.37	Open
8		P-104	J-255	J-122	328.78	8.00	110.00	-14.53	0.09	0.00	0.01	Open
9		P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10		P-106	J-157	J-170	353.94	8.00	110.00	87.88	0.56	0.10	0.28	Open
11		P-108	J-168	J72	163.38	8.00	110.00	8.07	0.05	0.00	0.00	Open
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13		P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14		P-113	J76	J-244	237.08	8.00	110.00	11.71	0.07	0.00	0.01	Open
15		P-114	J-244	J-131	21.10	12.00	110.00	6.59	0.02	0.00	0.00	Open
16		P-115	J-131	J-255	34.41	8.00	110.00	-3.65	0.02	0.00	0.00	Open
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18		P-117	J-168	J74	63.55	12.00	110.00	-13.19	0.04	0.00	0.00	Open
19		P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20		P-119	J-201	J-170	17.29	12.00	110.00	-21.97	0.06	0.00	0.00	Open
21		P-12	J-114	J-115	298.01	10.00	110.00	179.63	0.73	0.10	0.35	Open
22		P-120	J-241	J-201	61.98	6.00	110.00	-11.73	0.13	0.00	0.03	Open
23		P-121	J-158	J-157	92.45	8.00	110.00	98.12	0.63	0.03	0.34	Open
24		P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26		P-124	J-236	J42	42.81	8.00	110.00	-1,052.17	6.72	1.17	27.35	Open
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28		P-127	J-211	J-181	330.78	8.00	110.00	-658.96	4.21	3.80	11.50	Open
29		P-128	J-212	J-190	143.39	12.00	110.00	-210.68	0.60	0.03	0.19	Open
30		P-129	J-231	J-150	227.08	8.00	110.00	-236.38	1.51	0.39	1.72	Open
31		P-130	J-141	J-205	202.64	8.00	110.00	149.82	0.96	0.15	0.74	Open
32		P-131	J-115	J-205	245.54	8.00	110.00	158.10	1.01	0.20	0.82	Open
33		P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34		P-133	J-153	J-152	97.97	12.00	110.00	199.70	0.57	0.02	0.18	Open
35		P-134	J-192	J-191	110.45	8.00	110.00	179.22	1.14	0.11	1.03	Open
36		P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.98	1.08	0.02	0.92	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.34	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.58	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-342.38	1.40	0.27	1.15	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	160.06	1.02	0.11	0.84	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-365.13	1.04	0.10	0.53	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-360.01	1.02	0.12	0.52	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-221.02	1.41	0.26	1.52	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-210.78	1.35	0.03	1.40	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-226.14	1.44	0.09	1.59	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	153.89	0.98	0.11	0.78	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	184.75	1.18	0.16	1.09	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	273.97	1.75	0.77	2.26	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	80.03	0.51	0.07	0.23	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-159.01	1.01	0.12	0.83	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-84.10	0.54	0.04	0.25	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	185.66	1.19	0.02	1.10	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-466.22	1.90	0.49	2.04	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-468.18	2.99	1.34	6.10	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	165.18	1.05	0.09	0.88	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-180.54	1.15	0.02	1.05	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	154.94	0.99	0.01	0.80	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-634.93	2.59	2.39	3.62	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	302.79	1.93	0.60	2.72	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	143.10	0.91	0.02	0.68	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-328.55	2.10	0.15	3.17	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,647.73	4.67	2.97	8.71	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.00	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-337.26	1.38	0.32	1.12	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-343.91	2.20	0.16	3.45	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,273.10	3.61	0.14	5.39	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-359.27	2.29	0.53	3.74	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,637.49	4.65	0.45	8.61	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-338.79	2.16	0.67	3.35	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.69	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-251.74	1.61	0.05	1.93	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-241.50	1.54	0.02	1.79	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-674.32	4.30	0.26	11.99	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	669.20	4.27	1.57	11.83	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	12.00	110.00	183.93	0.52	0.17	0.15	Open
100		P-196	J28	J26	390.87	12.00	110.00	20.07	0.06	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	178.81	1.14	0.02	1.02	Open
102		P-198	J-249	J-254	108.97	12.00	110.00	148.08	0.42	0.01	0.10	Open
103		P-199	J-254	J-177	467.39	12.00	110.00	142.96	0.41	0.04	0.09	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-476.46	1.95	0.27	2.13	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	12.00	110.00	-33.86	0.10	0.00	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	102.00	0.42	0.00	0.13	Open
110		P-205	J-206	J-207	208.07	12.00	110.00	43.48	0.12	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-78.39	0.50	0.22	0.22	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	-5.53	0.02	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	4.71	0.01	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	604.20	2.47	1.84	3.30	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	-0.41	0.00	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-544.19	1.54	0.05	1.12	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.00	Open
122		P-216	J-293	J-294	1,100.07	12.00	110.00	411.06	1.17	0.73	0.67	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	12.00	110.00	390.58	1.11	0.43	0.61	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	331.64	1.35	0.26	1.09	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	12.00	110.00	405.94	1.15	0.03	0.65	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.01	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	12.00	110.00	370.10	1.05	0.57	0.55	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	267.44	1.09	0.09	0.73	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	17.13	0.19	0.03	0.05	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	6.89	0.08	0.00	0.01	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	12.00	110.00	15.36	0.04	0.00	0.00	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-304.27	1.24	0.63	0.93	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-345.51	3.92	5.84	14.12	Open
146		P-242	J-230	N13-2H	414.06	12.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	148.23	0.95	0.54	0.73	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.00	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-376.24	4.27	0.94	16.53	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	371.12	4.21	7.07	16.12	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.77	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-350.63	3.98	2.05	14.51	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	457.94	2.92	0.11	5.87	Open
159		P-253	J-342	J-277	166.27	12.00	110.00	10.24	0.03	0.00	0.00	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	12.00	110.00	-67.06	0.19	0.02	0.02	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	21.36	0.24	0.06	0.08	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	16.23	0.18	0.01	0.05	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	369.61	1.05	0.41	0.55	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	441.78	1.25	0.33	0.76	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	462.26	1.31	0.12	0.83	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-45.23	0.51	0.11	0.33	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.00	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	60.59	0.69	0.02	0.57	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	349.62	2.23	4.49	3.55	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-65.71	0.75	0.13	0.65	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-200.44	0.57	0.01	0.18	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.61	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	8.00	110.00	5.76	0.04	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-319.03	2.04	4.81	3.00	Open
186		P-281	J-273	J-318	140.95	6.00	110.00	-4.48	0.05	0.00	0.01	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.00	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.25	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.49	0.23	0.02	0.08	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.00	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.00	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	28.55	0.18	0.04	0.03	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.25	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.38	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.62	0.69	0.00	0.57	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	139.57	1.58	1.36	2.63	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-150.07	0.43	0.04	0.10	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.48	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-205.56	0.58	0.06	0.18	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-164.59	1.87	0.27	3.58	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-159.47	1.81	0.23	3.37	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	144.69	1.64	0.18	2.82	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-149.82	1.70	0.06	3.00	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.00	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.25	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-170.30	1.93	0.04	3.80	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.13	0.06	0.00	0.01	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.00	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-46.49	0.30	0.03	0.08	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.01	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	12.00	110.00	25.60	0.07	0.00	0.00	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.08	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.00	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-15.77	0.04	0.00	0.00	Open
237		P-330	J-266	J-313	206.46	12.00	110.00	-0.93	0.00	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	12.00	110.00	-28.74	0.08	0.00	0.01	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	12.00	110.00	9.31	0.03	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	12.00	110.00	4.19	0.01	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	80.16	0.51	0.02	0.23	Open
248		P-340	J-287	J-206	239.33	12.00	110.00	57.90	0.16	0.00	0.02	Open
249		P-341	J-178	J-287	70.36	12.00	110.00	63.02	0.18	0.00	0.02	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.72	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.84	0.41	0.01	0.22	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253		P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.01	Open
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255		P-347	J-111	J-284	43.43	6.00	110.00	22.25	0.25	0.00	0.09	Open
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257		P-349	J-265	J-264	236.64	12.00	110.00	-10.24	0.03	0.00	0.00	Open
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259		P-350	J-265	J-265A	252.43	12.00	110.00	5.12	0.01	0.00	0.00	Open
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262		P-353	J-281	J-282	60.97	6.00	110.00	-40.13	0.46	0.02	0.26	Open
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264		P-355	J-123	J50	205.02	6.00	110.00	-29.89	0.34	0.03	0.15	Open
265		P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266		P-357	J-285	J-306	386.52	6.00	110.00	12.01	0.14	0.01	0.03	Open
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268		P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269		P-361	J-295	J-295A	196.76	12.00	110.00	442.64	1.26	0.15	0.76	Open
270		P-361A	J-295A	J-239	291.39	12.00	110.00	437.52	1.24	0.22	0.75	Open
271		P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272		P-363	J-336	J-345	166.85	10.00	110.00	375.22	1.53	0.23	1.37	Open
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274		P-369	J-278	J-295	165.68	12.00	110.00	447.76	1.27	0.13	0.78	Open
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.00	Open
278		P-371	J-358	J64	110.10	8.00	110.00	-1,041.93	6.65	2.96	26.86	Open
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280		P-374	J-350	J-153	30.43	12.00	110.00	-155.19	0.44	0.00	0.11	Open
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284		P-378J	J-378	J-299	400.51	6.00	110.00	-174.83	1.98	1.60	4.00	Open
285		P-379	J-119	J-359	917.88	8.00	110.00	76.67	0.49	0.20	0.21	Open
286		P-38	J-183	J-186	1,090.53	8.00	110.00	345.37	2.20	3.79	3.47	Open
287		P-380	J-119	J-359	917.88	8.00	110.00	76.67	0.49	0.20	0.21	Open
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	249.73	1.59	0.57	1.91	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	244.61	1.56	0.20	1.83	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	12.00	110.00	416.18	1.18	0.83	0.68	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	368.80	2.35	2.51	3.92	Open
301		P-390	J-315	J46	657.48	12.00	110.00	364.49	1.03	0.35	0.53	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-0.87	0.01	0.00	0.00	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-5.99	0.07	0.00	0.01	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-11.11	0.07	0.01	0.01	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	354.74	2.26	1.80	3.65	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	452.88	1.28	0.06	0.80	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-539.07	1.53	0.42	1.10	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	359.86	2.30	7.62	3.75	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	684.56	4.37	0.84	12.34	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.57	0.42	0.01	0.17	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	898.11	5.73	7.80	20.40	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	265.09	1.69	1.17	2.13	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.24	0.07	0.00	0.01	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,663.09	4.72	4.90	8.86	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.09	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.21	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.33	0.36	0.00	0.12	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.85	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.85	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.01	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,258.49	6.41	7.74	15.61	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,668.21	4.73	0.13	8.89	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,709.17	4.85	1.35	9.32	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,704.05	4.83	3.47	9.27	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,263.61	6.42	3.66	15.68	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-270.21	1.72	0.20	2.21	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-347.50	1.42	0.28	1.18	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,122.24	7.16	8.78	30.82	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	705.04	4.50	6.24	13.03	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	699.92	4.47	1.83	12.85	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.72	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.02	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-412.08	2.63	1.33	4.82	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363		P-9	J-113	J-104	183.55	10.00	110.00	-362.86	1.48	0.24	1.28	Open
364		P-90	J-133	J-134	116.30	8.00	110.00	229.25	1.46	0.19	1.63	Open
365		P-93	J-209	J-247	44.60	8.00	110.00	-259.97	1.66	0.09	2.05	Open
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367		P-95	J-221	J-162	263.63	8.00	110.00	365.99	2.34	1.02	3.87	Open
368		P-96	J-163	J-162	264.20	8.00	110.00	-360.87	2.30	1.00	3.77	Open
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370		P-98	J-172	J-163	39.90	8.00	110.00	-355.75	2.27	0.15	3.67	Open
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,036.81	6.62	2.24	26.61	Open
373		P-J106	J-252	J-106	417.04	8.00	110.00	178.85	1.14	0.43	1.03	Open
374		P-J286	J-363	J-286	10.63	6.00	110.00	81.07	0.92	0.01	0.96	Open
375		P-J335	J-335	J-286	287.42	6.00	110.00	-75.95	0.86	0.25	0.85	Open
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.01	Open
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,442.17	21.97	11.61	245.60	Open
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,442.17	21.97	18.13	245.60	Open
393		P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,538.94	7.20	5.38	19.39	Open
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395		P126	J-242	J-376	11.13	8.00	110.00	463.06	2.96	0.07	5.97	Open
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397		P128	J-344	J-393	9.32	12.00	110.00	-139.83	0.40	0.00	0.08	Open
398		P130	J10	J14	116.51	10.00	110.00	299.15	1.22	0.10	0.90	Open
399		P132	J14	M8-2H	217.35	8.00	110.00	86.08	0.55	0.06	0.27	Open
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	86.08	0.55	0.06	0.27	Open
401		P136	M8-3H	J16	275.97	8.00	110.00	86.08	0.55	0.07	0.26	Open
402		P138	J16	J12	16.19	10.00	110.00	288.91	1.18	0.01	0.84	Open
403		P140	J16	M8-4H	42.30	10.00	110.00	-207.95	0.85	0.02	0.46	Open
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-207.95	0.85	0.12	0.46	Open
405		P144	M8-5H	J14	116.30	10.00	110.00	-207.95	0.85	0.05	0.46	Open
406		P146	J12	J-102	126.72	10.00	110.00	283.79	1.16	0.10	0.81	Open
407		P148	J20	J22	6.79	12.00	110.00	-26.01	0.07	0.00	0.00	Open
408		P150	J22	J-161	73.04	8.00	110.00	-31.13	0.20	0.00	0.04	Open
409		P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.00	Open
410		P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.00	Open
411		P156	J32	J40	349.41	12.00	110.00	12.44	0.04	0.00	0.00	Open
412		P158	J30	J28	652.66	12.00	110.00	30.31	0.09	0.00	0.01	Open
413		P160	J-313	J32	17.72	6.00	110.00	22.68	0.26	0.00	0.08	Open
414		P162	J30	J-207	49.17	12.00	110.00	-17.66	0.05	0.00	0.00	Open
415		P164	J30	J36	31.14	12.00	110.00	-15.57	0.04	0.00	0.00	Open
416		P166	J36	J-207	18.03	12.00	110.00	-20.69	0.06	0.00	0.00	Open
417		P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418		P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422		P178	J44	J-236	15.32	8.00	110.00	-1,047.05	6.68	0.42	27.10	Open
423		P180	J42	J-190	51.62	8.00	110.00	-1,057.29	6.75	1.42	27.59	Open
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425		P184	J48	J46	1,260.92	6.00	110.00	61.94	0.70	0.74	0.59	Open
426		P186	J46	J-366	444.59	12.00	110.00	421.30	1.20	0.31	0.70	Open
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428		P190	J40	J38	318.75	12.00	110.00	7.32	0.02	0.00	0.00	Open
429		P192	J38	J30	286.67	12.00	110.00	2.20	0.01	0.00	0.00	Open
430		P194	J50	J-281	85.58	6.00	110.00	-35.01	0.40	0.02	0.20	Open
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432		P198	J52	J54	266.38	8.00	110.00	20.48	0.13	0.00	0.02	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.42	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.00	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,678.45	4.76	0.31	9.01	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,041.93	6.65	7.91	26.86	Open
445		P224	J-344	J-106	395.17	12.00	110.00	274.28	0.78	0.12	0.31	Open
446		P226	J-106	J-104	393.05	12.00	110.00	448.02	1.27	0.31	0.78	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.85	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.71	0.04	0.00	0.00	Open
449		P232	J74	J-241	28.57	12.00	110.00	-1.49	0.00	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	14.87	0.04	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	29.14	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-22.51	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-11.70	0.03	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-34.21	0.10	0.00	0.01	Open
456		P246	J78	J84	490.51	12.00	110.00	14.87	0.04	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	1.36	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	6.63	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	6.63	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	8.24	0.09	0.00	0.01	Open
461		P256	J78	J76	5.94	12.00	110.00	-49.08	0.14	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	60.79	0.39	0.00	0.14	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.03	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-961.39	6.14	4.26	23.14	Open

High Zone 4 hr 2020 MDD FF with Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP5	2,205.70	131.22	221.34	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP6	2,134.00	27.97	247.35	0.00	0.00	Closed	0.00	0.00	0.00
3	PUMP8	1,956.00	-0.63	344.47	3,476.85	796.47	Open	1.00	32.10	0.00
4	TRANSF	2,629.54	7.57	28.24	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 4 hr 2020 MDD FF with Improvements Tank Report

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	1,023.49	2,691.54	2,692.52	4.90	0.98
2	FAIRWAYTANK	1,009.38	2,679.54	2,690.56	34.44	11.02
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-48.38	2,491.89	1,315.29	1,624.62	M12-8H	10.66	2,628.15	1,315.24	1,315.24
2	J12-5H	3,000.00	J12-5H	-191.17	2,115.35	1,086.49	1,086.49	J12-5H	20.00	2,602.70	1,086.50	1,086.49
3	J12-6H	3,000.00	J12-6H	-222.94	2,034.49	1,057.61	1,058.65	J12-6H	20.00	2,595.16	1,058.64	1,057.61
4	J12-8H	3,000.00	J12-8H	-256.83	1,959.27	982.96	982.96	J12-8H	20.00	2,598.16	982.96	982.96
5	J13-1H	3,000.00	J13-4H	-17.09	2,540.11	1,899.65	2,225.31	J13-4H	10.28	2,603.25	1,899.63	1,899.63
6	J13-2H	3,000.00	J13-2H	-50.71	2,456.50	1,577.75	1,577.76	J13-2H	20.00	2,619.70	1,577.74	1,577.74
7	J13-3H	3,000.00	J13-3H	-92.38	2,352.34	1,366.13	1,366.14	J13-3H	20.00	2,611.70	1,366.14	1,366.13
8	J13-4H	3,000.00	J13-4H	-18.94	2,535.82	1,871.85	1,871.83	J13-4H	20.00	2,625.70	1,871.83	1,871.83
9	J13-5H	3,000.00	J13-5H	-19.66	2,534.17	1,861.66	1,861.65	J13-5H	20.00	2,625.70	1,861.64	1,861.64
10	J13-6H	3,000.00	J13-4H	-15.55	2,543.65	1,923.62	2,063.81	J13-4H	16.01	2,616.48	1,923.61	1,923.61
11	J14-1H	3,000.00	K13-4H	-2.55	2,594.10	1,983.39	2,319.46	K13-4H	13.22	2,630.51	1,983.34	1,983.34
12	J7-1H	3,000.00	K7-7H	21.08	2,633.20	3,066.01	3,999.86	K7-7H	3.00	2,591.47	3,066.08	3,066.01
13	J7-2H	3,000.00	K7-7H	20.93	2,632.85	3,056.65	3,337.93	K7-7H	15.19	2,619.59	3,056.71	3,056.65
14	K10-2H	3,000.00	M9-1H	28.49	2,669.29	4,093.56	4,726.54	M9-1H	13.64	2,635.03	4,093.67	4,093.56
15	K12-1H	3,000.00	K12-1H	-88.67	2,320.36	1,651.60	1,651.91	K12-1H	20.00	2,571.16	1,651.91	1,651.60
16	K13-1H	3,000.00	K13-1H	42.32	2,636.67	4,102.40	4,101.13	K13-1H	20.00	2,585.16	4,101.14	4,101.14
17	K13-2H	3,000.00	K13-2H	17.21	2,636.27	2,813.09	2,812.66	K13-2H	20.00	2,642.70	2,812.62	2,812.62
18	K13-3H	3,000.00	K13-3H	-27.40	2,524.29	1,697.72	1,697.74	K13-3H	20.00	2,633.70	1,697.72	1,697.72
19	K13-4H	3,000.00	K13-4H	-11.45	2,573.57	1,794.40	1,794.41	K13-4H	20.00	2,646.16	1,794.38	1,794.38
20	K14-1H	3,000.00	K14-1H	-32.64	2,485.20	1,853.61	1,853.61	K14-1H	20.00	2,606.70	1,853.58	1,853.58
21	K14-6H	3,000.00	K14-6H	-177.18	2,122.08	1,263.83	1,264.28	K14-6H	20.00	2,577.16	1,264.28	1,263.83
22	K7-1H	3,000.00	K7-7H	20.88	2,632.74	3,053.58	3,249.00	K7-7H	16.68	2,623.05	3,053.66	3,053.58
23	K7-2H	3,000.00	K7-7H	21.23	2,633.54	3,075.36	3,640.94	K7-7H	10.10	2,607.84	3,075.43	3,075.36
24	K7-3H	3,000.00	K7-3H	-23.41	2,489.52	2,087.42	2,087.41	K7-3H	20.00	2,589.70	2,087.42	2,087.42
25	K7-4H	3,000.00	K7-7H	24.74	2,641.64	3,325.22	4,523.37	K7-7H	-0.08	2,584.35	3,325.40	3,325.22
26	K7-5H	3,000.00	K7-5H	-5.91	2,521.90	2,382.94	2,382.96	K7-5H	20.00	2,581.70	2,382.96	2,382.94
27	K7-6H	3,000.00	K7-6H	19.20	2,618.85	2,961.91	2,959.93	K7-6H	20.00	2,620.70	2,959.87	2,959.87
28	K7-7H	3,000.00	K7-7H	19.82	2,630.28	2,989.99	2,989.40	K7-7H	20.00	2,630.70	2,989.35	2,989.35
29	K7-8H	3,000.00	K7-8H	-26.99	2,458.25	2,147.11	2,147.14	K7-8H	20.00	2,566.70	2,147.13	2,147.11
30	K7-9H	3,000.00	K7-9H	-55.87	2,398.60	1,845.48	1,845.43	K7-9H	20.00	2,573.70	1,845.43	1,845.43
31	K8-1H	3,000.00	K8-1H	-59.65	2,371.88	1,895.66	1,895.64	K8-1H	20.00	2,555.70	1,895.65	1,895.65
32	K8-2H	3,000.00	K7-7H	23.61	2,639.02	3,238.16	4,072.88	K7-7H	5.97	2,598.32	3,238.24	3,238.16
33	L10-1H	3,000.00	M9-1H	28.75	2,669.88	4,139.29	4,552.84	M9-1H	15.99	2,640.43	4,139.40	4,139.29
34	L10-2H	3,000.00	M9-1H	28.56	2,669.44	4,106.76	4,256.08	M9-1H	18.59	2,646.45	4,106.86	4,106.76
35	L10-4H	3,000.00	L10-8H	-111.85	2,297.41	1,375.59	1,404.45	L10-8H	18.40	2,598.00	1,375.47	1,375.47
36	L10-5H	3,000.00	L10-8H	-57.45	2,422.95	1,687.34	1,759.07	L10-8H	16.73	2,594.15	1,687.78	1,687.34
37	L10-6H	3,000.00	M9-1H	27.12	2,666.13	3,867.98	4,682.33	M9-1H	11.29	2,629.60	3,868.04	3,867.98
38	L10-7H	3,000.00	M9-1H	28.00	2,668.16	4,010.89	4,579.02	M9-1H	14.26	2,636.46	4,011.00	4,010.89
39	L10-8H	3,000.00	L10-8H	-232.47	2,019.02	1,032.39	1,032.05	L10-8H	20.00	2,601.70	1,032.05	1,032.05
40	L11-1H	3,000.00	M9-1H	28.94	2,670.33	4,169.96	4,565.84	M9-1H	16.17	2,640.86	4,170.04	4,169.96
41	L11-2H	3,000.00	K13-4H	29.80	2,668.78	4,139.15	5,202.79	K13-4H	7.47	2,617.25	4,139.30	4,139.15
42	L11-3H	3,000.00	M9-1H	28.88	2,670.20	4,160.01	4,924.68	M9-1H	12.28	2,631.88	4,160.10	4,160.01
43	L11-4H	3,000.00	L11-4H	-141.06	2,211.45	1,385.38	1,386.27	L11-4H	20.00	2,583.16	1,386.27	1,385.38
44	L11-5H	3,000.00	L11-5H	-29.65	2,493.58	1,949.87	1,949.84	L11-5H	20.00	2,608.16	1,949.85	1,949.85
45	L11-6H	3,000.00	K13-4H	29.94	2,669.09	4,179.92	4,280.60	K13-4H	18.97	2,643.78	4,180.04	4,179.92
46	L12-3H	3,000.00	M12-5H	27.92	2,646.99	3,520.30	3,662.53	M12-5H	17.54	2,623.02	3,520.32	3,520.30
47	L12-4H	3,000.00	K13-4H	28.24	2,665.17	3,872.22	5,153.41	K13-4H	3.62	2,608.36	3,872.27	3,872.22
48	L12-6H	3,000.00	L12-6H	32.43	2,635.38	3,683.63	3,682.25	L12-6H	20.00	2,606.70	3,682.25	3,682.25
49	L12-7H	3,000.00	L12-8H	37.45	2,651.97	4,223.06	4,224.09	L12-8H	19.98	2,611.65	4,222.81	4,222.81

High Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
50	L12-8H	3,000.00	L12-8H	20.95	2,613.90	3,043.26	3,043.26	L12-8H	20.00	2,611.70	3,043.26	3,043.26
51	L13-10H	3,000.00	L13-10H	29.99	2,605.22	3,370.24	3,370.05	L13-10H	20.00	2,582.16	3,370.04	3,370.04
52	L13-11H	3,000.00	M12-8H	36.85	2,688.59	6,131.56	6,605.04	M12-8H	16.28	2,641.12	6,132.43	6,131.56
53	L13-12H	3,000.00	L13-12H	42.31	2,652.64	4,419.41	4,416.91	L13-12H	20.00	2,601.16	4,416.91	4,416.91
54	L13-1H	3,000.00	K13-4H	27.03	2,662.38	3,696.09	4,680.87	K13-4H	7.22	2,616.66	3,696.09	3,696.09
55	L13-2H	3,000.00	K13-4H	25.68	2,659.26	3,536.09	4,837.42	K13-4H	1.75	2,604.04	3,533.08	3,533.08
56	L13-3H	3,000.00	M12-8H	28.47	2,669.24	3,906.82	4,248.44	M12-8H	16.12	2,640.75	3,906.86	3,906.82
57	L13-4H	3,000.00	M12-8H	23.21	2,657.10	3,274.30	3,956.78	M12-8H	10.62	2,628.04	3,273.73	3,273.73
58	L13-5H	3,000.00	M12-8H	28.85	2,670.11	3,953.59	5,129.13	M12-8H	5.89	2,617.13	3,953.60	3,953.59
59	L13-6H	3,000.00	K13-4H	27.64	2,663.80	3,772.49	4,015.66	K13-4H	17.17	2,639.63	3,772.51	3,772.49
60	L13-7H	3,000.00	M12-8H	34.89	2,684.06	5,324.48	6,345.01	M12-8H	10.63	2,628.07	5,324.73	5,324.48
61	L13-8H	3,000.00	M12-8H	34.93	2,684.16	5,307.01	5,451.60	M12-8H	18.76	2,646.85	5,307.26	5,307.01
62	L13-9H	3,000.00	L13-9H	32.12	2,635.66	3,655.10	3,654.00	L13-9H	20.00	2,607.70	3,653.99	3,653.99
63	L14-2H	3,000.00	L14-2H	-45.25	2,447.56	1,823.73	1,822.48	L14-2H	20.00	2,598.16	1,822.48	1,822.48
64	L14-3H	3,000.00	L14-3H	-19.76	2,519.41	2,026.78	2,026.76	L14-3H	20.00	2,611.16	2,026.76	2,026.76
65	L7-1H	3,000.00	K7-7H	24.09	2,640.13	3,274.12	3,630.64	K7-7H	14.33	2,617.62	3,274.24	3,274.12
66	L7-2H	3,000.00	L7-2H	19.06	2,597.52	2,964.73	2,963.38	L7-2H	20.00	2,599.70	2,963.35	2,963.35
67	L7-3H	3,000.00	K7-7H	22.74	2,637.03	3,176.00	3,308.85	K7-7H	17.86	2,625.76	3,176.05	3,176.00
68	L7-4H	3,000.00	L7-4H	20.56	2,603.00	3,022.10	3,023.06	L7-4H	20.00	2,601.70	3,023.02	3,022.10
69	L7-5H	3,000.00	L7-5H	14.37	2,603.71	2,759.60	2,759.66	L7-5H	20.00	2,616.70	2,759.64	2,759.60
70	L8-1H	3,000.00	L8-1H	28.21	2,630.64	3,446.64	3,446.78	L8-1H	20.00	2,611.70	3,446.76	3,446.64
71	L9-1H	3,000.00	M9-1H	23.17	2,657.02	3,299.33	3,675.55	M9-1H	15.88	2,640.19	3,300.08	3,299.33
72	M11-1H	3,000.00	M11-3H	23.41	2,673.58	3,463.22	4,324.99	M11-3H	12.03	2,647.30	3,463.25	3,463.22
73	M11-2H	3,000.00	M11-2H	16.47	2,621.55	2,840.70	2,840.38	M11-2H	20.00	2,629.70	2,840.38	2,840.38
74	M11-3H	3,000.00	M11-3H	-126.27	2,328.12	850.64	850.81	M11-3H	20.00	2,665.70	850.81	850.64
75	M11-4H	3,000.00	M11-3H	-29.88	2,550.58	1,357.69	1,893.79	M11-3H	6.95	2,635.58	1,357.70	1,357.69
76	M11-5H	3,000.00	M11-3H	9.50	2,641.46	2,229.57	2,751.74	M11-3H	13.15	2,649.89	2,227.46	2,227.46
77	M11-6H	3,000.00	M11-6H	-5.25	2,545.42	2,340.36	2,340.25	M11-6H	20.00	2,603.70	2,340.25	2,340.25
78	M12-1H	3,000.00	M12-1H	23.65	2,640.12	3,219.28	3,218.54	M12-1H	20.00	2,631.70	3,218.53	3,218.53
79	M12-2H	3,000.00	M12-8H	-22.70	2,551.14	1,584.94	1,895.27	M12-8H	12.46	2,632.30	1,584.91	1,584.91
80	M12-3H	3,000.00	M12-8H	-55.20	2,476.15	1,263.81	1,495.13	M12-8H	12.83	2,633.16	1,263.75	1,263.75
81	M12-4H	3,000.00	M12-4H	20.73	2,661.38	3,059.36	3,059.29	M12-4H	20.00	2,659.70	3,059.28	3,059.28
82	M12-5H	3,000.00	M12-5H	9.75	2,605.04	2,551.53	2,551.55	M12-5H	20.00	2,628.70	2,551.54	2,551.53
83	M12-6H	3,000.00	M12-8H	-48.38	2,491.89	1,315.28	1,571.36	M12-8H	12.38	2,632.10	1,315.23	1,315.23
84	M12-7H	3,000.00	M12-8H	-75.83	2,428.55	1,139.73	1,161.05	M12-8H	19.29	2,648.06	1,139.67	1,139.67
85	M12-8H	3,000.00	M12-8H	-102.20	2,367.69	1,025.42	1,025.35	M12-8H	20.00	2,649.70	1,025.35	1,025.35
86	M13-1H	3,000.00	M13-1H	47.97	2,670.26	5,308.20	5,308.21	M13-1H	20.00	2,605.70	5,308.23	5,308.20
87	M13-2H	3,000.00	M13-2H	43.85	2,673.74	5,131.79	5,131.74	M13-2H	20.00	2,618.70	5,131.75	5,131.75
88	M13-3H	3,000.00	M13-3H	17.54	2,599.03	2,907.85	2,907.84	M13-3H	20.00	2,604.70	2,907.83	2,907.83
89	M13-4H	3,000.00	M13-4H	-139.51	2,257.02	1,107.00	1,107.00	M13-4H	20.00	2,625.16	1,106.99	1,106.99
90	M13-5H	3,000.00	M12-8H	4.80	2,614.63	2,198.16	2,670.19	M12-8H	11.70	2,630.55	2,198.04	2,198.04
91	M14-1H	3,000.00	M14-1H	12.65	2,599.20	2,720.87	2,720.43	M14-1H	20.00	2,616.16	2,720.44	2,720.44
92	M14-2H	3,000.00	M14-2H	19.71	2,609.48	2,989.79	2,988.16	M14-2H	20.00	2,610.16	2,988.17	2,988.17
93	M14-3H	3,000.00	M14-3H	16.62	2,608.96	2,861.61	2,861.52	M14-3H	20.00	2,616.76	2,861.52	2,861.52
94	M6-1H	3,000.00	M6-1H	23.26	2,609.22	3,140.55	3,140.60	M6-1H	20.00	2,601.70	3,140.56	3,140.55
95	M7-1H	3,000.00	M7-1H	23.47	2,606.70	3,145.46	3,145.51	M7-1H	20.00	2,598.70	3,145.48	3,145.46
96	M7-2H	3,000.00	M7-2H	2.56	2,573.46	2,417.65	2,417.65	M7-2H	20.00	2,613.70	2,417.65	2,417.65
97	M8-1H	3,000.00	M8-1H	-25.46	2,522.79	1,810.32	1,810.12	M8-1H	20.00	2,627.70	1,810.12	1,810.12
98	M8-2H	3,000.00	M8-2H	25.04	2,649.79	3,383.50	3,383.51	M8-2H	20.00	2,638.16	3,383.50	3,383.50

High Zone 4 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
99		M8-3H	3,000.00	M8-3H	24.37	2,648.74	3,327.50	3,327.51	M8-3H	20.00	2,638.66	3,327.50	3,327.50
100		M8-4H	3,000.00	O10-1H	23.57	2,681.94	3,662.16	4,273.71	O10-1H	16.29	2,665.14	3,662.55	3,662.16
101		M8-5H	3,000.00	O10-1H	23.76	2,682.39	3,711.26	4,007.49	O10-1H	18.29	2,669.74	3,712.03	3,711.26
102		M9-1H	3,000.00	M9-1H	11.32	2,629.67	2,470.27	2,470.74	M9-1H	20.00	2,649.70	2,470.74	2,470.27
103		N10-1H	3,000.00	N10-1H	-42.52	2,519.42	1,281.13	1,280.84	N10-1H	20.00	2,663.70	1,280.83	1,280.83
104		N11-1H	3,000.00	N11-1H	12.87	2,653.24	2,403.18	2,403.05	N11-1H	20.00	2,669.70	2,403.05	2,403.05
105		N11-2H	3,000.00	M11-3H	-41.71	2,523.27	1,260.58	1,282.52	M11-3H	19.49	2,664.52	1,260.57	1,260.57
106		N11-3H	3,000.00	M11-3H	-35.71	2,537.12	1,306.12	1,660.42	M11-3H	11.29	2,645.60	1,306.12	1,306.12
107		N12-1H	3,000.00	N11-1H	29.20	2,690.93	4,746.41	5,344.55	N11-1H	14.94	2,658.02	4,747.66	4,746.41
108		N13-1H	3,000.00	O9-1H	27.39	2,690.21	5,312.01	6,278.39	O9-1H	14.76	2,661.07	5,312.88	5,312.01
109		N13-2H	3,000.00	N13-2H	35.69	2,677.90	4,596.04	4,599.33	N13-2H	20.00	2,641.70	4,599.33	4,596.04
110		N13-3H	3,000.00	N13-3H	41.79	2,642.98	4,128.45	4,128.48	N13-3H	20.00	2,592.70	4,128.50	4,128.45
111		N14-1H	3,000.00	N14-1H	50.08	2,664.11	5,037.56	5,037.75	N14-1H	20.00	2,594.70	5,037.71	5,037.56
112		N14-2H	3,000.00	N14-2H	-3.34	2,549.84	2,347.79	2,347.44	N14-2H	20.00	2,603.70	2,347.44	2,347.44
113		N14-3H	3,000.00	O12-1H	39.44	2,670.56	4,687.49	4,903.05	O12-1H	16.77	2,618.23	4,687.93	4,687.49
114		N15-1H	3,000.00	N15-1H	-90.22	2,350.33	1,477.83	1,477.76	N15-1H	20.00	2,604.70	1,477.76	1,477.76
115		N15-2H	3,000.00	N15-2H	6.24	2,570.95	2,568.07	2,567.71	N15-2H	20.00	2,602.70	2,567.71	2,567.71
116		N15-3H	3,000.00	N15-3H	-32.61	2,481.29	1,923.68	1,923.67	N15-3H	20.00	2,602.70	1,923.67	1,923.67
117		O10-1H	3,000.00	O10-1H	-108.57	2,376.97	702.08	702.08	O10-1H	20.00	2,673.70	702.08	702.08
118		O12-1H	3,000.00	O12-1H	-2.49	2,573.80	2,238.18	2,236.51	O12-1H	20.00	2,625.70	2,236.48	2,236.48
119		O13-1H	3,000.00	O12-1H	36.45	2,663.66	4,293.41	5,212.13	O12-1H	4.00	2,588.78	4,293.77	4,293.41
120		O13-2H	3,000.00	O12-1H	36.45	2,663.66	4,293.42	5,126.57	O12-1H	5.62	2,592.51	4,293.78	4,293.42
121		O8-1H	3,000.00	O8-1H	-131.70	2,317.06	727.67	727.71	O8-1H	20.00	2,667.16	727.71	727.67
122		O9-1H	3,000.00	O9-1H	-129.52	2,328.10	647.86	647.89	O9-1H	20.00	2,673.16	647.89	647.86
123		P13-1H	3,000.00	O12-1H	33.85	2,657.65	4,011.77	5,360.95	O12-1H	-6.06	2,565.56	4,011.99	4,011.77
124		P13-2H	3,000.00	O12-1H	34.88	2,660.03	4,128.55	5,071.73	O12-1H	3.05	2,586.57	4,128.79	4,128.55
125		P6-1H	3,000.00	P6-1H	-25.46	2,510.78	1,942.26	1,942.82	P6-1H	20.00	2,615.70	1,942.82	1,942.26
126		P6-2H	3,000.00	P6-2H	-141.53	2,265.91	1,048.07	1,047.96	P6-2H	20.00	2,638.70	1,047.96	1,047.96
127		Q10-1H	3,000.00	Q10-1H	31.66	2,565.08	3,315.37	3,315.38	Q10-1H	20.00	2,538.16	3,315.39	3,315.37
128		Q10-2H	3,000.00	Q10-2H	-19.56	2,449.40	2,338.10	2,338.87	Q10-2H	20.00	2,540.70	2,338.87	2,338.10
129		Q10-3H	3,000.00	Q10-3H	25.76	2,548.00	3,141.26	3,141.26	Q10-3H	20.00	2,534.70	3,141.25	3,141.25
130		Q11-1H	3,000.00	P6-2H	28.72	2,658.83	3,789.37	4,441.76	P6-2H	10.90	2,617.70	3,789.43	3,789.37
131		R7-1H	3,000.00	R7-1H	7.58	2,535.04	2,698.96	2,698.58	R7-1H	20.00	2,563.70	2,698.59	2,698.59
132		R9-1H	3,000.00	R9-1H	3.23	2,506.99	2,651.58	2,651.26	R9-1H	20.00	2,545.70	2,651.26	2,651.26

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	0.00	0.00	0.00	0.00	Closed
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-626.92	1.78	1.71	1.45	Open
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.49	0.23	0.00	0.04	Open
4		P-100	J-239	J-238	960.70	8.00	110.00	-30.98	0.20	0.04	0.04	Open
5		P-101	J-245	J-238	149.26	8.00	110.00	36.10	0.23	0.01	0.05	Open
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7		P-103	J-233	J-158	215.33	8.00	110.00	103.24	0.66	0.08	0.37	Open
8		P-104	J-255	J-122	328.78	8.00	110.00	-14.53	0.09	0.00	0.01	Open
9		P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10		P-106	J-157	J-170	353.94	8.00	110.00	87.88	0.56	0.10	0.28	Open
11		P-108	J-168	J72	163.38	8.00	110.00	8.07	0.05	0.00	0.00	Open
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13		P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14		P-113	J76	J-244	237.08	8.00	110.00	11.71	0.07	0.00	0.01	Open
15		P-114	J-244	J-131	21.10	12.00	110.00	6.59	0.02	0.00	0.00	Open
16		P-115	J-131	J-255	34.41	8.00	110.00	-3.65	0.02	0.00	0.00	Open
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18		P-117	J-168	J74	63.55	12.00	110.00	-13.19	0.04	0.00	0.00	Open
19		P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20		P-119	J-201	J-170	17.29	12.00	110.00	-21.97	0.06	0.00	0.00	Open
21		P-12	J-114	J-115	298.01	10.00	110.00	186.63	0.76	0.11	0.37	Open
22		P-120	J-241	J-201	61.98	6.00	110.00	-11.73	0.13	0.00	0.03	Open
23		P-121	J-158	J-157	92.45	8.00	110.00	98.12	0.63	0.03	0.34	Open
24		P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26		P-124	J-236	J42	42.81	8.00	110.00	-1,038.85	6.63	1.14	26.71	Open
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28		P-127	J-211	J-181	330.78	8.00	110.00	-666.00	4.25	3.88	11.72	Open
29		P-128	J-212	J-190	143.39	12.00	110.00	-219.72	0.62	0.03	0.21	Open
30		P-129	J-231	J-150	227.08	8.00	110.00	-250.73	1.60	0.44	1.92	Open
31		P-130	J-141	J-205	202.64	8.00	110.00	156.66	1.00	0.16	0.80	Open
32		P-131	J-115	J-205	245.54	8.00	110.00	165.14	1.05	0.22	0.89	Open
33		P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34		P-133	J-153	J-152	97.97	12.00	110.00	199.70	0.57	0.02	0.18	Open
35		P-134	J-192	J-191	110.45	8.00	110.00	179.21	1.14	0.11	1.03	Open
36		P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.97	1.08	0.02	0.92	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.34	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.58	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-358.91	1.47	0.30	1.26	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	160.67	1.03	0.11	0.84	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-388.51	1.10	0.11	0.60	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-383.39	1.09	0.13	0.58	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-235.36	1.50	0.29	1.71	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-225.12	1.44	0.03	1.57	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-240.49	1.53	0.10	1.78	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	160.78	1.03	0.12	0.84	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	191.75	1.22	0.17	1.17	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	281.18	1.79	0.81	2.37	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	86.72	0.55	0.08	0.27	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-165.91	1.06	0.13	0.89	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-84.31	0.54	0.04	0.25	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	186.27	1.19	0.02	1.11	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-489.30	2.00	0.53	2.23	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-474.61	3.03	1.38	6.26	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	165.79	1.06	0.09	0.89	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-181.15	1.16	0.02	1.05	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	161.79	1.03	0.01	0.85	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-665.35	2.72	2.61	3.95	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	316.68	2.02	0.66	2.96	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	150.45	0.96	0.02	0.75	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-342.89	2.19	0.16	3.43	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,657.79	4.70	3.01	8.81	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.00	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-353.79	1.45	0.35	1.22	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-358.25	2.29	0.17	3.71	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,268.81	3.60	0.14	5.37	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-373.61	2.38	0.57	4.02	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,647.55	4.67	0.45	8.71	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-353.13	2.25	0.72	3.62	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.69	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-266.09	1.70	0.05	2.15	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-255.85	1.63	0.02	1.98	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-681.36	4.35	0.26	12.23	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	676.24	4.32	1.60	12.06	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	12.00	110.00	189.67	0.54	0.18	0.16	Open
100		P-196	J28	J26	390.87	12.00	110.00	25.82	0.07	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	184.55	1.18	0.02	1.08	Open
102		P-198	J-249	J-254	108.97	12.00	110.00	153.83	0.44	0.01	0.11	Open
103		P-199	J-254	J-177	467.39	12.00	110.00	148.71	0.42	0.05	0.10	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-499.54	2.04	0.30	2.32	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	12.00	110.00	-35.84	0.10	0.00	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	107.74	0.44	0.00	0.14	Open
110		P-205	J-206	J-207	208.07	12.00	110.00	47.48	0.13	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-82.98	0.53	0.24	0.25	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	0.22	0.00	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	10.46	0.03	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	634.63	2.59	2.02	3.62	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	5.34	0.02	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-553.67	1.57	0.05	1.15	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.02	Open
122		P-216	J-293	J-294	1,100.07	12.00	110.00	420.53	1.19	0.76	0.69	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	12.00	110.00	400.05	1.13	0.45	0.63	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	351.74	1.44	0.29	1.21	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	12.00	110.00	415.41	1.18	0.03	0.68	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.00	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	12.00	110.00	379.57	1.08	0.60	0.57	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	277.77	1.13	0.10	0.78	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	17.18	0.19	0.03	0.05	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	6.94	0.08	0.00	0.01	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	12.00	110.00	15.36	0.04	0.00	0.00	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-324.32	1.32	0.71	1.04	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-353.61	4.01	6.10	14.74	Open
146		P-242	J-230	N13-2H	414.06	12.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	155.57	0.99	0.60	0.79	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.01	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-384.34	4.36	0.97	17.20	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	379.22	4.30	7.36	16.78	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.77	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-358.73	4.07	2.14	15.14	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	464.37	2.96	0.11	6.02	Open
159		P-253	J-342	J-277	166.27	12.00	110.00	10.24	0.03	0.00	0.00	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	12.00	110.00	-68.43	0.19	0.02	0.02	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	20.28	0.23	0.06	0.07	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	15.16	0.17	0.01	0.04	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	377.71	1.07	0.42	0.57	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	451.25	1.28	0.34	0.79	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	471.73	1.34	0.12	0.86	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-46.34	0.53	0.11	0.34	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.00	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	61.70	0.70	0.02	0.58	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	359.08	2.29	4.72	3.73	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-66.82	0.76	0.13	0.67	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-209.47	0.59	0.01	0.19	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.61	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	8.00	110.00	5.76	0.04	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-328.21	2.09	5.07	3.16	Open
186		P-281	J-273	J-318	140.95	6.00	110.00	-4.48	0.05	0.00	0.01	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.00	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.24	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.48	0.23	0.02	0.07	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.01	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.00	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	38.93	0.25	0.08	0.06	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.25	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.37	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.61	0.69	0.00	0.57	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	140.19	1.59	1.37	2.66	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-173.45	0.49	0.05	0.13	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.48	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-214.59	0.61	0.06	0.20	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-173.63	1.97	0.29	3.95	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-168.51	1.91	0.26	3.73	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.00	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	145.31	1.65	0.18	2.84	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-150.43	1.71	0.06	3.03	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.00	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.25	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-177.15	2.01	0.04	4.10	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.13	0.06	0.00	0.01	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-40.75	0.26	0.02	0.07	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.01	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	12.00	110.00	25.60	0.07	0.00	0.00	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.08	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.01	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-10.03	0.03	0.00	0.00	Open
237		P-330	J-266	J-313	206.46	12.00	110.00	-1.18	0.00	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	12.00	110.00	-30.72	0.09	0.00	0.01	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	12.00	110.00	9.06	0.03	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	12.00	110.00	3.94	0.01	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	84.79	0.54	0.02	0.25	Open
248		P-340	J-287	J-206	239.33	12.00	110.00	61.66	0.17	0.00	0.02	Open
249		P-341	J-178	J-287	70.36	12.00	110.00	66.78	0.19	0.00	0.02	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.72	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.84	0.41	0.01	0.22	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253		P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.01	Open
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255		P-347	J-111	J-284	43.43	6.00	110.00	22.31	0.25	0.00	0.09	Open
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257		P-349	J-265	J-264	236.64	12.00	110.00	-10.24	0.03	0.00	0.00	Open
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259		P-350	J-265	J-265A	252.43	12.00	110.00	5.12	0.01	0.00	0.00	Open
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262		P-353	J-281	J-282	60.97	6.00	110.00	-40.13	0.46	0.02	0.26	Open
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264		P-355	J-123	J50	205.02	6.00	110.00	-29.89	0.34	0.03	0.15	Open
265		P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266		P-357	J-285	J-306	386.52	6.00	110.00	12.06	0.14	0.01	0.03	Open
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268		P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269		P-361	J-295	J-295A	196.76	12.00	110.00	451.00	1.28	0.16	0.79	Open
270		P-361A	J-295A	J-239	291.39	12.00	110.00	445.88	1.26	0.23	0.77	Open
271		P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272		P-363	J-336	J-345	166.85	10.00	110.00	384.69	1.57	0.24	1.43	Open
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274		P-369	J-278	J-295	165.68	12.00	110.00	456.12	1.29	0.13	0.81	Open
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.00	Open
278		P-371	J-358	J64	110.10	8.00	110.00	-1,028.61	6.57	2.89	26.22	Open
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280		P-374	J-350	J-153	30.43	12.00	110.00	-178.57	0.51	0.00	0.14	Open
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284		P-378J	J-378	J-299	400.51	6.00	110.00	-183.87	2.09	1.76	4.39	Open
285		P-379	J-119	J-359	917.88	8.00	110.00	80.34	0.51	0.21	0.23	Open
286		P-38	J-183	J-186	1,090.53	8.00	110.00	353.76	2.26	3.96	3.63	Open
287		P-380	J-119	J-359	917.88	8.00	110.00	80.34	0.51	0.21	0.23	Open
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	254.18	1.62	0.59	1.97	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	249.06	1.59	0.21	1.89	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	12.00	110.00	425.65	1.21	0.87	0.71	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	387.57	2.47	2.75	4.30	Open
301		P-390	J-315	J46	657.48	12.00	110.00	372.59	1.06	0.36	0.55	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	0.20	0.00	0.00	0.00	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-4.92	0.06	0.00	0.01	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-10.04	0.06	0.01	0.00	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	364.20	2.32	1.89	3.83	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	461.24	1.31	0.06	0.82	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-548.55	1.56	0.43	1.14	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	369.33	2.36	8.00	3.93	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	691.60	4.41	0.85	12.57	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.57	0.42	0.01	0.16	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	908.80	5.80	7.97	20.85	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	269.54	1.72	1.21	2.20	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.25	0.07	0.00	0.01	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,673.15	4.75	4.95	8.96	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.09	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.21	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.33	0.36	0.00	0.12	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.85	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.85	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.01	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,278.02	6.46	7.86	15.87	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,678.27	4.76	0.13	9.02	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,719.23	4.88	1.36	9.42	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,714.11	4.86	3.50	9.37	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,283.14	6.48	3.72	15.93	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-274.66	1.75	0.20	2.27	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-364.03	1.49	0.30	1.29	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,137.38	7.26	9.00	31.59	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	712.08	4.55	6.36	13.27	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	706.96	4.51	1.86	13.09	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.72	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.02	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-420.18	2.68	1.38	5.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363		P-9	J-113	J-104	183.55	10.00	110.00	-379.39	1.55	0.26	1.39	Open
364		P-90	J-133	J-134	116.30	8.00	110.00	233.70	1.49	0.20	1.69	Open
365		P-93	J-209	J-247	44.60	8.00	110.00	-264.42	1.69	0.09	2.12	Open
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367		P-95	J-221	J-162	263.63	8.00	110.00	374.09	2.39	1.06	4.03	Open
368		P-96	J-163	J-162	264.20	8.00	110.00	-368.97	2.36	1.04	3.93	Open
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370		P-98	J-172	J-163	39.90	8.00	110.00	-363.85	2.32	0.15	3.83	Open
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,023.49	6.53	2.19	25.98	Open
373		P-J106	J-252	J-106	417.04	8.00	110.00	178.07	1.14	0.42	1.02	Open
374		P-J286	J-363	J-286	10.63	6.00	110.00	82.18	0.93	0.01	0.99	Open
375		P-J335	J-335	J-286	287.42	6.00	110.00	-77.06	0.87	0.25	0.88	Open
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.01	Open
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,476.85	22.19	11.83	250.20	Open
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	3,476.84	22.19	18.46	250.20	Open
393		P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,562.93	7.27	5.47	19.74	Open
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395		P126	J-242	J-376	11.13	8.00	110.00	469.49	3.00	0.07	6.12	Open
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397		P128	J-344	J-393	9.32	12.00	110.00	-163.21	0.46	0.00	0.13	Open
398		P130	J10	J14	116.51	10.00	110.00	319.20	1.30	0.12	1.01	Open
399		P132	J14	M8-2H	217.35	8.00	110.00	91.95	0.59	0.07	0.30	Open
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	91.95	0.59	0.07	0.30	Open
401		P136	M8-3H	J16	275.97	8.00	110.00	91.95	0.59	0.08	0.30	Open
402		P138	J16	J12	16.19	10.00	110.00	308.96	1.26	0.02	0.95	Open
403		P140	J16	M8-4H	42.30	10.00	110.00	-222.13	0.91	0.02	0.52	Open
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-222.13	0.91	0.14	0.52	Open
405		P144	M8-5H	J14	116.30	10.00	110.00	-222.13	0.91	0.06	0.52	Open
406		P146	J12	J-102	126.72	10.00	110.00	303.84	1.24	0.12	0.92	Open
407		P148	J20	J22	6.79	12.00	110.00	-20.27	0.06	0.00	0.00	Open
408		P150	J22	J-161	73.04	8.00	110.00	-25.39	0.16	0.00	0.03	Open
409		P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.01	Open
410		P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.00	Open
411		P156	J32	J40	349.41	12.00	110.00	14.18	0.04	0.00	0.00	Open
412		P158	J30	J28	652.66	12.00	110.00	36.06	0.10	0.00	0.01	Open
413		P160	J-313	J32	17.72	6.00	110.00	24.42	0.28	0.00	0.10	Open
414		P162	J30	J-207	49.17	12.00	110.00	-19.62	0.06	0.00	0.00	Open
415		P164	J30	J36	31.14	12.00	110.00	-17.62	0.05	0.00	0.00	Open
416		P166	J36	J-207	18.03	12.00	110.00	-22.74	0.06	0.00	0.00	Open
417		P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418		P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422		P178	J44	J-236	15.32	8.00	110.00	-1,033.73	6.60	0.41	26.46	Open
423		P180	J42	J-190	51.62	8.00	110.00	-1,043.97	6.66	1.39	26.95	Open
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425		P184	J48	J46	1,260.92	6.00	110.00	63.31	0.72	0.77	0.61	Open
426		P186	J46	J-366	444.59	12.00	110.00	430.77	1.22	0.32	0.73	Open
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428		P190	J40	J38	318.75	12.00	110.00	9.06	0.03	0.00	0.00	Open
429		P192	J38	J30	286.67	12.00	110.00	3.94	0.01	0.00	0.00	Open
430		P194	J50	J-281	85.58	6.00	110.00	-35.01	0.40	0.02	0.20	Open
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432		P198	J52	J54	266.38	8.00	110.00	20.48	0.13	0.01	0.02	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.43	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.00	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,688.51	4.79	0.32	9.11	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,028.61	6.57	7.72	26.22	Open
445		P224	J-344	J-106	395.17	12.00	110.00	298.28	0.85	0.15	0.37	Open
446		P226	J-106	J-104	393.05	12.00	110.00	471.23	1.34	0.34	0.86	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.85	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.71	0.04	0.00	0.00	Open
449		P232	J74	J-241	28.57	12.00	110.00	-1.49	0.00	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	14.87	0.04	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	29.14	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-22.51	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-11.70	0.03	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-34.21	0.10	0.00	0.01	Open
456		P246	J78	J84	490.51	12.00	110.00	14.87	0.04	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	1.36	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	6.63	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	6.63	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	8.24	0.09	0.00	0.01	Open
461		P256	J78	J76	5.94	12.00	110.00	-49.08	0.14	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	60.79	0.39	0.00	0.14	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.03	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-1,009.38	6.44	4.66	25.32	Open

APPENDIX I

Item 5 – Water Modeling Results: Low Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events (Includes Transmission line from Well 7 to Observation Hill Reservoir)

Low Zone 2 hr 2020 MDD FF with Improvements Pump Report Including Transmission line

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	125.14	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.68	263.02	2,925.14	608.58	Open	1.00	0.00	0.00

Low Zone 2 hr 2020 MDD FF with Improvements Tank Report Including Transmission line

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	992.01	2,629.54	2,647.79	82.95	18.25
2		RES-OBS-2	934.02	2,629.54	2,647.79	82.95	18.25

Low Zone 2 hr 2020 MDD FF with Improvements Tank 2647.79 Hydrant Report Including Transmission line

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	J12-7L	25.55	2,640.97	5,135.92	6,546.67	J12-7L	14.22	2,614.81	5,137.19	5,135.92
2		I13-2L	3,000.00	J12-7L	26.06	2,642.14	5,513.39	8,863.88	J12-7L	4.52	2,592.43	5,515.23	5,513.39
3		I14-1L	3,000.00	J12-7L	26.45	2,643.03	5,802.64	5,928.07	J12-7L	19.58	2,627.18	5,804.77	5,802.64
4		I14-2L	3,000.00	J12-7L	27.25	2,644.89	6,431.66	15,036.83	J12-7L	-23.71	2,527.28	6,432.27	6,431.66
5		I14-3L	3,000.00	J12-7L	25.90	2,641.77	5,393.91	7,705.19	J12-7L	10.03	2,605.14	5,395.59	5,393.91
6		J12-10L	3,000.00	J12-10L	19.05	2,621.96	2,870.93	2,870.96	J12-10L	20.00	2,624.16	2,870.93	2,870.93
7		J12-11L	3,000.00	L13-1H	30.34	2,623.02	4,253.64	29,246.01	L13-1H	-721.76	887.26	4,255.22	4,253.64
8		J12-1L	3,000.00	J12-1L	-136.58	2,206.34	1,201.24	1,201.16	J12-1L	20.00	2,567.70	1,201.16	1,201.16
9		J12-2L	3,000.00	J12-2L	-38.61	2,416.44	1,878.35	1,878.33	J12-2L	20.00	2,551.70	1,878.33	1,878.33
10		J12-3L	3,000.00	J12-4L	-33.94	2,465.22	1,632.35	1,915.32	J12-4L	11.10	2,569.15	1,632.26	1,632.26
11		J12-4L	3,000.00	J12-4L	-123.49	2,258.54	1,084.93	1,084.91	J12-4L	20.00	2,589.70	1,084.91	1,084.91
12		J12-7L	3,000.00	J12-7L	21.36	2,631.30	3,262.85	3,262.94	J12-7L	20.00	2,628.16	3,262.94	3,262.85
13		J12-9L	3,000.00	J12-9L	-107.22	2,285.56	1,230.96	1,230.87	J12-9L	20.00	2,579.16	1,230.88	1,230.88
14		J13-10L	3,000.00	J12-7L	25.75	2,641.43	5,284.57	6,120.95	J12-7L	16.81	2,620.80	5,286.08	5,284.57
15		J13-11L	3,000.00	J13-11L	45.01	2,606.87	4,766.75	4,763.19	J13-11L	20.00	2,549.16	4,763.18	4,763.18
16		J13-12L	3,000.00	J12-7L	25.17	2,640.08	4,847.73	5,593.56	J12-7L	17.04	2,621.33	4,848.41	4,847.73
17		J13-7L	3,000.00	J12-7L	24.63	2,638.83	4,465.99	6,491.39	J12-7L	10.61	2,606.49	4,464.16	4,464.16
18		J13-8L	3,000.00	J13-8L	-189.61	2,101.94	937.02	937.06	J13-8L	20.00	2,585.70	937.06	937.02
19		J13-9L	3,000.00	J13-9L	27.47	2,599.40	3,512.68	3,512.77	J13-9L	20.00	2,582.16	3,512.78	3,512.68
20		J14-2L	3,000.00	K15-16L	22.89	2,644.83	5,589.22	9,569.11	K15-16L	12.20	2,620.16	5,591.92	5,589.22
21		J14-3L	3,000.00	J12-7L	26.56	2,643.29	5,953.25	10,043.68	J12-7L	2.03	2,586.70	5,955.09	5,953.25
22		J14-4L	3,000.00	K15-16L	23.07	2,645.24	5,991.93	10,865.45	K15-16L	10.31	2,615.79	5,992.17	5,991.93
23		J14-5L	3,000.00	J12-7L	26.18	2,642.42	5,572.10	7,995.46	J12-7L	10.04	2,605.17	5,573.10	5,572.10
24		J14-6L	3,000.00	J12-7L	27.18	2,644.73	6,498.54	13,254.67	J12-7L	-13.19	2,551.55	6,502.49	6,498.54
25		J14-7L	3,000.00	J14-7L	30.26	2,545.38	3,349.20	3,349.36	J14-7L	20.00	2,521.70	3,349.36	3,349.20
26		J14-8L	3,000.00	J14-8L	35.73	2,586.45	3,826.74	3,826.79	J14-8L	20.00	2,550.16	3,826.81	3,826.74
27		J15-1L	3,000.00	K15-16L	23.00	2,645.08	5,821.89	7,833.12	K15-16L	16.56	2,630.23	5,822.10	5,821.89
28		J15-2L	3,000.00	K15-16L	22.77	2,644.54	5,395.29	5,687.06	K15-16L	19.56	2,637.15	5,396.43	5,395.29
29		J15-3L	3,000.00	J15-3L	31.44	2,526.10	3,329.62	3,329.62	J15-3L	20.00	2,499.70	3,329.63	3,329.62
30		J15-4L	3,000.00	K15-16L	22.39	2,643.67	4,719.00	7,413.96	K15-16L	14.69	2,625.91	4,719.94	4,719.00
31		J15-5L	3,000.00	J15-5L	29.32	2,521.21	3,260.73	3,260.73	J15-5L	20.00	2,499.70	3,260.73	3,260.73
32		J15-7L	3,000.00	J15-7L	-981.21	179.04	681.98	681.97	J15-7L	20.00	2,489.70	681.97	681.97
33		J15-8L	3,000.00	K15-16L	21.60	2,641.84	3,875.68	7,343.19	K15-16L	11.27	2,618.00	3,876.94	3,875.68
34		J15-9L	3,000.00	J15-9L	14.48	2,511.96	2,847.17	2,845.80	J15-9L	20.00	2,524.70	2,845.80	2,845.80
35		J16-1L	3,000.00	J16-1L	31.26	2,495.69	3,262.56	3,265.55	J16-1L	20.00	2,469.70	3,265.55	3,262.56
36		J16-2L	3,000.00	J16-2L	-36.59	2,364.08	2,152.37	2,152.36	J16-2L	20.00	2,494.70	2,152.36	2,152.36
37		J16-3L	3,000.00	K15-16L	21.16	2,640.83	3,570.10	4,763.52	K15-16L	17.15	2,631.57	3,570.40	3,570.10
38		J16-4L	3,000.00	K15-16L	21.37	2,641.33	3,711.15	3,839.94	K15-16L	19.73	2,637.54	3,711.74	3,711.15
39		K-120101	3,000.00	K12-3L	28.21	2,605.65	3,648.10	4,498.26	K12-3L	7.43	2,557.69	3,648.20	3,648.10
40		K10-1L	3,000.00	K10-1L	-89.30	2,347.46	1,128.26	1,128.15	K10-1L	20.00	2,599.70	1,128.15	1,128.15
41		K11-10L	3,000.00	J12-7L	24.16	2,637.76	4,080.47	4,117.59	J12-7L	19.86	2,627.83	4,083.75	4,080.47
42		K11-11L	3,000.00	J12-7L	24.13	2,637.68	4,066.43	4,650.96	J12-7L	17.55	2,622.50	4,069.57	4,066.43
43		K11-12L	3,000.00	J12-7L	24.34	2,638.18	4,153.92	5,048.75	J12-7L	16.38	2,619.80	4,157.81	4,153.92
44		K11-1L	3,000.00	K10-1L	30.45	2,623.82	4,302.15	5,213.34	K10-1L	11.33	2,579.70	4,303.16	4,302.15
45		K11-2L	3,000.00	J12-7L	24.80	2,639.24	4,363.03	5,426.92	J12-7L	15.88	2,618.66	4,363.08	4,363.03
46		K11-3L	3,000.00	K11-3L	-30.17	2,469.91	1,712.72	1,712.66	K11-3L	20.00	2,585.70	1,712.66	1,712.66
47		K11-4L	3,000.00	J12-7L	24.37	2,638.25	4,165.24	5,560.48	J12-7L	14.08	2,614.48	4,169.23	4,165.24
48		K11-5L	3,000.00	J12-7L	24.25	2,637.97	4,115.59	5,040.05	J12-7L	16.20	2,619.38	4,119.15	4,115.59

Low Zone 2 hr 2020 MDD FF with Improvements Tank 2647.79 Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
49		K11-6L	3,000.00	J12-7L	24.24	2,637.95	4,113.01	4,677.89	J12-7L	17.68	2,622.79	4,116.54	4,113.01
50		K11-9L	3,000.00	K11-9L	12.85	2,547.66	2,726.30	2,726.30	K11-9L	20.00	2,564.16	2,726.29	2,726.29
51		K12-2L	3,000.00	K12-2L	19.11	2,583.64	2,949.76	2,948.81	K12-2L	20.00	2,585.70	2,948.79	2,948.79
52		K12-3L	3,000.00	K12-3L	17.61	2,581.17	2,868.06	2,865.64	K12-3L	20.00	2,586.70	2,865.63	2,865.63
53		K12-4L	3,000.00	K12-4L	18.07	2,563.71	2,916.27	2,915.13	K12-4L	20.00	2,568.16	2,915.12	2,915.12
54		K14-10L	3,000.00	K15-16L	21.71	2,642.10	3,965.27	7,017.81	K15-16L	12.82	2,621.59	3,966.96	3,965.27
55		K14-2L	3,000.00	J12-7L	26.64	2,643.48	5,945.86	8,278.98	J12-7L	11.53	2,608.61	5,945.08	5,945.08
56		K14-3L	3,000.00	K14-3L	27.85	2,593.81	3,489.79	3,491.29	K14-3L	20.00	2,575.70	3,491.30	3,489.79
57		K14-4L	3,000.00	K14-4L	-23.48	2,471.35	1,912.22	1,912.19	K14-4L	20.00	2,571.70	1,912.20	1,912.20
58		K14-5L	3,000.00	K15-10L	23.11	2,632.86	3,661.39	7,023.00	K15-10L	-2.14	2,574.61	3,661.59	3,661.39
59		K14-7L	3,000.00	J12-7L	26.92	2,644.14	6,038.48	9,508.72	J12-7L	6.63	2,597.30	6,036.45	6,036.45
60		K14-8L	3,000.00	J12-7L	27.48	2,645.42	6,649.30	9,052.95	J12-7L	12.54	2,610.94	6,646.33	6,646.33
61		K14-9L	3,000.00	L15-5L	25.00	2,623.23	3,655.42	4,041.11	L15-5L	16.70	2,604.09	3,658.89	3,655.42
62		K15-10L	3,000.00	K15-10L	-4.67	2,568.76	1,513.28	1,513.19	K15-10L	20.00	2,625.70	1,513.19	1,513.19
63		K15-11L	3,000.00	K15-11L	5.48	2,601.65	1,493.56	1,494.22	K15-11L	20.00	2,635.16	1,494.20	1,493.56
64		K15-12L	3,000.00	K15-16L	17.31	2,631.96	2,271.62	3,486.25	K15-16L	15.15	2,626.97	2,270.42	2,270.42
65		K15-13L	3,000.00	K15-16L	18.76	2,635.29	2,599.47	3,902.99	K15-16L	15.42	2,627.58	2,599.38	2,599.38
66		K15-14L	3,000.00	K15-16L	19.62	2,637.28	2,860.79	4,572.19	K15-16L	14.32	2,625.06	2,860.78	2,860.78
67		K15-15L	3,000.00	K15-10L	15.56	2,615.46	2,459.11	3,322.68	K15-10L	12.55	2,608.51	2,458.99	2,458.99
68		K15-16L	3,000.00	K15-16L	3.29	2,599.59	1,266.30	1,267.17	K15-16L	20.00	2,638.16	1,267.16	1,266.30
69		K15-17L	3,000.00	K15-16L	20.27	2,638.77	3,109.09	5,500.73	K15-16L	12.52	2,620.90	3,109.12	3,109.09
70		K15-18L	3,000.00	K15-18L	5.50	2,512.69	2,574.55	2,574.55	K15-18L	20.00	2,546.16	2,574.55	2,574.55
71		K15-1L	3,000.00	K15-10L	23.00	2,632.62	3,631.60	6,961.51	K15-10L	-2.12	2,574.66	3,631.77	3,631.60
72		K15-2L	3,000.00	K15-10L	22.93	2,632.46	3,612.15	6,938.69	K15-10L	-2.25	2,574.35	3,612.31	3,612.15
73		K15-3L	3,000.00	K15-10L	22.99	2,632.59	3,628.75	6,189.15	K15-10L	4.06	2,588.91	3,628.92	3,628.75
74		K15-4L	3,000.00	K15-16L	21.04	2,640.55	3,487.33	7,369.54	K15-16L	8.19	2,610.90	3,487.46	3,487.33
75		K15-5L	3,000.00	K15-16L	21.31	2,641.18	3,665.97	7,847.34	K15-16L	8.04	2,610.55	3,666.48	3,665.97
76		K15-6L	3,000.00	K15-10L	23.31	2,633.34	3,720.48	7,913.61	K15-10L	-8.94	2,558.90	3,720.74	3,720.48
77		K15-7L	3,000.00	K15-16L	21.18	2,640.88	3,576.23	7,082.91	K15-16L	10.04	2,615.17	3,576.47	3,576.23
78		K15-8L	3,000.00	K15-8L	3.99	2,597.21	1,477.08	1,477.99	K15-8L	20.00	2,634.16	1,477.99	1,477.08
79		K15-9L	3,000.00	K15-9L	7.35	2,600.51	1,778.12	1,778.94	K15-9L	20.00	2,629.70	1,778.94	1,778.12
80		K16-2L	3,000.00	K16-2L	15.82	2,558.06	2,820.98	2,820.99	K16-2L	20.00	2,567.70	2,820.98	2,820.98
81		K16-3L	3,000.00	L16-1L	5.77	2,574.86	2,168.45	2,439.39	L16-1L	15.78	2,597.96	2,168.48	2,168.45
82		K16-4L	3,000.00	K16-5L	-96.69	2,310.86	1,229.29	1,328.21	K16-5L	15.68	2,570.20	1,230.20	1,229.29
83		K16-5L	3,000.00	K16-5L	-138.22	2,215.01	1,075.57	1,076.36	K16-5L	20.00	2,580.16	1,076.35	1,075.57
84		K17-1L	3,000.00	K17-1L	-105.61	2,233.81	1,546.83	1,547.00	K17-1L	20.00	2,523.70	1,547.00	1,546.83
85		K17-2L	3,000.00	K16-5L	5.85	2,547.51	2,404.30	2,574.41	K16-5L	16.23	2,571.45	2,404.37	2,404.30
86		K17-3L	3,000.00	K16-5L	-26.10	2,473.76	1,763.50	1,982.66	K16-5L	13.33	2,564.76	1,763.64	1,763.50
87		K17-4L	3,000.00	K17-4L	-56.43	2,313.32	1,993.65	1,993.65	K17-4L	20.00	2,489.70	1,993.64	1,993.64
88		K17-5L	3,000.00	K17-5L	-7.66	2,425.86	2,494.29	2,494.30	K17-5L	20.00	2,489.70	2,494.30	2,494.29
89		K17-6L	3,000.00	K16-5L	14.38	2,567.19	2,718.82	2,990.19	K16-5L	14.59	2,567.66	2,718.84	2,718.82
90		K17-7L	3,000.00	K16-5L	-39.92	2,441.86	1,608.39	1,627.64	K16-5L	19.39	2,578.76	1,608.93	1,608.39
91		K17-8L	3,000.00	K17-8L	-38.04	2,389.76	2,005.33	2,005.34	K17-8L	20.00	2,523.70	2,005.33	2,005.33
92		K18-1L	3,000.00	K18-1L	-143.16	2,123.15	1,506.58	1,506.63	K18-1L	20.00	2,499.70	1,506.62	1,506.58
93		L13-1H	3,000.00	L13-1H	-25.22	2,494.80	1,617.39	1,617.15	L13-1H	20.00	2,599.16	1,617.15	1,617.15
94		L13-2H	3,000.00	L13-2H	-26.67	2,491.46	1,601.30	1,601.04	L13-2H	20.00	2,599.16	1,601.04	1,601.04
95		L14-3L	3,000.00	L15-4L	33.61	2,643.10	8,056.99	8,873.81	L15-4L	17.00	2,604.78	8,061.95	8,056.99
96		L14-4L	3,000.00	L14-4L	17.24	2,603.33	2,766.41	2,763.75	L14-4L	20.00	2,609.70	2,763.75	2,763.75

Low Zone 2 hr 2020 MDD FF with Improvements Tank 2647.79 Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
97		L15-3L	3,000.00	L15-3L	1.96	2,568.06	2,025.04	2,025.06	L15-3L	20.00	2,609.70	2,025.06	2,025.04
98		L15-4L	3,000.00	L15-4L	13.98	2,597.81	2,524.29	2,524.29	L15-4L	20.00	2,611.70	2,524.29	2,524.29
99		L15-5L	3,000.00	L15-5L	15.95	2,602.35	2,656.57	2,656.56	L15-5L	20.00	2,611.70	2,656.56	2,656.56
100		L15-6L	3,000.00	L15-5L	16.79	2,604.29	2,718.69	2,725.63	L15-5L	19.92	2,611.52	2,718.67	2,718.67
101		L15-7L	3,000.00	L15-7L	9.77	2,604.55	1,965.46	1,967.09	L15-7L	20.00	2,628.16	1,967.10	1,965.46
102		L16-1L	3,000.00	L16-1L	0.55	2,562.81	1,996.81	1,996.84	L16-1L	20.00	2,607.70	1,996.84	1,996.81
103		L16-2L	3,000.00	L16-2L	2.88	2,545.19	2,304.33	2,304.34	L16-2L	20.00	2,584.70	2,304.34	2,304.33
104		L16-3L	3,000.00	L16-3L	-151.75	2,193.33	989.41	988.44	L16-3L	20.00	2,589.70	988.44	988.44
105		L16-4L	3,000.00	L16-3L	-43.69	2,442.71	1,517.12	1,517.13	L16-3L	20.00	2,589.70	1,517.13	1,517.12

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report Including Transmission line

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,119.92	3.18	0.07	3.63	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-55.75	0.63	0.05	0.41	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	90.93	1.03	0.21	1.01	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	137.18	0.88	0.08	0.54	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-137.18	0.39	0.01	0.07	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-138.33	0.88	0.05	0.54	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-138.33	0.88	0.18	0.54	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	265.81	1.70	0.03	1.82	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	265.81	1.70	0.23	1.82	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	273.33	1.74	0.19	1.92	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,119.92	3.18	0.11	3.62	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	136.98	1.55	0.15	2.17	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	321.62	2.05	0.21	2.59	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-19.55	0.12	0.01	0.01	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	224.78	0.64	0.16	0.18	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-972.76	2.76	1.09	2.79	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	0.19	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.31	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	40.03	0.26	0.02	0.05	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-17.97	0.20	0.01	0.05	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	29.29	0.33	0.02	0.13	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	842.81	2.39	0.61	2.14	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	22.59	0.09	0.00	0.00	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-32.29	0.13	0.00	0.01	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.59	0.22	0.02	0.06	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-529.85	1.50	0.25	0.91	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.89	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.89	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-36.62	0.42	0.10	0.19	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-17.22	0.11	0.00	0.01	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	615.98	1.75	0.58	1.20	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-56.97	0.65	0.11	0.43	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-86.07	0.98	0.13	0.92	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	615.98	1.75	0.30	1.20	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-76.37	0.87	0.16	0.73	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-56.97	0.65	0.02	0.42	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-768.19	2.18	0.25	1.80	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-95.77	1.09	0.45	1.12	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.61	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.91	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	234.48	0.67	0.08	0.20	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-768.19	2.18	0.04	1.81	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	341.18	2.18	0.35	2.89	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	273.28	1.74	0.27	1.92	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	194.34	1.24	0.23	1.02	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	194.34	1.24	0.08	1.02	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	72.50	0.21	0.00	0.02	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-639.51	1.81	0.75	1.28	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	72.50	0.21	0.00	0.02	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	93.59	0.27	0.01	0.04	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-46.05	0.52	0.10	0.29	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-55.75	0.63	0.06	0.41	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.08	0.28	0.04	0.09	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.08	0.28	0.03	0.09	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	34.78	0.39	0.06	0.17	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	547.08	2.23	0.23	2.34	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	34.78	0.39	0.05	0.17	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-303.26	0.86	0.12	0.32	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	303.26	1.94	0.43	2.33	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	118.97	0.76	0.11	0.41	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	118.97	0.76	0.16	0.41	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	99.57	0.64	0.18	0.30	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	118.97	0.76	0.14	0.41	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	118.97	0.76	0.01	0.41	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	118.97	0.76	0.12	0.41	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	109.27	0.70	0.03	0.35	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-739.09	2.10	1.01	1.68	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-81.71	0.93	0.14	0.83	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	200.71	0.57	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	191.01	0.54	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-71.09	0.20	0.00	0.02	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-220.11	0.62	0.08	0.18	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	220.11	0.62	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	29.29	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	527.68	2.16	0.44	2.19	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	29.29	0.33	0.02	0.12	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	69.29	0.79	0.05	0.61	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	69.29	0.79	0.14	0.61	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-93.59	0.27	0.00	0.04	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-93.59	0.27	0.00	0.04	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	286.44	1.83	0.61	2.09	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.02	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	286.44	1.83	0.75	2.09	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	286.44	1.83	0.73	2.09	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-364.60	2.33	0.13	3.27	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	261.54	1.67	0.32	1.77	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	556.78	3.55	0.43	7.16	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-333.54	2.13	1.11	2.77	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-193.53	1.24	0.08	1.01	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	375.31	1.06	0.30	0.48	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-216.92	0.89	0.10	0.42	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	220.11	0.62	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	210.41	0.60	0.07	0.16	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	140.01	0.40	0.02	0.08	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	173.43	1.11	0.36	0.83	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	566.48	2.31	0.10	2.50	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	91.78	0.59	0.05	0.25	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-576.19	1.63	0.07	1.06	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	143.68	1.63	0.45	2.37	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	64.26	0.73	0.11	0.53	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	137.46	0.56	0.03	0.18	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-137.46	0.56	0.09	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	137.46	0.56	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	137.46	0.56	0.01	0.18	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-585.89	1.66	0.36	1.09	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-54.56	0.35	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-87.86	1.00	0.19	0.95	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.10	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-585.89	1.66	0.29	1.09	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-71.95	0.46	0.11	0.16	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	14.18	0.16	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-23.88	0.27	0.05	0.09	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	181.31	0.51	0.04	0.12	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,357.68	3.85	1.37	5.18	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-161.91	0.46	0.01	0.10	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-173.88	1.97	0.17	3.37	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	208.66	2.37	0.71	4.72	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	189.26	1.21	0.49	0.97	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-120.25	0.77	0.10	0.42	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-309.52	1.98	0.80	2.41	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,338.28	3.80	2.76	5.04	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-171.18	1.09	0.17	0.81	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-132.38	0.84	0.16	0.50	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	78.99	0.90	0.32	0.78	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	72.50	0.21	0.01	0.02	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	208.66	0.85	0.14	0.39	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	156.38	1.77	0.47	2.77	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	537.38	2.20	0.20	2.26	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,953.28	5.54	0.95	10.16	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-496.93	1.41	0.10	0.81	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-457.24	1.30	0.10	0.69	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,925.14	8.30	2.11	21.46	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	971.87	2.76	10.08	2.79	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-335.70	1.37	0.04	0.95	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-26.92	0.31	0.06	0.11	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	253.99	2.88	0.81	6.80	Open	0
201		P113	J72	J70	229.97	8.00	120.00	253.99	1.62	0.39	1.67	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-253.99	1.04	0.08	0.56	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	174.13	0.49	0.00	0.13	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-120.89	0.77	0.06	0.42	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-130.59	0.83	0.03	0.49	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	101.49	0.65	0.10	0.31	Open	0
209		P23	J24	J22	147.66	8.00	120.00	91.79	0.59	0.04	0.25	Open	0
210		P25	J22	J20	76.49	8.00	120.00	82.09	0.52	0.02	0.21	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	341.18	2.18	0.44	2.89	Open	0
214		P33	J18	J20	237.74	8.00	120.00	200.88	1.28	0.26	1.08	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.70	0.11	0.00	0.01	Open	0

Low Zone 2 hr 2020 MDD FF with Improvements Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217	P39	J36	J16	251.95	8.00	120.00	90.49	0.58	0.06	0.25	Open	0
218	P41	J16	J14	364.77	8.00	120.00	80.79	0.52	0.07	0.20	Open	0
219	P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220	P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221	P47	J34	J36	96.54	10.00	120.00	-226.62	0.93	0.04	0.46	Open	0
222	P49	J36	J-216	411.83	10.00	120.00	-326.81	1.33	0.37	0.90	Open	0
223	P51	K11-5L	J14	78.82	12.00	120.00	-71.09	0.20	0.00	0.02	Open	0
224	P53	J-217	J38	40.11	10.00	120.00	12.89	0.05	0.00	0.00	Open	0
225	P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226	P57	K11-4L	J40	50.14	10.00	120.00	-22.59	0.09	0.00	0.00	Open	0
227	P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228	P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229	P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230	P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231	P67	J46	J14-2L	267.66	8.00	120.00	-129.95	0.83	0.13	0.48	Open	0
232	P71	J26	J48	30.72	8.00	120.00	-111.19	0.71	0.01	0.36	Open	0
233	P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234	P75	I13-2L	I14-3L	261.95	10.00	120.00	241.24	0.99	0.13	0.51	Open	0
235	P77	I14-3L	J13-10L	320.82	10.00	120.00	241.24	0.99	0.16	0.51	Open	0
236	P79	J13-10L	J13-11L	244.28	8.00	120.00	241.24	1.54	0.37	1.52	Open	0
237	P81	J13-11L	J-228	132.88	8.00	120.00	241.24	1.54	0.20	1.52	Open	0
238	P83	J-228	J-229	166.40	6.00	120.00	241.24	2.74	1.03	6.18	Open	0
239	P85	J12-3L	J-271	46.04	6.00	120.00	19.40	0.22	0.00	0.06	Open	0
240	P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241	P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242	P91	J-220	J-215	304.83	12.00	110.00	210.87	0.60	0.06	0.19	Open	0
243	P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244	P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245	P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246	WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	495.09	1.40	0.15	0.80	Open	0
247	WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	476.78	1.35	0.15	0.75	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pump Report Including Transmission line

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	124.63	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.68	262.51	2,930.73	607.42	Open	1.00	0.00	0.00

Low Zone 3 hr 2020 MDD FF with Improvements Tank Report Including Transmission line

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	994.90	2,629.54	2,646.58	77.45	17.04
2		RES-OBS-2	936.72	2,629.54	2,646.58	77.45	17.04

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report Including Transmission line

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	I13-1L	3,000.00	J12-7L	25.03	2,639.77	4,987.74	6,520.22	J12-7L	13.83	2,613.92	4,989.05	4,987.74
2	I13-2L	3,000.00	J12-7L	25.54	2,640.94	5,362.13	8,833.44	J12-7L	4.20	2,591.68	5,364.10	5,362.13
3	I14-1L	3,000.00	J12-7L	25.93	2,641.83	5,650.12	5,907.97	J12-7L	19.14	2,626.16	5,652.48	5,650.12
4	I14-2L	3,000.00	J12-7L	26.73	2,643.69	6,269.70	15,004.72	J12-7L	-23.96	2,526.70	6,270.44	6,269.70
5	I14-3L	3,000.00	J12-7L	25.38	2,640.57	5,243.44	7,677.71	J12-7L	9.67	2,604.31	5,245.23	5,243.44
6	J12-10L	3,000.00	J12-10L	18.53	2,620.77	2,798.79	2,798.82	J12-10L	20.00	2,624.16	2,798.79	2,798.79
7	J12-11L	3,000.00	L13-1H	29.83	2,621.83	4,197.28	29,240.63	L13-1H	-721.89	886.97	4,198.61	4,197.28
8	J12-1L	3,000.00	J12-1L	-137.09	2,205.15	1,191.60	1,191.52	J12-1L	20.00	2,567.70	1,191.52	1,191.52
9	J12-2L	3,000.00	J12-2L	-39.12	2,415.25	1,865.93	1,865.91	J12-2L	20.00	2,551.70	1,865.91	1,865.91
10	J12-3L	3,000.00	J12-4L	-34.45	2,464.03	1,614.54	1,899.86	J12-4L	11.10	2,569.15	1,614.42	1,614.42
11	J12-4L	3,000.00	J12-4L	-124.01	2,257.35	1,073.04	1,073.03	J12-4L	20.00	2,589.70	1,073.03	1,073.03
12	J12-7L	3,000.00	J12-7L	20.84	2,630.10	3,164.90	3,164.97	J12-7L	20.00	2,628.16	3,164.93	3,164.90
13	J12-9L	3,000.00	J12-9L	-107.73	2,284.36	1,219.47	1,219.37	J12-9L	20.00	2,579.16	1,219.37	1,219.37
14	J13-10L	3,000.00	J12-7L	25.23	2,640.24	5,134.96	6,092.30	J12-7L	16.42	2,619.90	5,136.54	5,134.96
15	J13-11L	3,000.00	J13-11L	44.49	2,605.68	4,736.89	4,733.45	J13-11L	20.00	2,549.16	4,733.43	4,733.43
16	J13-12L	3,000.00	J12-7L	24.65	2,638.88	4,702.64	5,563.48	J12-7L	16.66	2,620.45	4,703.26	4,702.64
17	J13-7L	3,000.00	J12-7L	24.11	2,637.64	4,307.55	6,431.00	J12-7L	10.44	2,606.10	4,307.62	4,307.55
18	J13-8L	3,000.00	J13-8L	-190.13	2,100.75	927.44	927.49	J13-8L	20.00	2,585.70	927.48	927.44
19	J13-9L	3,000.00	J13-9L	26.95	2,598.20	3,479.14	3,479.22	J13-9L	20.00	2,582.16	3,479.22	3,479.14
20	J14-2L	3,000.00	K15-16L	22.37	2,643.63	5,203.68	9,500.32	K15-16L	11.85	2,619.36	5,203.25	5,203.25
21	J14-3L	3,000.00	K15-16L	22.56	2,644.06	5,609.58	9,985.42	K15-16L	11.97	2,619.62	5,609.76	5,609.58
22	J14-4L	3,000.00	K15-16L	22.55	2,644.04	5,610.39	10,805.19	K15-16L	9.95	2,614.96	5,610.66	5,610.39
23	J14-5L	3,000.00	J12-7L	25.66	2,641.23	5,410.96	7,938.81	J12-7L	9.81	2,604.64	5,411.74	5,410.96
24	J14-6L	3,000.00	K15-16L	22.87	2,644.77	6,292.04	13,209.38	K15-16L	6.74	2,607.55	6,292.23	6,292.04
25	J14-7L	3,000.00	J14-7L	29.74	2,544.18	3,332.11	3,332.24	J14-7L	20.00	2,521.70	3,332.24	3,332.11
26	J14-8L	3,000.00	J14-8L	35.21	2,585.26	3,801.90	3,801.95	J14-8L	20.00	2,550.16	3,801.97	3,801.90
27	J15-1L	3,000.00	K15-16L	22.48	2,643.88	5,446.07	7,794.16	K15-16L	16.12	2,629.21	5,446.26	5,446.07
28	J15-2L	3,000.00	K15-16L	22.25	2,643.34	5,019.44	5,660.27	K15-16L	19.08	2,636.04	5,018.93	5,018.93
29	J15-3L	3,000.00	J15-3L	30.92	2,524.91	3,315.33	3,315.33	J15-3L	20.00	2,499.70	3,315.34	3,315.33
30	J15-4L	3,000.00	K15-16L	21.87	2,642.47	4,355.04	7,375.60	K15-16L	14.27	2,624.93	4,355.13	4,355.04
31	J15-5L	3,000.00	J15-5L	28.80	2,520.02	3,243.63	3,246.75	J15-5L	20.00	2,499.70	3,246.75	3,243.63
32	J15-7L	3,000.00	J15-7L	-981.72	177.85	679.19	679.18	J15-7L	20.00	2,489.70	679.18	679.18
33	J15-8L	3,000.00	K15-16L	21.07	2,640.64	3,606.67	7,308.49	K15-16L	10.86	2,617.06	3,607.13	3,606.67
34	J15-9L	3,000.00	J15-9L	13.96	2,510.76	2,832.47	2,830.95	J15-9L	20.00	2,524.70	2,830.95	2,830.95
35	J16-1L	3,000.00	J16-1L	30.74	2,494.49	3,250.89	3,253.75	J16-1L	20.00	2,469.70	3,253.75	3,250.89
36	J16-2L	3,000.00	J16-2L	-37.11	2,362.89	2,143.27	2,143.26	J16-2L	20.00	2,494.70	2,143.26	2,143.26
37	J16-3L	3,000.00	K15-16L	20.64	2,639.63	3,322.96	4,739.13	K15-16L	16.69	2,630.51	3,323.03	3,322.96
38	J16-4L	3,000.00	K15-16L	20.85	2,640.12	3,454.42	3,822.11	K15-16L	19.25	2,636.42	3,454.61	3,454.42
39	K-120101	3,000.00	K12-3L	27.69	2,604.45	3,610.06	4,465.39	K12-3L	7.43	2,557.69	3,610.14	3,610.06
40	K10-1L	3,000.00	K10-1L	-89.81	2,346.26	1,113.18	1,113.05	K10-1L	20.00	2,599.70	1,113.05	1,113.05
41	K11-10L	3,000.00	J12-7L	23.65	2,636.57	3,956.08	4,088.88	J12-7L	19.46	2,626.92	3,958.27	3,956.08
42	K11-11L	3,000.00	J12-7L	23.61	2,636.49	3,942.59	4,616.71	J12-7L	17.17	2,621.64	3,944.68	3,942.59
43	K11-12L	3,000.00	J12-7L	23.83	2,636.99	4,026.98	5,008.73	J12-7L	16.03	2,618.98	4,029.58	4,026.98
44	K11-1L	3,000.00	K10-1L	29.93	2,622.63	4,244.62	5,161.96	K10-1L	11.33	2,579.70	4,245.48	4,244.62
45	K11-2L	3,000.00	J12-7L	24.29	2,638.05	4,222.47	5,378.76	J12-7L	15.57	2,617.94	4,226.60	4,222.47
46	K11-3L	3,000.00	K11-3L	-30.69	2,468.72	1,695.06	1,695.01	K11-3L	20.00	2,585.70	1,695.01	1,695.01
47	K11-4L	3,000.00	J12-7L	23.86	2,637.06	4,037.90	5,517.50	J12-7L	13.77	2,613.78	4,040.57	4,037.90
48	K11-5L	3,000.00	J12-7L	23.73	2,636.78	3,990.00	5,003.42	J12-7L	15.84	2,618.55	3,992.37	3,990.00

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
49	K11-6L	3,000.00	J12-7L	23.73	2,636.76	3,987.50	4,644.06	J12-7L	17.29	2,621.91	3,989.87	3,987.50
50	K11-9L	3,000.00	K11-9L	12.33	2,546.46	2,705.61	2,705.61	K11-9L	20.00	2,564.16	2,705.60	2,705.60
51	K12-2L	3,000.00	K12-2L	18.59	2,582.45	2,920.24	2,918.73	K12-2L	20.00	2,585.70	2,918.71	2,918.71
52	K12-3L	3,000.00	K12-3L	17.09	2,579.98	2,835.92	2,835.94	K12-3L	20.00	2,586.70	2,835.94	2,835.92
53	K12-4L	3,000.00	K12-4L	17.56	2,562.52	2,893.48	2,892.03	K12-4L	20.00	2,568.16	2,892.02	2,892.02
54	K14-10L	3,000.00	K15-16L	21.19	2,640.90	3,689.79	6,965.11	K15-16L	12.46	2,620.76	3,690.47	3,689.79
55	K14-2L	3,000.00	K15-16L	22.59	2,644.12	5,532.86	8,195.87	K15-16L	15.82	2,628.52	5,532.51	5,532.51
56	K14-3L	3,000.00	K14-3L	27.33	2,592.62	3,459.30	3,460.75	K14-3L	20.00	2,575.70	3,460.75	3,459.30
57	K14-4L	3,000.00	K14-4L	-24.00	2,470.16	1,896.01	1,895.99	K14-4L	20.00	2,571.70	1,895.99	1,895.99
58	K14-5L	3,000.00	K15-16L	20.84	2,640.11	3,449.38	6,977.79	K15-16L	10.92	2,617.21	3,449.58	3,449.38
59	K14-7L	3,000.00	J12-7L	26.41	2,642.95	5,842.58	9,436.32	J12-7L	6.48	2,596.94	5,838.63	5,838.63
60	K14-8L	3,000.00	J12-7L	26.97	2,644.23	6,419.83	8,963.58	J12-7L	12.36	2,610.53	6,417.22	6,417.22
61	K14-9L	3,000.00	L15-5L	24.48	2,622.03	3,591.97	3,993.22	L15-5L	16.61	2,603.88	3,595.50	3,591.97
62	K15-10L	3,000.00	K15-10L	-5.19	2,567.56	1,468.57	1,468.74	K15-10L	20.00	2,625.70	1,468.73	1,468.57
63	K15-11L	3,000.00	K15-11L	4.96	2,600.44	1,417.73	1,418.42	K15-11L	20.00	2,635.16	1,418.40	1,417.73
64	K15-12L	3,000.00	K15-16L	16.79	2,630.75	2,102.31	3,417.62	K15-16L	14.95	2,626.51	2,102.24	2,102.24
65	K15-13L	3,000.00	K15-16L	18.24	2,634.09	2,413.33	3,836.72	K15-16L	15.17	2,627.00	2,412.95	2,412.95
66	K15-14L	3,000.00	K15-16L	19.10	2,636.07	2,660.20	4,521.18	K15-16L	14.00	2,624.31	2,660.14	2,660.14
67	K15-15L	3,000.00	K15-10L	15.04	2,614.26	2,388.54	3,278.59	K15-10L	12.46	2,608.30	2,388.33	2,388.33
68	K15-16L	3,000.00	K15-16L	2.77	2,598.38	1,182.88	1,183.74	K15-16L	20.00	2,638.16	1,183.74	1,182.88
69	K15-17L	3,000.00	K15-16L	19.74	2,637.57	2,891.15	5,453.46	K15-16L	12.17	2,620.09	2,891.16	2,891.15
70	K15-18L	3,000.00	K15-18L	4.98	2,511.50	2,558.21	2,558.21	K15-18L	20.00	2,546.16	2,558.21	2,558.21
71	K15-1L	3,000.00	K15-16L	20.83	2,640.07	3,440.03	6,914.76	K15-16L	11.07	2,617.54	3,440.22	3,440.02
72	K15-2L	3,000.00	K15-16L	20.82	2,640.05	3,433.98	6,892.04	K15-16L	11.10	2,617.62	3,434.17	3,433.98
73	K15-3L	3,000.00	K15-16L	20.83	2,640.07	3,439.13	6,137.99	K15-16L	13.49	2,623.13	3,439.33	3,439.13
74	K15-4L	3,000.00	K15-16L	20.52	2,639.35	3,249.72	7,327.07	K15-16L	7.84	2,610.09	3,249.74	3,249.72
75	K15-5L	3,000.00	K15-16L	20.79	2,639.97	3,412.55	7,803.65	K15-16L	7.69	2,609.74	3,412.71	3,412.55
76	K15-6L	3,000.00	K15-16L	20.87	2,640.17	3,468.32	7,868.09	K15-16L	7.94	2,610.32	3,468.54	3,468.32
77	K15-7L	3,000.00	K15-16L	20.66	2,639.68	3,331.51	7,046.02	K15-16L	9.66	2,614.28	3,331.57	3,331.51
78	K15-8L	3,000.00	K15-8L	3.47	2,596.00	1,407.39	1,408.34	K15-8L	20.00	2,634.16	1,408.36	1,407.39
79	K15-9L	3,000.00	K15-9L	6.83	2,599.30	1,714.13	1,715.03	K15-9L	20.00	2,629.70	1,715.03	1,714.13
80	K16-2L	3,000.00	K15-16L	19.22	2,636.37	2,702.67	2,798.06	K15-16L	19.76	2,637.60	2,702.66	2,702.66
81	K16-3L	3,000.00	L16-1L	5.25	2,573.65	2,132.96	2,426.95	L16-1L	15.46	2,597.23	2,132.99	2,132.96
82	K16-4L	3,000.00	K16-5L	-97.21	2,309.66	1,217.02	1,317.07	K16-5L	15.67	2,570.16	1,217.97	1,217.02
83	K16-5L	3,000.00	K16-5L	-138.74	2,213.81	1,064.92	1,065.72	K16-5L	20.00	2,580.16	1,065.72	1,064.92
84	K17-1L	3,000.00	K17-1L	-106.13	2,232.61	1,538.51	1,538.69	K17-1L	20.00	2,523.70	1,538.69	1,538.51
85	K17-2L	3,000.00	K16-5L	5.34	2,546.31	2,380.07	2,561.53	K16-5L	16.00	2,570.92	2,380.14	2,380.07
86	K17-3L	3,000.00	K16-5L	-26.62	2,472.57	1,745.37	1,973.99	K16-5L	13.08	2,564.19	1,745.59	1,745.37
87	K17-4L	3,000.00	K17-4L	-56.94	2,312.12	1,985.32	1,985.32	K17-4L	20.00	2,489.70	1,985.31	1,985.31
88	K17-5L	3,000.00	K17-5L	-8.18	2,424.66	2,483.97	2,483.97	K17-5L	20.00	2,489.70	2,483.98	2,483.97
89	K17-6L	3,000.00	K16-5L	13.86	2,566.00	2,691.62	2,974.49	K16-5L	14.39	2,567.22	2,691.65	2,691.62
90	K17-7L	3,000.00	K16-5L	-40.44	2,440.66	1,592.07	1,613.89	K16-5L	19.32	2,578.58	1,592.66	1,592.07
91	K17-8L	3,000.00	K17-8L	-38.56	2,388.56	1,994.52	1,994.52	K17-8L	20.00	2,523.70	1,994.52	1,994.52
92	K18-1L	3,000.00	K18-1L	-143.68	2,121.96	1,499.88	1,499.93	K18-1L	20.00	2,499.70	1,499.93	1,499.88
93	L13-1H	3,000.00	L13-1H	-25.73	2,493.61	1,595.60	1,595.34	L13-1H	20.00	2,599.16	1,595.34	1,595.34
94	L13-2H	3,000.00	L13-2H	-27.18	2,490.26	1,579.79	1,579.54	L13-2H	20.00	2,599.16	1,579.53	1,579.53
95	L14-3L	3,000.00	L15-4L	33.09	2,641.90	7,903.69	8,753.78	L15-4L	16.95	2,604.65	7,907.75	7,903.69
96	L14-4L	3,000.00	L14-4L	16.72	2,602.13	2,717.05	2,717.05	L14-4L	20.00	2,609.70	2,717.04	2,717.04

Low Zone 3 hr 2020 MDD FF with Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
97		L15-3L	3,000.00	L15-3L	1.44	2,566.85	1,991.09	1,991.11	L15-3L	20.00	2,609.70	1,991.11	1,991.09
98		L15-4L	3,000.00	L15-4L	13.46	2,596.61	2,479.43	2,479.44	L15-4L	20.00	2,611.70	2,479.44	2,479.43
99		L15-5L	3,000.00	L15-5L	15.43	2,601.15	2,609.39	2,609.37	L15-5L	20.00	2,611.70	2,609.37	2,609.37
100		L15-6L	3,000.00	L15-5L	16.27	2,603.09	2,670.45	2,678.56	L15-5L	19.91	2,611.50	2,670.43	2,670.43
101		L15-7L	3,000.00	L15-7L	9.25	2,603.35	1,902.12	1,902.12	L15-7L	20.00	2,628.16	1,902.11	1,902.11
102		L16-1L	3,000.00	L16-1L	0.03	2,561.61	1,964.18	1,964.21	L16-1L	20.00	2,607.70	1,964.21	1,964.18
103		L16-2L	3,000.00	L16-2L	2.36	2,543.99	2,280.38	2,280.39	L16-2L	20.00	2,584.70	2,280.39	2,280.38
104		L16-3L	3,000.00	L16-3L	-152.27	2,192.12	978.31	977.35	L16-3L	20.00	2,589.70	977.34	977.34
105		L16-4L	3,000.00	L16-3L	-44.21	2,441.51	1,500.08	1,500.09	L16-3L	20.00	2,589.70	1,500.09	1,500.08

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report Including Transmission line

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,122.01	3.18	0.07	3.64	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-55.87	0.63	0.05	0.41	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	91.14	1.03	0.21	1.02	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	137.40	0.88	0.08	0.54	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-137.40	0.39	0.01	0.07	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-138.65	0.88	0.05	0.54	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-138.65	0.88	0.18	0.55	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	266.34	1.70	0.03	1.84	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	266.34	1.70	0.23	1.83	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	273.96	1.75	0.19	1.92	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,122.01	3.18	0.11	3.64	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	137.31	1.56	0.15	2.18	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	322.41	2.06	0.21	2.60	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-19.89	0.13	0.01	0.01	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	225.90	0.64	0.16	0.19	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-974.69	2.76	1.09	2.80	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	0.21	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.29	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	39.86	0.25	0.02	0.05	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-18.13	0.21	0.01	0.05	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	29.31	0.33	0.02	0.13	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	844.54	2.40	0.61	2.15	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	22.78	0.09	0.00	0.02	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-32.48	0.13	0.00	0.01	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.61	0.22	0.02	0.06	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-531.04	1.51	0.25	0.91	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.91	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.91	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-36.71	0.42	0.10	0.19	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-17.31	0.11	0.00	0.01	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	617.58	1.75	0.58	1.20	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-57.14	0.65	0.11	0.43	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-86.24	0.98	0.13	0.92	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	617.58	1.75	0.30	1.20	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-76.54	0.87	0.16	0.74	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-57.14	0.65	0.02	0.43	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-770.51	2.19	0.25	1.82	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-95.94	1.09	0.45	1.12	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.59	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.89	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	235.60	0.67	0.08	0.20	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-770.51	2.19	0.04	1.81	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	342.30	2.18	0.35	2.91	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	274.40	1.75	0.27	1.93	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	194.80	1.24	0.24	1.02	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	194.80	1.24	0.08	1.03	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	72.64	0.21	0.00	0.02	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-641.49	1.82	0.75	1.29	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	72.64	0.21	0.00	0.02	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	93.77	0.27	0.01	0.04	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-46.17	0.52	0.10	0.29	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-55.87	0.63	0.06	0.41	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.14	0.29	0.04	0.09	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.14	0.29	0.03	0.09	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	34.84	0.40	0.06	0.17	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	548.05	2.24	0.23	2.34	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	34.84	0.40	0.05	0.17	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-303.80	0.86	0.12	0.32	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	303.80	1.94	0.43	2.33	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	119.32	0.76	0.11	0.41	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	119.32	0.76	0.16	0.41	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	99.92	0.64	0.18	0.30	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	119.32	0.76	0.14	0.41	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	119.32	0.76	0.01	0.41	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	119.32	0.76	0.12	0.41	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	109.62	0.70	0.03	0.35	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-741.41	2.10	1.01	1.69	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-81.83	0.93	0.15	0.83	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	201.43	0.57	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	191.73	0.54	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-71.28	0.20	0.00	0.02	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-220.83	0.63	0.08	0.18	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	220.83	0.63	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	29.31	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	528.65	2.16	0.44	2.19	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	29.31	0.33	0.02	0.12	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	69.45	0.79	0.05	0.61	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	69.45	0.79	0.14	0.62	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-93.77	0.27	0.00	0.04	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-93.77	0.27	0.00	0.04	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	286.97	1.83	0.61	2.10	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.01	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	286.97	1.83	0.76	2.10	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	286.97	1.83	0.73	2.10	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-365.28	2.33	0.13	3.28	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	262.06	1.67	0.32	1.77	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	557.75	3.56	0.43	7.19	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-334.19	2.13	1.11	2.78	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-193.89	1.24	0.08	1.01	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	376.03	1.07	0.30	0.48	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-217.45	0.89	0.10	0.42	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	220.83	0.63	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	211.13	0.60	0.07	0.16	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	140.30	0.40	0.02	0.08	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	173.84	1.11	0.36	0.83	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	567.45	2.32	0.10	2.50	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	91.91	0.59	0.05	0.26	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-577.16	1.64	0.07	1.06	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	143.97	1.63	0.45	2.37	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	64.42	0.73	0.11	0.53	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	137.62	0.56	0.03	0.18	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-137.62	0.56	0.09	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	137.62	0.56	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	137.62	0.56	0.01	0.18	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-586.86	1.66	0.36	1.09	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-54.72	0.35	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-88.02	1.00	0.19	0.95	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.10	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-586.86	1.66	0.29	1.10	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-72.23	0.46	0.11	0.16	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	14.31	0.16	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-24.01	0.27	0.05	0.09	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	182.03	0.52	0.04	0.13	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,360.16	3.86	1.38	5.20	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-162.63	0.46	0.00	0.10	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-174.21	1.98	0.17	3.38	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	209.05	2.37	0.71	4.74	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	189.65	1.21	0.49	0.97	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-120.45	0.77	0.10	0.42	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-310.10	1.98	0.80	2.42	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,340.76	3.80	2.77	5.06	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-171.45	1.09	0.18	0.81	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-132.65	0.85	0.16	0.50	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	79.15	0.90	0.32	0.78	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	72.64	0.21	0.01	0.02	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	209.05	0.85	0.14	0.39	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	156.71	1.78	0.47	2.78	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	538.35	2.20	0.20	2.27	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,956.72	5.55	0.95	10.19	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-498.72	1.41	0.10	0.81	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-458.89	1.30	0.10	0.69	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,930.73	8.31	2.11	21.53	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	974.01	2.76	10.12	2.80	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-336.31	1.37	0.05	0.95	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-27.01	0.31	0.06	0.11	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	254.48	2.89	0.81	6.82	Open	0
201		P113	J72	J70	229.97	8.00	120.00	254.48	1.62	0.39	1.68	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-254.48	1.04	0.08	0.57	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	174.49	0.49	0.00	0.13	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-121.28	0.77	0.06	0.43	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-130.98	0.84	0.03	0.49	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	101.88	0.65	0.10	0.31	Open	0
209		P23	J24	J22	147.66	8.00	120.00	92.18	0.59	0.04	0.26	Open	0
210		P25	J22	J20	76.49	8.00	120.00	82.48	0.53	0.02	0.21	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	342.30	2.18	0.44	2.91	Open	0
214		P33	J18	J20	237.74	8.00	120.00	201.62	1.29	0.26	1.09	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.70	0.11	0.00	0.01	Open	0

Low Zone 3 hr 2020 MDD FF with Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217		P39	J36	J16	251.95	8.00	120.00	90.68	0.58	0.06	0.25	Open	0
218		P41	J16	J14	364.77	8.00	120.00	80.98	0.52	0.07	0.20	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-227.15	0.93	0.04	0.46	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-327.53	1.34	0.37	0.90	Open	0
223		P51	K11-5L	J14	78.82	12.00	120.00	-71.28	0.20	0.00	0.02	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	13.08	0.05	0.00	0.00	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-22.78	0.09	0.00	0.00	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-130.15	0.83	0.13	0.49	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-111.58	0.71	0.01	0.37	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	241.69	0.99	0.14	0.52	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	241.69	0.99	0.17	0.51	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	241.69	1.54	0.37	1.53	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	241.69	1.54	0.20	1.53	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	241.69	2.74	1.03	6.20	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.40	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	304.83	12.00	110.00	211.24	0.60	0.06	0.19	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	496.18	1.41	0.15	0.80	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	477.83	1.36	0.15	0.75	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pump Report including transmission line

		ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1		PUMP-4	2,367.54	-1,025.86	123.27	0.00	0.00	Closed	0.00	0.00	0.00
2		PUMP7	2,051.00	-0.69	261.16	2,945.80	604.32	Open	1.00	0.00	0.00

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Tank Report including transmission line

		ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1		OBS-RES-1	1,002.68	2,629.54	2,643.34	62.73	13.80
2		RES-OBS-2	944.01	2,629.54	2,643.34	62.73	13.80

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Hydrant Report including transmission line

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1		I13-1L	3,000.00	J12-7L	23.64	2,636.57	4,557.46	6,448.85	J12-7L	12.80	2,611.54	4,558.59	4,557.46
2		I13-2L	3,000.00	J12-7L	24.15	2,637.73	4,926.02	8,751.39	J12-7L	3.33	2,589.69	4,928.37	4,926.02
3		I14-1L	3,000.00	J12-7L	24.53	2,638.62	5,211.27	5,853.81	J12-7L	17.96	2,623.45	5,214.30	5,211.27
4		I14-2L	3,000.00	K15-16L	21.70	2,642.08	5,329.59	14,918.38	K15-16L	2.58	2,597.96	5,329.63	5,329.59
5		I14-3L	3,000.00	J12-7L	23.99	2,637.37	4,808.92	7,603.64	J12-7L	8.70	2,602.07	4,810.95	4,808.92
6		J12-10L	3,000.00	J12-10L	17.15	2,617.58	2,597.28	2,597.28	J12-10L	20.00	2,624.16	2,597.28	2,597.28
7		J12-11L	3,000.00	J12-7L	22.99	2,635.05	3,908.89	29,226.26	J12-7L	-282.44	1,930.18	3,911.31	3,908.89
8		J12-1L	3,000.00	J12-1L	-138.47	2,201.96	1,165.46	1,165.41	J12-1L	20.00	2,567.70	1,165.41	1,165.41
9		J12-2L	3,000.00	J12-2L	-40.50	2,412.06	1,832.33	1,832.30	J12-2L	20.00	2,551.70	1,832.30	1,832.30
10		J12-3L	3,000.00	J12-4L	-35.83	2,460.84	1,565.92	1,857.90	J12-4L	11.10	2,569.15	1,565.73	1,565.73
11		J12-4L	3,000.00	J12-4L	-125.39	2,254.16	1,040.66	1,040.68	J12-4L	20.00	2,589.70	1,040.68	1,040.66
12		J12-7L	3,000.00	J12-7L	19.46	2,626.91	2,890.69	2,890.74	J12-7L	20.00	2,628.16	2,890.70	2,890.69
13		J12-9L	3,000.00	J12-9L	-109.12	2,281.17	1,188.19	1,188.09	J12-9L	20.00	2,579.16	1,188.09	1,188.09
14		J13-10L	3,000.00	J12-7L	23.84	2,637.03	4,702.10	6,014.87	J12-7L	15.37	2,617.48	4,703.78	4,702.10
15		J13-11L	3,000.00	J12-7L	23.61	2,636.48	4,527.61	4,652.76	J12-7L	19.62	2,627.28	4,528.55	4,527.61
16		J13-12L	3,000.00	J12-7L	23.26	2,635.68	4,277.32	5,482.06	J12-7L	15.63	2,618.08	4,276.90	4,276.90
17		J13-7L	3,000.00	J12-7L	22.72	2,634.44	3,864.13	6,266.05	J12-7L	9.98	2,605.03	3,864.24	3,864.13
18		J13-8L	3,000.00	J13-8L	-191.51	2,097.56	901.38	901.44	J13-8L	20.00	2,585.70	901.44	901.38
19		J13-9L	3,000.00	J13-9L	25.57	2,595.01	3,388.14	3,388.18	J13-9L	20.00	2,582.16	3,388.18	3,388.14
20		J14-2L	3,000.00	K15-16L	20.97	2,640.41	3,918.09	9,313.41	K15-16L	10.93	2,617.22	3,919.68	3,918.09
21		J14-3L	3,000.00	K15-16L	21.16	2,640.84	4,299.85	9,827.57	K15-16L	10.96	2,617.29	4,301.83	4,299.85
22		J14-4L	3,000.00	K15-16L	21.15	2,640.82	4,329.74	10,642.03	K15-16L	8.98	2,612.73	4,328.51	4,328.51
23		J14-5L	3,000.00	K15-16L	21.21	2,640.96	4,407.03	7,784.86	K15-16L	15.42	2,627.59	4,406.49	4,406.49
24		J14-6L	3,000.00	K15-16L	21.47	2,641.55	5,082.32	13,087.27	K15-16L	5.68	2,605.10	5,083.01	5,082.32
25		J14-7L	3,000.00	J14-7L	28.36	2,540.99	3,286.17	3,286.24	J14-7L	20.00	2,521.70	3,286.25	3,286.17
26		J14-8L	3,000.00	K15-16L	20.71	2,639.80	3,602.47	3,734.85	K15-16L	19.84	2,637.78	3,603.11	3,602.47
27		J15-1L	3,000.00	K15-16L	21.08	2,640.66	4,141.67	7,688.82	K15-16L	14.95	2,626.49	4,142.02	4,141.67
28		J15-2L	3,000.00	K15-16L	20.85	2,640.12	3,776.68	5,587.85	K15-16L	17.80	2,633.08	3,778.84	3,776.68
29		J15-3L	3,000.00	J15-3L	29.54	2,521.72	3,276.83	3,276.83	J15-3L	20.00	2,499.70	3,276.83	3,276.83
30		J15-4L	3,000.00	K15-16L	20.47	2,639.25	3,370.65	7,271.84	K15-16L	13.13	2,622.31	3,370.79	3,370.65
31		J15-5L	3,000.00	J15-5L	27.42	2,516.82	3,206.39	3,209.05	J15-5L	20.00	2,499.70	3,209.06	3,206.39
32		J15-7L	3,000.00	J15-7L	-983.11	174.65	671.67	671.67	J15-7L	20.00	2,489.70	671.67	671.67
33		J15-8L	3,000.00	K15-16L	19.68	2,637.41	2,798.13	7,214.77	K15-16L	9.77	2,614.55	2,798.13	2,798.13
34		J15-9L	3,000.00	K15-16L	18.76	2,635.30	2,372.83	2,790.85	K15-16L	19.20	2,636.32	2,372.48	2,372.48
35		J16-1L	3,000.00	K15-16L	19.46	2,636.90	2,677.36	3,221.99	K15-16L	19.05	2,635.97	2,677.33	2,677.33
36		J16-2L	3,000.00	J16-2L	-38.50	2,359.69	2,118.75	2,118.74	J16-2L	20.00	2,494.70	2,118.74	2,118.74
37		J16-3L	3,000.00	K15-16L	19.24	2,636.40	2,571.77	4,673.43	K15-16L	15.46	2,627.68	2,571.73	2,571.73
38		J16-4L	3,000.00	K15-16L	19.46	2,636.90	2,677.36	3,774.03	K15-16L	17.95	2,633.43	2,677.33	2,677.33
39		K-120101	3,000.00	K12-3L	26.31	2,601.26	3,506.68	4,376.75	K12-3L	7.43	2,557.69	3,506.73	3,506.68
40		K10-1L	3,000.00	K10-1L	-91.20	2,343.07	1,071.82	1,071.64	K10-1L	20.00	2,599.70	1,071.64	1,071.64
41		K11-10L	3,000.00	J12-7L	22.27	2,633.38	3,613.11	4,011.34	J12-7L	18.40	2,624.46	3,613.69	3,613.11
42		K11-11L	3,000.00	J12-7L	22.23	2,633.31	3,601.09	4,524.51	J12-7L	16.17	2,619.33	3,601.64	3,601.09
43		K11-12L	3,000.00	J12-7L	22.45	2,633.81	3,677.59	4,899.00	J12-7L	15.07	2,616.78	3,678.30	3,677.59
44		K11-1L	3,000.00	J12-7L	23.05	2,635.19	3,913.73	5,020.08	J12-7L	15.92	2,618.75	3,915.15	3,913.73
45		K11-2L	3,000.00	J12-7L	22.91	2,634.86	3,854.19	5,246.92	J12-7L	14.73	2,616.00	3,855.41	3,854.19
46		K11-3L	3,000.00	K11-3L	-32.07	2,465.52	1,647.01	1,646.96	K11-3L	20.00	2,585.70	1,646.96	1,646.96
47		K11-4L	3,000.00	J12-7L	22.48	2,633.87	3,687.49	5,400.39	J12-7L	12.95	2,611.89	3,688.23	3,687.49
48		K11-5L	3,000.00	J12-7L	22.35	2,633.59	3,644.02	4,903.22	J12-7L	14.85	2,616.28	3,644.65	3,644.02
49		K11-6L	3,000.00	J12-7L	22.35	2,633.58	3,641.75	4,553.03	J12-7L	16.28	2,619.58	3,642.38	3,641.75
50		K11-9L	3,000.00	K11-9L	10.95	2,543.27	2,649.51	2,649.50	K11-9L	20.00	2,564.16	2,649.51	2,649.51
51		K12-2L	3,000.00	K12-2L	17.21	2,579.26	2,836.82	2,836.84	K12-2L	20.00	2,585.70	2,836.84	2,836.82

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available Node ID	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
52		K12-3L	3,000.00	K12-3L	15.71	2,576.79	2,755.07	2,755.07	K12-3L	20.00	2,586.70	2,755.07	2,755.07
53		K12-4L	3,000.00	K12-4L	16.17	2,559.32	2,831.71	2,829.39	K12-4L	20.00	2,568.16	2,829.39	2,829.39
54		K14-10L	3,000.00	K15-16L	19.79	2,637.67	2,865.10	6,821.84	K15-16L	11.49	2,618.51	2,865.12	2,865.10
55		K14-2L	3,000.00	K15-16L	21.19	2,640.91	4,188.08	7,968.60	K15-16L	14.86	2,626.31	4,185.28	4,185.28
56		K14-3L	3,000.00	K14-3L	25.94	2,589.42	3,376.48	3,377.80	K14-3L	20.00	2,575.70	3,377.80	3,376.48
57		K14-4L	3,000.00	K14-4L	-25.39	2,466.95	1,852.04	1,852.03	K14-4L	20.00	2,571.70	1,852.03	1,852.03
58		K14-5L	3,000.00	K15-16L	19.45	2,636.89	2,674.86	6,855.20	K15-16L	9.94	2,614.93	2,674.90	2,674.86
59		K14-7L	3,000.00	K15-16L	21.51	2,641.64	4,676.24	9,239.50	K15-16L	14.11	2,624.57	4,676.80	4,676.24
60		K14-8L	3,000.00	K15-16L	21.78	2,642.27	5,262.59	8,719.40	K15-16L	16.55	2,630.20	5,266.13	5,262.59
61		K14-9L	3,000.00	L15-5L	23.09	2,618.82	3,420.61	3,862.47	L15-5L	16.37	2,603.32	3,420.58	3,420.58
62		K15-10L	3,000.00	K15-10L	-6.58	2,564.36	1,344.02	1,345.05	K15-10L	20.00	2,625.70	1,345.04	1,344.02
63		K15-11L	3,000.00	K15-11L	3.56	2,597.21	1,196.32	1,197.03	K15-11L	20.00	2,635.16	1,197.01	1,196.32
64		K15-12L	3,000.00	K15-16L	15.39	2,627.53	1,609.79	3,227.52	K15-16L	14.42	2,625.28	1,609.72	1,609.72
65		K15-13L	3,000.00	K15-16L	16.84	2,630.86	1,823.13	3,654.32	K15-16L	14.49	2,625.45	1,823.22	1,823.13
66		K15-14L	3,000.00	K15-16L	17.70	2,632.85	2,029.69	4,382.36	K15-16L	13.14	2,622.32	2,029.67	2,029.67
67		K15-15L	3,000.00	K15-16L	18.19	2,633.98	2,172.23	3,157.91	K15-16L	17.79	2,633.05	2,170.91	2,170.91
68		K15-16L	3,000.00	K15-16L	1.36	2,595.15	930.47	931.32	K15-16L	20.00	2,638.16	931.30	930.47
69		K15-17L	3,000.00	K15-16L	18.35	2,634.34	2,220.09	5,326.06	K15-16L	11.23	2,617.93	2,219.13	2,219.13
70		K15-18L	3,000.00	K15-16L	18.97	2,635.78	2,455.20	2,514.00	K15-16L	19.90	2,637.92	2,455.11	2,455.11
71		K15-1L	3,000.00	K15-16L	19.43	2,636.85	2,667.56	6,787.89	K15-16L	10.09	2,615.29	2,667.61	2,667.56
72		K15-2L	3,000.00	K15-16L	19.42	2,636.83	2,662.87	6,765.44	K15-16L	10.12	2,615.37	2,662.92	2,662.87
73		K15-3L	3,000.00	K15-16L	19.43	2,636.85	2,666.86	5,998.47	K15-16L	12.50	2,620.84	2,666.90	2,666.86
74		K15-4L	3,000.00	K15-16L	19.12	2,636.13	2,525.59	7,212.09	K15-16L	6.90	2,607.93	2,525.48	2,525.48
75		K15-5L	3,000.00	K15-16L	19.39	2,636.75	2,645.88	7,685.37	K15-16L	6.74	2,607.55	2,645.92	2,645.88
76		K15-6L	3,000.00	K15-16L	19.48	2,636.95	2,689.96	7,744.84	K15-16L	7.00	2,608.16	2,690.00	2,689.96
77		K15-7L	3,000.00	K15-16L	19.26	2,636.46	2,588.47	6,946.23	K15-16L	8.63	2,611.91	2,588.44	2,588.44
78		K15-8L	3,000.00	K15-8L	2.07	2,592.77	1,205.43	1,206.53	K15-8L	20.00	2,634.16	1,206.51	1,205.43
79		K15-9L	3,000.00	K15-16L	12.38	2,620.56	1,355.60	1,534.05	K15-16L	19.38	2,636.72	1,355.58	1,355.58
80		K16-2L	3,000.00	K15-16L	17.83	2,633.15	2,069.03	2,735.84	K15-16L	18.52	2,634.74	2,068.95	2,068.95
81		K16-3L	3,000.00	K15-16L	16.36	2,629.76	1,825.83	2,393.36	K15-16L	18.40	2,634.47	1,826.83	1,825.83
82		K16-4L	3,000.00	K16-5L	-98.60	2,306.45	1,183.68	1,286.86	K16-5L	15.62	2,570.06	1,184.71	1,183.68
83		K16-5L	3,000.00	K16-5L	-140.13	2,210.61	1,035.96	1,036.82	K16-5L	20.00	2,580.16	1,036.82	1,035.96
84		K17-1L	3,000.00	K17-1L	-107.52	2,229.40	1,516.07	1,516.27	K17-1L	20.00	2,523.70	1,516.27	1,516.07
85		K17-2L	3,000.00	K15-16L	18.15	2,633.89	2,166.40	2,526.73	K15-16L	19.27	2,636.47	2,164.96	2,164.96
86		K17-3L	3,000.00	K16-5L	-28.01	2,469.36	1,696.17	1,950.61	K16-5L	12.42	2,562.67	1,696.62	1,696.17
87		K17-4L	3,000.00	K17-4L	-58.33	2,308.92	1,962.86	1,962.84	K17-4L	20.00	2,489.70	1,962.84	1,962.84
88		K17-5L	3,000.00	K15-16L	18.63	2,634.99	2,327.17	2,456.15	K15-16L	19.76	2,637.61	2,326.70	2,326.70
89		K17-6L	3,000.00	K15-16L	18.24	2,634.09	2,195.11	2,932.09	K15-16L	18.41	2,634.48	2,193.90	2,193.90
90		K17-7L	3,000.00	K16-5L	-41.83	2,437.46	1,547.73	1,576.62	K16-5L	19.11	2,578.11	1,548.50	1,547.73
91		K17-8L	3,000.00	K17-8L	-39.94	2,385.35	1,965.29	1,965.29	K17-8L	20.00	2,523.70	1,965.28	1,965.28
92		K18-1L	3,000.00	K18-1L	-145.06	2,118.75	1,481.82	1,481.89	K18-1L	20.00	2,499.70	1,481.88	1,481.82
93		L13-1H	3,000.00	L13-1H	-27.12	2,490.42	1,535.91	1,535.66	L13-1H	20.00	2,599.16	1,535.65	1,535.65
94		L13-2H	3,000.00	L13-2H	-28.57	2,487.07	1,520.93	1,520.66	L13-2H	20.00	2,599.16	1,520.66	1,520.66
95		L14-3L	3,000.00	K15-16L	22.08	2,642.95	6,371.78	8,421.96	K15-16L	18.52	2,634.74	6,371.70	6,371.70
96		L14-4L	3,000.00	L14-4L	15.32	2,598.91	2,588.54	2,588.54	L14-4L	20.00	2,609.70	2,588.54	2,588.54
97		L15-3L	3,000.00	L15-3L	0.04	2,563.63	1,897.65	1,897.67	L15-3L	20.00	2,609.70	1,897.67	1,897.65
98		L15-4L	3,000.00	L15-4L	12.07	2,593.39	2,355.94	2,355.95	L15-4L	20.00	2,611.70	2,355.96	2,355.94
99		L15-5L	3,000.00	L15-5L	14.04	2,597.94	2,479.45	2,479.45	L15-5L	20.00	2,611.70	2,479.45	2,479.45
100		L15-6L	3,000.00	L15-5L	14.88	2,599.87	2,537.38	2,548.83	L15-5L	19.88	2,611.43	2,537.36	2,537.36
101		L15-7L	3,000.00	L15-7L	7.85	2,600.12	1,718.06	1,718.05	L15-7L	20.00	2,628.16	1,718.04	1,718.04
102		L16-1L	3,000.00	K15-16L	16.36	2,629.76	1,825.83	1,874.54	K15-16L	19.88	2,637.88	1,826.83	1,825.83

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure (psi)	Critical Fire Node Head (ft)	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant (gpm)	Critical Available Node ID	Critical Available Node Pressure (psi)	Critical Available Node Head (ft)	Adjusted Available Flow (gpm)	Design Flow (gpm)
103		L16-2L	3,000.00	K15-16L	16.36	2,629.76	1,825.83	2,215.22	K15-16L	18.94	2,635.71	1,826.83	1,825.83
104		L16-3L	3,000.00	L16-3L	-153.67	2,188.89	947.09	947.09	L16-3L	20.00	2,589.70	947.09	947.09
105		L16-4L	3,000.00	L16-4L	-45.61	2,438.28	1,453.62	1,453.63	L16-4L	20.00	2,589.70	1,453.63	1,453.62

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report including transmission line

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1		P-10	J14-4L	J-207	20.00	12.00	120.00	-1,127.64	3.20	0.07	3.67	Open	0
2		P-100	K15-10L	J-243	130.00	6.00	120.00	-56.18	0.64	0.05	0.42	Open	0
3		P-101	J-243	K15-15L	210.00	6.00	120.00	91.70	1.04	0.22	1.03	Open	0
4		P-103	K15-5L	J-247	150.00	8.00	120.00	137.98	0.88	0.08	0.54	Open	0
5		P-104	K15-5L	K15-6L	190.00	12.00	120.00	-137.98	0.39	0.01	0.08	Open	0
6		P-105	J-247	K15-7L	95.00	8.00	120.00	-139.50	0.89	0.05	0.55	Open	0
7		P-106	K15-7L	J15-8L	328.00	8.00	120.00	-139.50	0.89	0.18	0.55	Open	0
8		P-107	J-247	K15-4L	15.00	8.00	120.00	267.78	1.71	0.03	1.84	Open	0
9		P-108	K15-4L	J-246	125.00	8.00	120.00	267.78	1.71	0.23	1.85	Open	0
10		P-109	J-246	K15-17L	100.00	8.00	120.00	275.65	1.76	0.19	1.95	Open	0
11		P-11	J-208	J14-4L	30.00	12.00	120.00	-1,127.64	3.20	0.11	3.67	Open	0
12		P-111	K15-15L	J-245	70.00	6.00	120.00	138.18	1.57	0.15	2.20	Open	0
13		P-112	J-245	K15-13L	80.00	8.00	120.00	324.52	2.07	0.21	2.63	Open	0
14		P-114	K15-13L	J-252	475.00	8.00	120.00	-20.80	0.13	0.01	0.02	Open	0
15		P-115	J-244	J-261	875.00	12.00	120.00	228.93	0.65	0.17	0.19	Open	0
16		P-117	J-300	J-259	220.00	8.00	120.00	29.10	0.19	0.01	0.03	Open	0
17		P-118	J-260	J-259	125.00	6.00	120.00	-11.24	0.13	0.00	0.02	Open	0
18		P-12	J14-2L	J-208	390.00	12.00	120.00	-979.89	2.78	1.10	2.83	Open	0
19		P-121	L16-2L	J-260	285.00	8.00	120.00	-1.54	0.01	0.00	0.00	Open	0
20		P-122	J-258	L16-2L	171.00	6.00	120.00	-1.54	0.02	0.00	0.00	Open	0
21		P-124	J-256	J-257	190.00	6.00	120.00	0.24	0.00	0.00	0.00	Open	0
22		P-125	J-263	J-253	246.01	8.00	120.00	-48.26	0.31	0.02	0.08	Open	0
23		P-127	J-252	J-253	400.00	8.00	120.00	39.40	0.25	0.02	0.05	Open	0
24		P-128	J-253	J-264	230.00	6.00	120.00	-18.56	0.21	0.01	0.05	Open	0
25		P-129	J-264	K17-2L	150.00	6.00	120.00	29.34	0.33	0.02	0.13	Open	0
26		P-13	J14-2L	J-209	283.34	12.00	120.00	849.20	2.41	0.62	2.17	Open	0
27		P-130	J-269	K12-3L	235.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
28		P-131	K12-2L	J-269	125.00	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
29		P-132	J-267	J-266	310.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
30		P-133	J-269	J-267	415.00	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
31		P-134	J-269	K-120101	345.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
32		P-135	K-120101	J-268	155.00	10.00	120.00	-29.10	0.12	0.00	0.01	Open	0
33		P-136	K11-4L	J-217	10.00	10.00	120.00	23.31	0.10	0.00	0.00	Open	0
34		P-137	J40	J-268	220.97	10.00	120.00	-33.01	0.13	0.00	0.01	Open	0
35		P-139	J-254	J-255	330.00	6.00	120.00	19.64	0.22	0.02	0.06	Open	0
36		P-14	K14-2L	J-209	280.00	12.00	120.00	-534.24	1.52	0.26	0.92	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
37		P-140	J-255	K17-3L	60.00	6.00	120.00	9.94	0.11	0.00	0.02	Open	0
38		P-141	K17-3L	J-256	790.00	6.00	120.00	9.94	0.11	0.01	0.02	Open	0
39		P-142	J-255	K17-1L	140.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40		P-143	J-190	J16-3L	522.45	6.00	120.00	-36.96	0.42	0.10	0.19	Open	0
41		P-144	J-246	J-265	60.00	8.00	120.00	-17.56	0.11	0.00	0.01	Open	0
42		P-149	J14-6L	J-123	68.00	10.00	120.00	19.40	0.08	0.00	0.01	Open	0
43		P-15	K14-2L	K14-7L	480.00	12.00	120.00	621.88	1.76	0.59	1.22	Open	0
44		P-150	J-123	J-124	189.00	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
45		P-151	J-123	J14-7L	143.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46		P-153	J-128	K18-1L	397.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47		P-154	K17-6L	J-131	256.00	6.00	120.00	-57.60	0.65	0.11	0.44	Open	0
48		P-156	J-132	K17-5L	109.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49		P-157	J-128	K17-4L	108.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50		P-158	J-132	J-127	139.00	6.00	120.00	-86.70	0.98	0.13	0.93	Open	0
51		P-16	K14-7L	J-210	250.00	12.00	120.00	621.88	1.76	0.30	1.22	Open	0
52		P-167	J-131	J-132	223.00	6.00	120.00	-77.00	0.87	0.17	0.74	Open	0
53		P-168	J-131	J-128	170.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
54		P-169	J-264	K17-6L	45.00	6.00	120.00	-57.60	0.65	0.02	0.43	Open	0
55		P-17	K14-8L	J-210	140.00	12.00	120.00	-776.78	2.20	0.26	1.84	Open	0
56		P-170	J-127	J16-3L	401.00	6.00	120.00	-96.40	1.09	0.45	1.13	Open	0
57		P-171	J-143	J-263	292.00	6.00	120.00	-38.56	0.44	0.06	0.21	Open	0
58		P-172	J-257	J-143	223.00	6.00	120.00	-28.86	0.33	0.03	0.12	Open	0
59		P-173	J-143	K17-7L	35.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60		P-174	J-187	K16-4L	17.19	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61		P-174.5	J-257	J-187	104.69	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
62		P-174.6	J-187	J-188	41.82	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
63		P-174.7	J-188	K16-5L	103.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
64		P-175	J-258	K16-3L	124.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
65		P-176	J-260	L16-4L	171.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
66		P-177	L16-4L	L16-3L	379.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
67		P-179	J-300	J-244	409.00	12.00	120.00	238.63	0.68	0.08	0.21	Open	0
68		P-18	J-211	K14-8L	20.00	12.00	120.00	-776.78	2.20	0.04	1.83	Open	0
69		P-180	K15-13L	K15-12L	120.00	8.00	120.00	345.33	2.20	0.35	2.96	Open	0
70		P-181	J20	J-300	139.30	8.00	120.00	277.43	1.77	0.27	1.97	Open	0
71		P-182	K15-17L	K15-14L	230.00	8.00	120.00	196.05	1.25	0.24	1.04	Open	0
72		P-183	K15-14L	J-245	74.00	8.00	120.00	196.05	1.25	0.08	1.04	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
73		P-184	J-250	J16-1L	100.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
74		P-185	J-250	J16-2L	300.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
75		P-186	J-249	J15-7L	125.00	3.00	120.00	0.00	0.00	0.00	0.00	Open	0
76		P-187	J-265	J15-9L	160.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
77		P-189	K14-5L	K15-3L	161.00	12.00	120.00	73.02	0.21	0.00	0.02	Open	0
78		P-19	L14-3L	J-211	580.00	12.00	120.00	-646.81	1.83	0.76	1.31	Open	0
79		P-190	K15-3L	J-242	209.00	12.00	120.00	73.02	0.21	0.00	0.02	Open	0
80		P-191	K15-6L	K15-1L	270.00	12.00	120.00	94.26	0.27	0.01	0.04	Open	0
81		P-194	K15-15L	J30	350.00	6.00	120.00	-46.48	0.53	0.10	0.29	Open	0
82		P-196	J30	K15-10L	144.00	6.00	120.00	-56.18	0.64	0.06	0.42	Open	0
83		P-197	J-240	J15-5L	411.00	6.00	120.00	25.29	0.29	0.04	0.09	Open	0
84		P-198	J15-5L	J-241	294.00	6.00	120.00	25.29	0.29	0.03	0.09	Open	0
85		P-199	J15-3L	J-240	334.00	6.00	120.00	34.99	0.40	0.06	0.17	Open	0
86		P-2	J-202	J-201	100.00	10.00	120.00	550.67	2.25	0.24	2.37	Open	0
87		P-200	J15-2L	J15-3L	266.00	6.00	120.00	34.99	0.40	0.05	0.17	Open	0
88		P-201	K15-6L	K14-10L	385.00	12.00	120.00	-305.26	0.87	0.13	0.33	Open	0
89		P-202	J-209	K14-10L	185.00	8.00	120.00	305.26	1.95	0.44	2.35	Open	0
90		P-205	J-211	K14-9L	270.00	8.00	120.00	120.27	0.77	0.11	0.42	Open	0
91		P-208	L15-5L	L15-4L	380.00	8.00	120.00	120.27	0.77	0.16	0.42	Open	0
92		P-21	L14-4L	L14-3L	600.00	8.00	120.00	100.87	0.64	0.18	0.30	Open	0
93		P-210	K14-9L	L15-6L	335.00	8.00	120.00	120.27	0.77	0.14	0.42	Open	0
94		P-211	L15-6L	L15-5L	35.00	8.00	120.00	120.27	0.77	0.01	0.42	Open	0
95		P-212	L15-4L	J-169	282.00	8.00	120.00	120.27	0.77	0.12	0.42	Open	0
96		P-213	L14-4L	J-168	400.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
97		P-214	J-169	L14-4L	93.00	8.00	120.00	110.57	0.71	0.03	0.36	Open	0
98		P-215	J-169	L15-3L	50.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
99		P-22	J-261	L14-3L	600.00	12.00	120.00	-747.68	2.12	1.03	1.72	Open	0
100		P-221	J-214	J66	174.00	6.00	120.00	-82.18	0.93	0.15	0.84	Open	0
101		P-224	J-231	J12-3L	94.73	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
102		P-230	J-219	J-179	798.00	12.00	120.00	203.40	0.58	0.12	0.15	Open	0
103		P-231	J-179	J-270	407.00	12.00	120.00	193.70	0.55	0.06	0.14	Open	0
104		P-232	J-216	J42	159.55	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
105		P-234	J-268	K11-5L	200.00	12.00	120.00	-71.81	0.20	0.00	0.02	Open	0
106		P-235	J14	K11-6L	201.71	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
107		P-236	K11-4L	K11-3L	230.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
108		P-237	K11-2L	J38	446.04	12.00	120.00	-222.80	0.63	0.08	0.18	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
109		P-238	K11-2L	K11-1L	163.00	12.00	120.00	222.80	0.63	0.03	0.18	Open	0
110		P-239	K17-2L	K17-8L	335.00	6.00	120.00	29.34	0.33	0.04	0.12	Open	0
111		P-24	J-200	I13-2L	200.00	10.00	120.00	531.28	2.17	0.44	2.22	Open	0
112		P-240	K17-8L	J-254	195.00	6.00	120.00	29.34	0.33	0.02	0.13	Open	0
113		P-241	J-251	K16-2L	76.00	6.00	120.00	69.90	0.79	0.05	0.62	Open	0
114		P-242	K16-2L	J-252	234.00	6.00	120.00	69.90	0.79	0.15	0.62	Open	0
115		P-243	J-259	L16-1L	90.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
116		P-244	L16-1L	J-258	147.00	6.00	120.00	8.16	0.09	0.00	0.01	Open	0
117		P-245	K15-2L	K15-1L	59.00	12.00	120.00	-94.26	0.27	0.00	0.04	Open	0
118		P-246	J-242	K15-2L	101.00	12.00	120.00	-94.26	0.27	0.00	0.04	Open	0
119		P-247	J13-8L	J12-4L	238.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
120		P-248	J-271	J60	183.80	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
121		P-25	I13-2L	I13-1L	290.00	8.00	120.00	288.39	1.84	0.61	2.12	Open	0
122		P-250	J-248	J-191	65.00	8.00	120.00	29.10	0.19	0.00	0.03	Open	0
123		P-251	J-191	J-249	60.00	8.00	120.00	19.40	0.12	0.00	0.01	Open	0
124		P-26	I13-1L	J13-12L	360.00	8.00	120.00	288.39	1.84	0.76	2.12	Open	0
125		P-27	J13-12L	J-212	350.00	8.00	120.00	288.39	1.84	0.74	2.12	Open	0
126		P-28	J-213	J-212	40.00	8.00	120.00	-367.12	2.34	0.13	3.31	Open	0
127		P-29	J-213	J-214	180.00	8.00	120.00	263.47	1.68	0.32	1.79	Open	0
128		P-3	J-203	J-202	60.00	8.00	120.00	560.38	3.58	0.43	7.25	Open	0
129		P-30	J12-7L	J-214	400.00	8.00	120.00	-335.95	2.14	1.12	2.81	Open	0
130		P-31	J74	J12-7L	80.00	8.00	120.00	-194.85	1.24	0.08	1.02	Open	0
131		P-32	J-215	J-216	620.00	12.00	120.00	378.00	1.07	0.30	0.49	Open	0
132		P-33	J38	J34	239.05	10.00	120.00	-218.89	0.89	0.10	0.43	Open	0
133		P-35	K11-1L	J-218	450.00	12.00	120.00	222.80	0.63	0.08	0.18	Open	0
134		P-36	J-218	J-219	400.00	12.00	120.00	213.10	0.60	0.07	0.17	Open	0
135		P-38	J12-7L	J-220	300.00	12.00	120.00	141.09	0.40	0.02	0.08	Open	0
136		P-39	J-220	J-221	432.23	8.00	120.00	174.93	1.12	0.36	0.84	Open	0
137		P-4	J-204	J-203	40.00	10.00	120.00	570.08	2.33	0.10	2.52	Open	0
138		P-40	J-221	J-222	200.00	8.00	120.00	92.26	0.59	0.05	0.26	Open	0
139		P-41	J-222	J-223	330.00	8.00	120.00	58.20	0.37	0.04	0.11	Open	0
140		P-42	J-223	J-224	400.00	12.00	120.00	48.50	0.14	0.00	0.01	Open	0
141		P-43	J-224	J-225	430.00	10.00	120.00	38.80	0.16	0.01	0.02	Open	0
142		P-44	J-225	J-226	880.00	10.00	120.00	29.10	0.12	0.01	0.01	Open	0
143		P-46	J-226	J-262	150.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
144		P-47	J-262	J-227	980.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
145		P-48	J-216	J-234	405.00	10.00	120.00	19.40	0.08	0.00	0.00	Open	0
146		P-49	J-234	J-235	315.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0
147		P-5	J-204	J-205	70.00	12.00	120.00	-579.79	1.64	0.07	1.07	Open	0
148		P-51	K11-1L	K10-1L	420.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
149		P-55	J-229	J13-7L	190.00	6.00	120.00	144.75	1.64	0.46	2.40	Open	0
150		P-56	J-213	J-230	210.00	6.00	120.00	64.85	0.74	0.11	0.54	Open	0
151		P-57	J68	J13-7L	161.92	10.00	120.00	138.06	0.56	0.03	0.18	Open	0
152		P-57.5	J68	J14-5L	512.52	10.00	120.00	-138.06	0.56	0.09	0.18	Open	0
153		P-58	J14-3L	J14-5L	168.00	10.00	120.00	138.06	0.56	0.03	0.18	Open	0
154		P-59	J-208	J14-3L	47.00	10.00	120.00	138.06	0.56	0.01	0.19	Open	0
155		P-6	J-205	I14-2L	330.00	12.00	120.00	-589.49	1.67	0.36	1.10	Open	0
156		P-60	J13-7L	J-230	170.00	8.00	120.00	-55.15	0.35	0.02	0.10	Open	0
157		P-62	J-212	J-229	200.00	6.00	120.00	-88.44	1.00	0.19	0.96	Open	0
158		P-63	J-213	J-231	150.00	6.00	120.00	29.10	0.33	0.02	0.12	Open	0
159		P-64	J-231	J12-2L	170.00	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
160		P-66	J32	J12-1L	242.85	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
161		P-67	J74	J-233	200.00	6.00	120.00	19.40	0.22	0.01	0.06	Open	0
162		P-68	J-233	J-232	50.00	6.00	120.00	9.70	0.11	0.00	0.01	Open	0
163		P-7	I14-2L	J-206	265.00	12.00	120.00	-589.49	1.67	0.29	1.10	Open	0
164		P-70	K14-2L	J-221	680.00	8.00	120.00	-72.97	0.47	0.11	0.17	Open	0
165		P-71	J-239	K14-2L	250.00	6.00	120.00	14.66	0.17	0.01	0.03	Open	0
166		P-72	J-239	J-222	600.00	6.00	120.00	-24.36	0.28	0.05	0.09	Open	0
167		P-74	K14-4L	J-238	195.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
168		P-75	K14-3L	K14-4L	185.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
169		P-76	J-237	K14-3L	70.00	6.00	120.00	9.70	0.11	0.00	0.02	Open	0
170		P-77	J-270	J-237	285.00	12.00	120.00	184.00	0.52	0.04	0.13	Open	0
171		P-8	J-206	J14-6L	265.00	12.00	120.00	1,366.83	3.88	1.39	5.24	Open	0
172		P-81	J-210	J-237	50.00	12.00	120.00	-164.60	0.47	0.01	0.11	Open	0
173		P-84	J-241	J15-2L	50.00	6.00	120.00	-175.09	1.99	0.17	3.41	Open	0
174		P-85	J15-1L	J15-2L	150.00	6.00	120.00	210.08	2.38	0.72	4.78	Open	0
175		P-87	J-241	J15-4L	500.00	8.00	120.00	190.68	1.22	0.49	0.98	Open	0
176		P-88	J15-4L	J46	237.07	8.00	120.00	-120.98	0.77	0.10	0.42	Open	0
177		P-89	J15-8L	J15-4L	330.00	8.00	120.00	-311.67	1.99	0.81	2.45	Open	0
178		P-9	J14-6L	J-207	548.00	12.00	120.00	1,347.43	3.82	2.80	5.11	Open	0
179		P-90	J-248	J15-8L	217.00	8.00	120.00	-172.17	1.10	0.18	0.81	Open	0
180		P-92	J-249	J-250	150.00	8.00	120.00	9.70	0.06	0.00	0.00	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
181		P-93	J16-3L	J-248	310.00	8.00	120.00	-133.37	0.85	0.16	0.51	Open	0
182		P-94	K15-17L	J-251	410.00	6.00	120.00	79.60	0.90	0.32	0.79	Open	0
183		P-97	K15-6L	K14-5L	320.00	12.00	120.00	73.02	0.21	0.01	0.02	Open	0
184		P-98	J-207	J15-1L	349.46	10.00	120.00	210.08	0.86	0.14	0.40	Open	0
185		P-99	J-242	J-243	170.00	6.00	120.00	157.58	1.79	0.48	2.81	Open	0
186		P-A	J-201	J-200	89.63	10.00	120.00	540.98	2.21	0.21	2.29	Open	0
187		P-K15-18L	K15-18L	J-190	20.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
188		P-PUMP4	PUMP-4	J-204	86.57	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
189		P-PUMP7	PUMP7	J-206	93.42	12.00	120.00	1,966.01	5.58	0.96	10.28	Open	0
190		P-RES-1	OBS-RES-1	J-261	120.00	12.00	120.00	-503.56	1.43	0.10	0.82	Open	0
191		P-RES2	RES-OBS-2	J-261	140.00	12.00	120.00	-463.34	1.31	0.10	0.71	Open	0
192		P-RES4	R-4	PUMP-4	57.33	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
193		P-RES7	R-7	PUMP7	98.17	12.00	120.00	2,945.80	8.36	2.13	21.74	Open	0
194		P101	J-225	L13-1H	31.59	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
195		P103	L13-2H	J-224	73.25	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
196		P105	PUMP7	J64	3,613.43	12.00	120.00	979.79	2.78	10.23	2.83	Open	0
197		P107	J66	J13-7L	47.41	10.00	120.00	-337.96	1.38	0.05	0.96	Open	0
198		P109	J13-9L	J68	43.99	6.00	110.00	0.00	0.00	0.00	0.00	Open	0
199		P11	J-265	J-190	522.45	6.00	120.00	-27.26	0.31	0.06	0.11	Open	0
200		P111	J70	J-220	119.29	6.00	120.00	255.78	2.90	0.82	6.89	Open	0
201		P113	J72	J70	229.97	8.00	120.00	255.78	1.63	0.39	1.70	Open	0
202		P115	J72	J66	143.74	10.00	120.00	-255.78	1.04	0.08	0.57	Open	0
203		P117	J74	J-215	9.73	12.00	120.00	175.45	0.50	0.00	0.13	Open	0
204		P13	K15-8L	J26	20.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
205		P15	J48	J28	134.35	8.00	120.00	-122.32	0.78	0.06	0.43	Open	0
206		P17	J28	J18	69.62	8.00	120.00	-132.02	0.84	0.03	0.50	Open	0
207		P19	J28	K15-9L	26.37	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
208		P21	J26	J24	334.47	8.00	120.00	102.92	0.66	0.11	0.31	Open	0
209		P23	J24	J22	147.66	8.00	120.00	93.22	0.60	0.04	0.26	Open	0
210		P25	J22	J20	76.49	8.00	120.00	83.52	0.53	0.02	0.21	Open	0
211		P27	J24	K15-16L	17.92	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
212		P29	J22	K15-11L	25.96	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
213		P31	K15-12L	J18	152.64	8.00	120.00	345.33	2.20	0.45	2.96	Open	0
214		P33	J18	J20	237.74	8.00	120.00	203.60	1.30	0.26	1.11	Open	0
215		P35	J32	J12-9L	122.46	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
216		P37	J-271	J32	103.37	6.00	120.00	9.70	0.11	0.00	0.02	Open	0

Low Zone 4 hr 2020 MDD FF with Transmission and Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
217		P39	J36	J16	251.95	8.00	120.00	91.21	0.58	0.06	0.25	Open	0
218		P41	J16	J14	364.77	8.00	120.00	81.51	0.52	0.07	0.20	Open	0
219		P43	J34	K11-11L	21.36	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
220		P45	J16	K11-10L	18.26	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
221		P47	J34	J36	96.54	10.00	120.00	-228.59	0.93	0.04	0.47	Open	0
222		P49	J36	J-216	411.83	10.00	120.00	-329.50	1.35	0.38	0.91	Open	0
223		P51	K11-5L	J14	78.82	12.00	120.00	-71.81	0.20	0.00	0.02	Open	0
224		P53	J-217	J38	40.11	10.00	120.00	13.61	0.06	0.00	0.00	Open	0
225		P55	J40	K11-12L	5.82	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
226		P57	K11-4L	J40	50.14	10.00	120.00	-23.31	0.10	0.00	0.01	Open	0
227		P59	J42	J44	137.81	10.00	120.00	9.70	0.04	0.00	0.00	Open	0
228		P61	J44	K12-4L	71.05	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
229		P63	J-244	L15-7L	46.63	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
230		P65	J46	J14-8L	60.73	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
231		P67	J46	J14-2L	267.66	8.00	120.00	-130.68	0.83	0.13	0.49	Open	0
232		P71	J26	J48	30.72	8.00	120.00	-112.62	0.72	0.01	0.37	Open	0
233		P73	J-201	I14-1L	196.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
234		P75	I13-2L	I14-3L	261.95	10.00	120.00	242.89	0.99	0.14	0.52	Open	0
235		P77	I14-3L	J13-10L	320.82	10.00	120.00	242.89	0.99	0.17	0.52	Open	0
236		P79	J13-10L	J13-11L	244.28	8.00	120.00	242.89	1.55	0.38	1.54	Open	0
237		P81	J13-11L	J-228	132.88	8.00	120.00	242.89	1.55	0.20	1.54	Open	0
238		P83	J-228	J-229	166.40	6.00	120.00	242.89	2.76	1.04	6.26	Open	0
239		P85	J12-3L	J-271	46.04	6.00	120.00	19.40	0.22	0.00	0.06	Open	0
240		P87	K-120101	K11-9L	357.88	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
241		P89	J-191	J16-4L	53.94	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
242		P91	J-220	J-215	304.83	12.00	110.00	212.25	0.60	0.06	0.20	Open	0
243		P93	J60	J12-4L	83.71	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
244		P97	J-220	J12-10L	15.20	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
245		P99	J-221	J12-11L	17.27	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
246		WELL7_TO_OBS	J64	OBS-RES-1	191.50	12.00	120.00	499.12	1.42	0.16	0.81	Open	0
247		WELL_7_TO_OBS2	J64	RES-OBS-2	205.34	12.00	120.00	480.67	1.36	0.16	0.76	Open	0

APPENDIX I

Item 6 – Water Modeling Results: High Zone Fire Flow Year 2020; 2-, 3- & 4-Hour Fire Events (Includes Transmission line from Well 8 to Fairway Reservoir)

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP5	2,205.70	131.22	228.22	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP6	2,134.00	27.97	255.08	0.00	0.00	Closed	0.00	0.00	0.00
3	PUMP8	1,956.00	26.61	354.33	3,661.33	756.34	Open	1.00	95.02	0.00
4	TRANSF	2,629.54	7.57	34.11	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Tank Report

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	1,181.36	2,691.54	2,705.40	69.30	13.86
2	FAIRWAYTANK	-8,210.15	2,679.54	2,707.51	87.41	27.97
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node	Critical Available Node Head	Adjusted Available	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-41.42	2,507.95	1,552.83	1,826.01	M12-8H	10.66	2,628.15	1,552.82	1,552.82
2	J12-5H	3,000.00	J12-5H	-184.12	2,131.62	1,194.49	1,195.20	J12-5H	20.00	2,602.70	1,195.21	1,194.49
3	J12-6H	3,000.00	J12-6H	-215.88	2,050.77	1,155.81	1,156.34	J12-6H	20.00	2,595.16	1,156.35	1,155.81
4	J12-8H	3,000.00	J12-8H	-249.78	1,975.55	1,075.01	1,075.75	J12-8H	20.00	2,598.16	1,075.75	1,075.01
5	J13-1H	3,000.00	J13-4H	-10.11	2,556.21	2,146.81	2,437.65	J13-4H	10.49	2,603.75	2,146.77	2,146.77
6	J13-2H	3,000.00	J13-2H	-43.60	2,472.91	1,768.70	1,768.71	J13-2H	20.00	2,619.70	1,768.71	1,768.70
7	J13-3H	3,000.00	J13-3H	-85.32	2,368.62	1,515.87	1,517.06	J13-3H	20.00	2,611.70	1,517.05	1,515.87
8	J13-4H	3,000.00	J13-4H	-13.52	2,548.33	2,090.06	2,090.06	J13-4H	20.00	2,625.70	2,090.03	2,090.03
9	J13-5H	3,000.00	J13-5H	-12.72	2,550.18	2,103.10	2,103.10	J13-5H	20.00	2,625.70	2,103.07	2,103.07
10	J13-6H	3,000.00	J13-4H	-9.84	2,556.83	2,151.49	2,336.86	J13-4H	14.05	2,611.98	2,151.46	2,151.46
11	J14-1H	3,000.00	J13-4H	-5.53	2,566.78	2,230.64	2,539.51	J13-4H	10.33	2,603.38	2,230.60	2,230.60
12	J7-1H	3,000.00	K7-7H	21.87	2,635.02	3,091.25	3,736.49	K7-7H	5.58	2,597.43	3,091.32	3,091.25
13	J7-2H	3,000.00	K7-7H	21.57	2,634.33	3,076.09	3,247.91	K7-7H	16.34	2,622.26	3,076.14	3,076.09
14	K10-2H	3,000.00	M9-1H	35.40	2,685.24	4,840.03	5,152.35	M9-1H	16.53	2,641.69	4,840.37	4,840.03
15	K12-1H	3,000.00	K12-1H	-82.02	2,335.71	1,768.64	1,768.87	K12-1H	20.00	2,571.16	1,768.87	1,768.64
16	K13-1H	3,000.00	K13-1H	49.43	2,653.09	4,418.82	4,415.90	K13-1H	20.00	2,585.16	4,415.91	4,415.91
17	K13-2H	3,000.00	K13-2H	23.88	2,651.66	3,257.38	3,255.85	K13-2H	20.00	2,642.70	3,255.82	3,255.82
18	K13-3H	3,000.00	K13-3H	-20.41	2,540.42	1,942.24	1,942.25	K13-3H	20.00	2,633.70	1,942.24	1,942.24
19	K13-4H	3,000.00	K13-4H	-4.73	2,589.09	2,110.56	2,110.55	K13-4H	20.00	2,646.16	2,110.55	2,110.55
20	K14-1H	3,000.00	K14-1H	-25.17	2,502.46	2,046.23	2,047.90	K14-1H	20.00	2,606.70	2,047.88	2,046.23
21	K14-6H	3,000.00	K14-6H	-169.23	2,140.45	1,364.63	1,364.93	K14-6H	20.00	2,577.16	1,364.93	1,364.63
22	K7-1H	3,000.00	K7-7H	21.52	2,634.21	3,073.68	3,146.39	K7-7H	18.47	2,627.17	3,073.73	3,073.68
23	K7-2H	3,000.00	K7-7H	22.24	2,635.87	3,110.27	3,514.65	K7-7H	11.27	2,610.54	3,110.29	3,110.27
24	K7-3H	3,000.00	K7-3H	-34.54	2,463.83	2,042.61	2,042.59	K7-3H	20.00	2,589.70	2,042.59	2,042.59
25	K7-4H	3,000.00	K7-7H	27.68	2,648.42	3,435.90	4,217.81	K7-7H	4.44	2,594.78	3,436.12	3,435.90
26	K7-5H	3,000.00	K7-5H	-5.84	2,522.07	2,443.92	2,443.93	K7-5H	20.00	2,581.70	2,443.93	2,443.92
27	K7-6H	3,000.00	K7-6H	18.17	2,616.47	2,926.62	2,926.67	K7-6H	20.00	2,620.70	2,926.67	2,926.62
28	K7-7H	3,000.00	K7-7H	20.22	2,631.22	3,009.93	3,010.53	K7-7H	20.00	2,630.70	3,010.47	3,009.93
29	K7-8H	3,000.00	K7-8H	-26.92	2,458.42	2,212.93	2,212.95	K7-8H	20.00	2,566.70	2,212.95	2,212.93
30	K7-9H	3,000.00	K7-9H	-55.79	2,398.77	1,922.39	1,922.35	K7-9H	20.00	2,573.70	1,922.35	1,922.35
31	K8-1H	3,000.00	K8-1H	-59.58	2,372.05	1,962.79	1,962.77	K8-1H	20.00	2,555.70	1,962.78	1,962.78
32	K8-2H	3,000.00	K7-7H	26.37	2,645.40	3,348.55	3,899.02	K7-7H	8.93	2,605.15	3,348.68	3,348.55
33	L10-1H	3,000.00	L10-8H	47.74	2,665.73	4,821.28	4,936.40	L10-8H	17.78	2,596.57	4,821.36	4,821.28
34	L10-2H	3,000.00	L10-2H	46.11	2,662.95	4,653.62	4,653.70	L10-2H	20.00	2,602.70	4,653.69	4,653.62
35	L10-4H	3,000.00	L10-8H	-105.09	2,313.00	1,506.05	1,528.62	L10-8H	18.64	2,598.57	1,505.89	1,505.89
36	L10-5H	3,000.00	L10-8H	-50.70	2,438.54	1,845.10	1,909.22	L10-8H	16.83	2,594.39	1,845.32	1,845.10
37	L10-6H	3,000.00	M9-1H	34.11	2,682.25	4,574.39	5,138.55	M9-1H	13.30	2,634.23	4,574.59	4,574.39
38	L10-7H	3,000.00	M9-1H	34.94	2,684.17	4,743.21	5,015.92	M9-1H	16.94	2,642.64	4,743.52	4,743.21
39	L10-8H	3,000.00	L10-8H	-225.72	2,034.61	1,130.87	1,130.56	L10-8H	20.00	2,601.70	1,130.56	1,130.56
40	L11-1H	3,000.00	K13-4H	36.75	2,684.82	4,901.87	4,947.31	K13-4H	19.48	2,644.96	4,902.75	4,901.87
41	L11-2H	3,000.00	K13-4H	36.35	2,683.90	4,814.98	5,627.31	K13-4H	9.64	2,622.25	4,815.75	4,814.98
42	L11-3H	3,000.00	K13-4H	36.70	2,684.70	4,887.89	5,359.10	K13-4H	14.26	2,632.90	4,888.77	4,887.89
43	L11-4H	3,000.00	L11-4H	-133.67	2,228.52	1,495.01	1,495.41	L11-4H	20.00	2,583.16	1,495.41	1,495.01
44	L11-5H	3,000.00	L11-5H	-22.25	2,510.64	2,145.91	2,143.79	L11-5H	20.00	2,608.16	2,143.80	2,143.80
45	L11-6H	3,000.00	L11-6H	50.28	2,655.04	4,621.74	4,621.79	L11-6H	20.00	2,585.16	4,621.77	4,621.74
46	L12-3H	3,000.00	M12-5H	34.94	2,663.17	3,938.88	4,015.08	M12-5H	18.57	2,625.40	3,938.98	3,938.88
47	L12-4H	3,000.00	K13-4H	34.82	2,680.35	4,508.91	5,613.60	K13-4H	4.64	2,610.71	4,509.33	4,508.91

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node	Critical Available Node Head	Adjusted Available	Design Flow (gpm)
48		L12-6H	3,000.00	L12-6H	39.22	2,651.05	4,035.52	4,035.52	L12-6H	20.00	2,606.70	4,035.53	4,035.52
49		L12-7H	3,000.00	L12-7H	46.38	2,662.59	4,618.45	4,618.54	L12-7H	20.00	2,601.70	4,618.51	4,618.45
50		L12-8H	3,000.00	L12-8H	27.72	2,629.52	3,341.66	3,341.98	L12-8H	20.00	2,611.70	3,341.99	3,341.66
51		L13-10H	3,000.00	L13-10H	37.10	2,621.63	3,619.64	3,618.96	L13-10H	20.00	2,582.16	3,618.95	3,618.95
52		L13-11H	3,000.00	M12-8H	44.33	2,705.86	7,154.33	7,203.37	M12-8H	19.58	2,648.72	7,153.84	7,153.84
53		L13-12H	3,000.00	L13-12H	49.34	2,668.86	4,803.27	4,803.26	L13-12H	20.00	2,601.16	4,803.28	4,803.27
54		L13-1H	3,000.00	K13-4H	33.69	2,677.75	4,305.01	5,120.75	K13-4H	8.42	2,619.42	4,305.27	4,305.01
55		L13-2H	3,000.00	K13-4H	32.35	2,674.65	4,117.35	5,288.76	K13-4H	2.08	2,604.79	4,117.55	4,117.35
56		L13-3H	3,000.00	M12-8H	35.14	2,684.65	4,552.46	4,661.93	M12-8H	18.64	2,646.55	4,552.72	4,552.46
57		L13-4H	3,000.00	M12-8H	30.14	2,673.10	3,823.62	4,361.11	M12-8H	11.83	2,630.84	3,823.66	3,823.62
58		L13-5H	3,000.00	M12-8H	35.95	2,686.50	4,620.41	5,593.73	M12-8H	7.26	2,620.29	4,620.44	4,620.41
59		L13-6H	3,000.00	K13-4H	34.39	2,679.37	4,395.20	4,395.86	K13-4H	19.99	2,646.14	4,395.43	4,395.20
60		L13-7H	3,000.00	M12-8H	42.06	2,700.61	6,207.95	6,903.29	M12-8H	12.99	2,633.51	6,207.88	6,207.88
61		L13-8H	3,000.00	L13-8H	58.82	2,683.29	5,908.29	5,908.31	L13-8H	20.00	2,593.70	5,908.34	5,908.29
62		L13-9H	3,000.00	L13-9H	38.96	2,651.45	4,003.14	4,003.17	L13-9H	20.00	2,607.70	4,003.16	4,003.14
63		L14-2H	3,000.00	L14-2H	-38.14	2,463.97	1,962.10	1,961.31	L14-2H	20.00	2,598.16	1,961.30	1,961.30
64		L14-3H	3,000.00	L14-3H	-13.41	2,534.06	2,201.60	2,201.55	L14-3H	20.00	2,611.16	2,201.56	2,201.56
65		L7-1H	3,000.00	L7-2H	3.87	2,562.47	2,567.66	2,676.70	L7-2H	16.13	2,590.76	2,567.68	2,567.66
66		L7-2H	3,000.00	L7-2H	-26.98	2,491.27	2,078.83	2,078.80	L7-2H	20.00	2,599.70	2,078.81	2,078.81
67		L7-3H	3,000.00	K7-7H	23.90	2,639.69	3,199.67	3,351.21	K7-7H	16.92	2,623.58	3,199.70	3,199.67
68		L7-4H	3,000.00	L7-4H	23.14	2,608.95	3,113.35	3,113.38	L7-4H	20.00	2,601.70	3,113.38	3,113.35
69		L7-5H	3,000.00	L7-5H	17.36	2,610.59	2,900.24	2,900.28	L7-5H	20.00	2,616.70	2,900.29	2,900.24
70		L8-1H	3,000.00	L8-1H	35.54	2,647.57	3,800.97	3,801.28	L8-1H	20.00	2,611.70	3,801.28	3,800.97
71		L9-1H	3,000.00	M9-1H	30.37	2,673.63	3,896.22	4,158.94	M9-1H	16.78	2,642.27	3,896.29	3,896.22
72		M11-1H	3,000.00	M11-3H	30.57	2,690.09	4,292.62	4,750.86	M11-3H	15.21	2,654.64	4,292.90	4,292.62
73		M11-2H	3,000.00	M11-2H	23.60	2,638.00	3,157.44	3,158.17	M11-2H	20.00	2,629.70	3,158.17	3,157.44
74		M11-3H	3,000.00	M11-3H	-118.96	2,344.99	1,055.97	1,056.12	M11-3H	20.00	2,665.70	1,056.12	1,055.97
75		M11-4H	3,000.00	M11-3H	-22.57	2,567.44	1,691.70	2,120.95	M11-3H	8.04	2,638.10	1,691.70	1,691.70
76		M11-5H	3,000.00	M11-3H	16.79	2,658.29	2,790.02	3,013.76	M11-3H	16.58	2,657.79	2,790.09	2,790.02
77		M11-6H	3,000.00	M11-6H	2.14	2,562.49	2,555.27	2,555.14	M11-6H	20.00	2,603.70	2,555.15	2,555.15
78		M12-1H	3,000.00	M12-1H	30.77	2,656.56	3,609.07	3,609.83	M12-1H	20.00	2,631.70	3,609.84	3,609.07
79		M12-2H	3,000.00	M12-8H	-15.74	2,567.20	1,866.98	2,137.35	M12-8H	12.53	2,632.46	1,866.94	1,866.94
80		M12-3H	3,000.00	M12-8H	-48.24	2,492.21	1,492.28	1,663.98	M12-8H	14.01	2,635.87	1,492.26	1,492.26
81		M12-4H	3,000.00	M12-4H	27.84	2,677.80	3,613.79	3,613.93	M12-4H	20.00	2,659.70	3,613.94	3,613.79
82		M12-5H	3,000.00	M12-5H	16.79	2,621.29	2,870.37	2,870.23	M12-5H	20.00	2,628.70	2,870.22	2,870.22
83		M12-6H	3,000.00	M12-8H	-41.42	2,507.95	1,552.84	1,766.58	M12-8H	12.79	2,633.06	1,552.82	1,552.82
84		M12-7H	3,000.00	M12-8H	-68.87	2,444.61	1,344.52	1,361.94	M12-8H	19.35	2,648.19	1,344.49	1,344.49
85		M12-8H	3,000.00	M12-8H	-95.24	2,383.75	1,207.73	1,207.70	M12-8H	20.00	2,649.70	1,207.70	1,207.70
86		M13-1H	3,000.00	M13-1H	55.17	2,686.87	5,799.09	5,798.94	M13-1H	20.00	2,605.70	5,798.97	5,798.97
87		M13-2H	3,000.00	M13-2H	51.10	2,690.48	5,663.70	5,664.96	M13-2H	20.00	2,618.70	5,664.98	5,663.70
88		M13-3H	3,000.00	M13-3H	24.60	2,615.32	3,168.85	3,168.77	M13-3H	20.00	2,604.70	3,168.77	3,168.77
89		M13-4H	3,000.00	M13-4H	-132.55	2,273.08	1,239.65	1,239.64	M13-4H	20.00	2,625.16	1,239.64	1,239.64
90		M13-5H	3,000.00	M12-8H	11.76	2,630.69	2,579.38	2,998.30	M12-8H	11.80	2,630.77	2,579.32	2,579.32
91		M14-1H	3,000.00	M14-1H	19.90	2,615.94	2,997.03	2,996.47	M14-1H	20.00	2,616.16	2,996.47	2,996.47
92		M14-2H	3,000.00	M14-2H	26.96	2,626.22	3,273.33	3,273.11	M14-2H	20.00	2,610.16	3,273.11	3,273.11
93		M14-3H	3,000.00	M14-3H	23.87	2,625.70	3,154.17	3,154.05	M14-3H	20.00	2,616.76	3,154.05	3,154.05
94		M6-1H	3,000.00	M6-1H	27.52	2,619.06	3,292.94	3,293.00	M6-1H	20.00	2,601.70	3,292.97	3,292.94

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node	Critical Available Node Head	Adjusted Available	Design Flow (gpm)
95	M7-1H	3,000.00	M7-1H	26.91	2,614.65	3,258.72	3,258.77	M7-1H	20.00	2,598.70	3,258.75	3,258.72
96	M7-2H	3,000.00	M7-2H	9.52	2,589.51	2,666.79	2,666.80	M7-2H	20.00	2,613.70	2,666.79	2,666.79
97	M8-1H	3,000.00	M8-1H	-18.23	2,539.48	2,044.51	2,044.43	M8-1H	20.00	2,627.70	2,044.43	2,044.43
98	M8-2H	3,000.00	M8-2H	32.44	2,666.86	3,880.54	3,880.58	M8-2H	20.00	2,638.16	3,880.57	3,880.54
99	M8-3H	3,000.00	M8-3H	31.77	2,665.82	3,820.59	3,820.62	M8-3H	20.00	2,638.66	3,820.61	3,820.59
100	M8-4H	3,000.00	O10-1H	31.00	2,699.10	4,773.70	4,886.85	O10-1H	19.20	2,671.85	4,773.74	4,773.70
101	M8-5H	3,000.00	M8-5H	37.64	2,679.87	4,602.58	4,603.43	M8-5H	20.00	2,639.16	4,603.42	4,602.58
102	M9-1H	3,000.00	M9-1H	18.50	2,646.23	2,915.36	2,915.39	M9-1H	20.00	2,649.70	2,915.37	2,915.36
103	N10-1H	3,000.00	N10-1H	-35.12	2,536.49	1,578.65	1,579.14	N10-1H	20.00	2,663.70	1,579.15	1,578.65
104	N11-1H	3,000.00	N11-1H	19.95	2,669.58	2,997.67	2,996.01	N11-1H	20.00	2,669.70	2,996.01	2,996.01
105	N11-2H	3,000.00	M11-3H	-34.41	2,540.12	1,565.37	1,576.93	M11-3H	19.67	2,664.95	1,565.37	1,565.37
106	N11-3H	3,000.00	M11-3H	-28.43	2,553.94	1,624.77	1,901.39	M11-3H	12.10	2,647.46	1,624.77	1,624.77
107	N12-1H	3,000.00	N11-1H	36.32	2,707.36	5,726.91	6,006.18	N11-1H	17.19	2,663.20	5,730.88	5,726.91
108	N13-1H	3,000.00	N11-1H	43.24	2,723.32	6,508.55	6,854.16	N11-1H	16.49	2,661.59	6,508.55	6,508.55
109	N13-2H	3,000.00	N13-2H	13.25	2,626.12	2,697.13	2,697.09	N13-2H	20.00	2,641.70	2,697.09	2,697.09
110	N13-3H	3,000.00	N13-3H	48.72	2,658.98	4,452.09	4,452.25	N13-3H	20.00	2,592.70	4,452.25	4,452.09
111	N14-1H	3,000.00	N14-1H	57.03	2,680.17	5,442.27	5,443.17	N14-1H	20.00	2,594.70	5,443.14	5,442.27
112	N14-2H	3,000.00	N14-2H	3.56	2,565.76	2,541.80	2,541.77	N14-2H	20.00	2,603.70	2,541.78	2,541.78
113	N14-3H	3,000.00	O12-1H	46.25	2,686.28	5,183.84	5,253.83	O12-1H	18.88	2,623.12	5,184.46	5,183.84
114	N15-1H	3,000.00	N15-1H	-83.39	2,366.10	1,616.98	1,617.00	N15-1H	20.00	2,604.70	1,617.00	1,616.98
115	N15-2H	3,000.00	N15-2H	13.07	2,586.70	2,781.29	2,780.73	N15-2H	20.00	2,602.70	2,780.73	2,780.73
116	N15-3H	3,000.00	N15-3H	-25.77	2,497.06	2,091.53	2,091.51	N15-3H	20.00	2,602.70	2,091.51	2,091.51
117	O10-1H	3,000.00	O10-1H	-101.35	2,393.64	967.14	967.17	O10-1H	20.00	2,673.70	967.17	967.14
118	O12-1H	3,000.00	O12-1H	-26.10	2,519.30	1,971.82	1,971.80	O12-1H	20.00	2,625.70	1,971.79	1,971.79
119	O13-1H	3,000.00	O13-1H	60.47	2,647.09	4,703.57	4,703.69	O13-1H	20.00	2,553.70	4,703.70	4,703.57
120	O13-2H	3,000.00	O13-2H	43.99	2,623.05	3,862.05	3,862.08	O13-2H	20.00	2,567.70	3,862.09	3,862.05
121	O8-1H	3,000.00	O8-1H	-124.94	2,332.65	951.47	951.46	O8-1H	20.00	2,667.16	951.47	951.47
122	O9-1H	3,000.00	O9-1H	-122.52	2,344.24	893.67	893.67	O9-1H	20.00	2,673.16	893.67	893.67
123	P13-1H	3,000.00	O12-1H	39.66	2,671.06	4,357.28	5,547.15	O12-1H	-4.92	2,568.18	4,358.08	4,357.28
124	P13-2H	3,000.00	O12-1H	40.60	2,673.24	4,492.86	4,726.34	O12-1H	15.77	2,615.93	4,494.10	4,492.86
125	P6-1H	3,000.00	P6-1H	-27.49	2,506.09	2,025.39	2,025.57	P6-1H	20.00	2,615.70	2,025.57	2,025.39
126	P6-2H	3,000.00	P6-2H	-141.20	2,266.67	1,172.61	1,172.49	P6-2H	20.00	2,638.70	1,172.48	1,172.48
127	Q10-1H	3,000.00	Q10-1H	17.69	2,532.83	2,951.56	2,951.56	Q10-1H	20.00	2,538.16	2,951.58	2,951.56
128	Q10-2H	3,000.00	Q10-2H	-33.53	2,417.15	2,249.83	2,250.49	Q10-2H	20.00	2,540.70	2,250.49	2,249.83
129	Q10-3H	3,000.00	Q10-3H	11.97	2,516.16	2,844.02	2,844.11	Q10-3H	20.00	2,534.70	2,844.11	2,844.02
130	Q11-1H	3,000.00	P6-2H	30.75	2,663.50	3,800.73	3,883.47	P6-2H	18.72	2,635.73	3,800.79	3,800.73
131	R7-1H	3,000.00	R7-1H	-9.69	2,495.17	2,455.61	2,456.05	R7-1H	20.00	2,563.70	2,456.05	2,455.61
132	R9-1H	3,000.00	R9-1H	-12.81	2,469.97	2,458.61	2,459.10	R9-1H	20.00	2,545.70	2,459.08	2,458.61

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1	12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	9,246.12	26.23	690.10	212.44	Open
2	P-1	J-103	J-102	1,176.22	12.00	110.00	-647.90	1.84	1.82	1.55	Open
3	P-10	J-128	J-127	45.45	10.00	110.00	-55.40	0.23	0.00	0.04	Open
4	P-100	J-239	J-238	960.70	8.00	110.00	-28.82	0.18	0.03	0.04	Open
5	P-101	J-245	J-238	149.26	8.00	110.00	33.94	0.22	0.01	0.05	Open
6	P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7	P-103	J-233	J-158	215.33	8.00	110.00	103.33	0.66	0.08	0.37	Open
8	P-104	J-255	J-122	328.78	8.00	110.00	-14.44	0.09	0.00	0.01	Open
9	P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10	P-106	J-157	J-170	353.94	8.00	110.00	87.97	0.56	0.10	0.28	Open
11	P-108	J-168	J72	163.38	8.00	110.00	5.47	0.03	0.00	0.00	Open
12	P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13	P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14	P-113	J76	J-244	237.08	12.00	110.00	18.24	0.05	0.00	0.00	Open
15	P-114	J-244	J-131	21.10	12.00	110.00	13.12	0.04	0.00	0.00	Open
16	P-115	J-131	J-255	34.41	12.00	110.00	2.88	0.01	0.00	0.00	Open
17	P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18	P-117	J-168	J74	63.55	8.00	110.00	-10.59	0.07	0.00	0.00	Open
19	P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20	P-119	J-201	J-170	17.29	12.00	110.00	-29.77	0.08	0.00	0.00	Open
21	P-12	J-114	J-115	298.01	10.00	110.00	193.47	0.79	0.12	0.40	Open
22	P-120	J-241	J-201	61.98	8.00	110.00	-19.53	0.12	0.00	0.02	Open
23	P-121	J-158	J-157	92.45	8.00	110.00	98.21	0.63	0.03	0.34	Open
24	P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25	P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26	P-124	J-236	J42	42.81	8.00	110.00	-1,196.72	7.64	1.49	34.71	Open
27	P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28	P-127	J-211	J-181	330.78	8.00	110.00	-707.02	4.51	4.33	13.10	Open
29	P-128	J-212	J-190	143.39	12.00	110.00	-211.78	0.60	0.03	0.20	Open
30	P-129	J-231	J-150	227.08	8.00	110.00	-240.21	1.53	0.40	1.77	Open
31	P-130	J-141	J-205	202.64	8.00	110.00	162.35	1.04	0.17	0.86	Open
32	P-131	J-115	J-205	245.54	8.00	110.00	170.99	1.09	0.23	0.94	Open
33	P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34	P-133	J-153	J-152	97.97	12.00	110.00	199.69	0.57	0.02	0.17	Open
35	P-134	J-192	J-191	110.45	8.00	110.00	179.21	1.14	0.11	1.03	Open
36	P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.97	1.08	0.02	0.93	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.33	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.57	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-369.93	1.51	0.31	1.33	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	171.66	1.10	0.12	0.95	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-370.05	1.05	0.10	0.55	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-364.93	1.04	0.12	0.53	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-224.85	1.44	0.27	1.57	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-214.61	1.37	0.03	1.44	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-229.97	1.47	0.09	1.64	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	165.48	1.06	0.12	0.89	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	198.59	1.27	0.19	1.25	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	295.07	1.88	0.88	2.60	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	84.36	0.54	0.08	0.26	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-170.60	1.09	0.14	0.94	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-91.36	0.58	0.04	0.30	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	197.27	1.26	0.02	1.24	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-506.42	2.07	0.57	2.38	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-504.63	3.22	1.54	7.01	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	176.79	1.13	0.10	1.01	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-192.15	1.23	0.02	1.17	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	167.47	1.07	0.01	0.90	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-687.91	2.81	2.78	4.20	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	328.22	2.09	0.70	3.16	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	155.89	1.00	0.02	0.79	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-332.37	2.12	0.15	3.24	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,797.20	5.10	3.49	10.23	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.00	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-364.81	1.49	0.37	1.30	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-347.73	2.22	0.16	3.52	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,418.74	4.02	0.17	6.60	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-363.09	2.32	0.54	3.81	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,786.96	5.07	0.53	10.12	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-342.61	2.19	0.68	3.42	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.68	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-255.57	1.63	0.05	2.00	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-245.33	1.57	0.02	1.82	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-722.38	4.61	0.29	13.63	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	717.26	4.58	1.79	13.45	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	10.00	110.00	163.95	0.67	0.34	0.29	Open
100		P-196	J28	J26	390.87	12.00	110.00	0.08	0.00	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	158.83	1.01	0.02	0.83	Open
102		P-198	J-249	J-254	108.97	10.00	110.00	128.10	0.52	0.02	0.19	Open
103		P-199	J-254	J-177	467.39	10.00	110.00	122.98	0.50	0.08	0.17	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-516.66	2.11	0.32	2.47	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	10.00	110.00	-27.31	0.11	0.01	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	82.02	0.34	0.00	0.08	Open
110		P-205	J-206	J-207	208.07	10.00	110.00	26.85	0.11	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-105.09	0.67	0.37	0.38	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	-25.52	0.07	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	-15.28	0.04	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	657.19	2.68	2.15	3.86	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	-20.40	0.06	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-535.25	1.52	0.05	1.09	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.00	Open
122		P-216	J-293	J-294	1,100.07	10.00	110.00	402.11	1.64	1.71	1.55	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	10.00	110.00	381.63	1.56	1.00	1.41	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	377.91	1.54	0.33	1.39	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	10.00	110.00	396.99	1.62	0.08	1.51	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.01	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	10.00	110.00	361.15	1.48	1.33	1.27	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	274.15	1.12	0.10	0.76	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	28.63	0.32	0.08	0.14	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	18.38	0.21	0.01	0.06	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	6.00	110.00	15.36	0.17	0.00	0.04	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-339.05	1.38	0.77	1.13	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-376.07	4.27	6.83	16.52	Open
146		P-242	J-230	N13-2H	414.06	8.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	161.01	1.03	0.64	0.85	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.01	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-406.80	4.62	1.08	19.10	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	401.68	4.56	8.19	18.66	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-381.20	4.33	2.40	16.94	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	494.39	3.16	0.13	6.75	Open
159		P-253	J-342	J-277	166.27	8.00	110.00	10.24	0.07	0.00	0.01	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	8.00	110.00	-76.81	0.49	0.17	0.21	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	36.50	0.41	0.16	0.22	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	31.38	0.36	0.04	0.17	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	350.91	1.00	0.37	0.50	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	432.83	1.23	0.32	0.73	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	453.32	1.29	0.11	0.80	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-44.18	0.50	0.11	0.31	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.00	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	59.54	0.68	0.02	0.55	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	340.66	2.17	4.28	3.39	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-64.66	0.73	0.13	0.63	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-201.53	0.57	0.01	0.18	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.60	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	12.00	110.00	12.20	0.03	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-334.45	2.13	5.25	3.27	Open
186		P-281	J-273	J-318	140.95	12.00	110.00	1.96	0.01	0.00	0.00	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.00	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.24	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.48	0.23	0.02	0.08	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.01	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.00	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	46.75	0.30	0.11	0.09	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.16	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.28	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.52	0.69	0.00	0.54	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	151.18	1.72	1.57	3.05	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-155.00	0.44	0.04	0.11	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.48	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-206.65	0.59	0.06	0.19	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-165.68	1.88	0.27	3.62	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-160.56	1.82	0.24	3.42	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.00	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	156.30	1.77	0.20	3.25	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-161.42	1.83	0.07	3.45	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.00	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.24	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-182.84	2.07	0.04	4.34	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.12	0.06	0.00	0.00	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-66.48	0.42	0.05	0.16	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.01	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	8.00	110.00	25.60	0.16	0.00	0.03	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.07	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.01	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-35.76	0.10	0.00	0.01	Open
237		P-330	J-266	J-313	206.46	10.00	110.00	2.25	0.01	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	10.00	110.00	-22.19	0.09	0.00	0.01	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	10.00	110.00	12.50	0.05	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	10.00	110.00	7.37	0.03	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	118.35	0.76	0.03	0.48	Open
248		P-340	J-287	J-206	239.33	10.00	110.00	44.47	0.18	0.01	0.03	Open
249		P-341	J-178	J-287	70.36	10.00	110.00	49.59	0.20	0.00	0.03	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.72	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.84	0.41	0.01	0.21	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253		P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.00	Open
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255		P-347	J-111	J-284	43.43	6.00	110.00	33.75	0.38	0.01	0.19	Open
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257		P-349	J-265	J-264	236.64	8.00	110.00	-10.24	0.07	0.00	0.01	Open
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259		P-350	J-265	J-265A	252.43	8.00	110.00	5.12	0.03	0.00	0.00	Open
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262		P-353	J-281	J-282	60.97	6.00	110.00	-40.04	0.45	0.02	0.26	Open
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264		P-355	J-123	J50	205.02	6.00	110.00	-29.80	0.34	0.03	0.15	Open
265		P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266		P-357	J-285	J-306	386.52	6.00	110.00	23.51	0.27	0.04	0.10	Open
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268		P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269		P-361	J-295	J-295A	196.76	12.00	110.00	434.74	1.23	0.15	0.74	Open
270		P-361A	J-295A	J-239	291.39	12.00	110.00	429.62	1.22	0.21	0.72	Open
271		P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272		P-363	J-336	J-345	166.85	10.00	110.00	366.27	1.50	0.22	1.31	Open
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274		P-369	J-278	J-295	165.68	12.00	110.00	439.86	1.25	0.13	0.76	Open
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.02	Open
278		P-371	J-358	J64	110.10	8.00	110.00	-1,186.48	7.57	3.76	34.16	Open
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280		P-374	J-350	J-153	30.43	12.00	110.00	-160.12	0.45	0.00	0.11	Open
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284		P-378J	J-378	J-299	400.51	6.00	110.00	-175.92	2.00	1.62	4.05	Open
285		P-379	J-119	J-359	917.88	8.00	110.00	83.07	0.53	0.23	0.25	Open
286		P-38	J-183	J-186	1,090.53	8.00	110.00	351.56	2.24	3.92	3.59	Open
287		P-380	J-119	J-359	917.88	8.00	110.00	83.07	0.53	0.23	0.25	Open
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	268.76	1.72	0.65	2.18	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	263.64	1.68	0.23	2.11	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	10.00	110.00	407.23	1.66	1.94	1.59	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	393.19	2.51	2.82	4.42	Open
301		P-390	J-315	J46	657.48	10.00	110.00	345.79	1.41	0.77	1.17	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-16.02	0.18	0.06	0.05	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-21.14	0.24	0.04	0.08	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-26.26	0.17	0.03	0.03	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	345.78	2.21	1.72	3.48	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	444.98	1.26	0.06	0.77	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-530.13	1.50	0.41	1.07	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	350.90	2.24	7.27	3.58	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	732.62	4.68	0.95	13.99	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.56	0.42	0.01	0.17	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	957.71	6.11	8.78	22.97	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	284.12	1.81	1.33	2.42	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.24	0.07	0.00	0.01	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,812.56	5.14	5.75	10.39	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.08	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.20	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.32	0.36	0.00	0.12	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.84	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.84	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.01	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,399.02	6.81	8.65	17.46	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,817.68	5.16	0.15	10.44	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,858.65	5.27	1.58	10.89	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,853.52	5.26	4.05	10.83	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,404.14	6.82	4.09	17.53	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-289.24	1.85	0.22	2.50	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-375.05	1.53	0.32	1.36	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,200.86	7.66	9.95	34.93	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	753.10	4.81	7.05	14.72	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	747.98	4.77	2.07	14.54	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.72	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.03	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-442.64	2.83	1.52	5.50	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361	P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362	P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363	P-9	J-113	J-104	183.55	10.00	110.00	-390.42	1.59	0.27	1.47	Open
364	P-90	J-133	J-134	116.30	8.00	110.00	248.28	1.58	0.22	1.89	Open
365	P-93	J-209	J-247	44.60	8.00	110.00	-279.00	1.78	0.10	2.34	Open
366	P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367	P-95	J-221	J-162	263.63	8.00	110.00	396.56	2.53	1.18	4.49	Open
368	P-96	J-163	J-162	264.20	8.00	110.00	-391.44	2.50	1.16	4.38	Open
369	P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370	P-98	J-172	J-163	39.90	8.00	110.00	-386.32	2.47	0.17	4.28	Open
371	P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372	P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,181.36	7.54	2.85	33.89	Open
373	P-J106	J-252	J-106	417.04	8.00	110.00	194.20	1.24	0.50	1.20	Open
374	P-J286	J-363	J-286	10.63	6.00	110.00	80.03	0.91	0.01	0.94	Open
375	P-J335	J-335	J-286	287.42	6.00	110.00	-74.90	0.85	0.24	0.83	Open
376	P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.00	Open
377	P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378	P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379	P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380	P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381	P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382	P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383	P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384	P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385	P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386	P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387	P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388	P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389	P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,661.33	23.37	13.02	275.34	Open
390	P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391	P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392	P-RES8	RES-8	PUMP8	73.80	8.00	110.00	-5,584.79	35.65	44.41	601.82	Open
393	P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,698.50	7.66	6.02	21.71	Open
394	P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395	P126	J-242	J-376	11.13	8.00	110.00	499.51	3.19	0.08	6.89	Open
396	P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397		P128	J-344	J-393	9.32	12.00	110.00	-144.75	0.41	0.00	0.08	Open
398		P130	J10	J14	116.51	10.00	110.00	333.93	1.36	0.13	1.10	Open
399		P132	J14	M8-2H	217.35	8.00	110.00	96.26	0.61	0.07	0.33	Open
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	96.26	0.61	0.08	0.33	Open
401		P136	M8-3H	J16	275.97	8.00	110.00	96.26	0.61	0.09	0.33	Open
402		P138	J16	J12	16.19	10.00	110.00	323.69	1.32	0.02	1.04	Open
403		P140	J16	M8-4H	42.30	10.00	110.00	-232.54	0.95	0.02	0.56	Open
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-232.54	0.95	0.15	0.56	Open
405		P144	M8-5H	J14	116.30	10.00	110.00	-232.54	0.95	0.07	0.56	Open
406		P146	J12	J-102	126.72	10.00	110.00	318.57	1.30	0.13	1.01	Open
407		P148	J20	J22	6.79	12.00	110.00	-46.00	0.13	0.00	0.04	Open
408		P150	J22	J-161	73.04	8.00	110.00	-51.12	0.33	0.01	0.10	Open
409		P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.00	Open
410		P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.00	Open
411		P156	J32	J40	349.41	12.00	110.00	9.08	0.03	0.00	0.00	Open
412		P158	J30	J28	652.66	12.00	110.00	10.32	0.03	0.00	0.00	Open
413		P160	J-313	J32	17.72	6.00	110.00	19.32	0.22	0.00	0.07	Open
414		P162	J30	J-207	49.17	12.00	110.00	-13.75	0.04	0.00	0.00	Open
415		P164	J30	J36	31.14	12.00	110.00	-2.86	0.01	0.00	0.00	Open
416		P166	J36	J-207	18.03	8.00	110.00	-7.98	0.05	0.00	0.00	Open
417		P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418		P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422		P178	J44	J-236	15.32	8.00	110.00	-1,191.60	7.61	0.53	34.44	Open
423		P180	J42	J-190	51.62	8.00	110.00	-1,201.84	7.67	1.81	34.99	Open
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425		P184	J48	J46	1,260.92	6.00	110.00	71.69	0.81	0.97	0.77	Open
426		P186	J46	J-366	444.59	10.00	110.00	412.35	1.68	0.72	1.63	Open
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428		P190	J40	J38	318.75	12.00	110.00	3.96	0.01	0.00	0.00	Open
429		P192	J38	J30	286.67	12.00	110.00	-1.17	0.00	0.00	0.00	Open
430		P194	J50	J-281	85.58	6.00	110.00	-34.92	0.40	0.02	0.20	Open
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432		P198	J52	J54	266.38	8.00	110.00	20.49	0.13	0.00	0.02	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.43	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.01	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,827.92	5.19	0.37	10.56	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,186.48	7.57	10.06	34.16	Open
445		P224	J-344	J-106	395.17	12.00	110.00	290.82	0.82	0.14	0.35	Open
446		P226	J-106	J-104	393.05	12.00	110.00	479.90	1.36	0.35	0.89	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.84	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.91	0.04	0.00	0.00	Open
449		P232	J74	J-241	28.57	12.00	110.00	-9.29	0.03	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	12.04	0.03	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	28.93	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-21.49	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-1.30	0.00	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-22.79	0.06	0.00	0.00	Open
456		P246	J78	J84	490.51	12.00	110.00	12.04	0.03	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	-1.44	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	7.44	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	7.44	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	4.60	0.05	0.00	0.01	Open
461		P256	J78	J76	5.94	12.00	110.00	-34.83	0.10	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	53.08	0.34	0.00	0.11	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.03	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.01	Open

High Zone 2 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-1,035.97	6.61	4.89	26.57	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP5	2,205.70	131.22	220.13	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP6	2,134.00	27.97	247.42	0.00	0.00	Closed	0.00	0.00	0.00
3	PUMP8	1,956.00	-0.63	344.68	3,474.85	796.93	Open	1.00	32.12	0.00
4	TRANSF	2,629.54	7.57	28.26	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Tank Report

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	1,160.50	2,691.54	2,701.15	48.05	9.61
2	FAIRWAYTANK	-8,130.99	2,679.54	2,701.15	67.53	21.61
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
1	J-M12-6H	3,000.00	M12-8H	-43.56	2,503.01	1,478.67	1,762.66	M12-8H	10.66	2,628.15	1,478.64	1,478.64
2	J12-5H	3,000.00	J12-5H	-186.24	2,126.72	1,158.74	1,159.59	J12-5H	20.00	2,602.70	1,159.59	1,158.74
3	J12-6H	3,000.00	J12-6H	-218.01	2,045.87	1,123.48	1,124.35	J12-6H	20.00	2,595.16	1,124.36	1,123.48
4	J12-8H	3,000.00	J12-8H	-251.90	1,970.64	1,045.65	1,045.64	J12-8H	20.00	2,598.16	1,045.65	1,045.65
5	J13-1H	3,000.00	J13-4H	-12.23	2,551.31	2,071.94	2,373.93	J13-4H	10.41	2,603.56	2,071.96	2,071.94
6	J13-2H	3,000.00	J13-2H	-45.73	2,468.01	1,709.61	1,709.62	J13-2H	20.00	2,619.70	1,709.62	1,709.61
7	J13-3H	3,000.00	J13-3H	-87.45	2,363.72	1,467.69	1,468.96	J13-3H	20.00	2,611.70	1,468.96	1,467.69
8	J13-4H	3,000.00	J13-4H	-15.65	2,543.43	2,016.98	2,017.00	J13-4H	20.00	2,625.70	2,017.00	2,016.98
9	J13-5H	3,000.00	J13-5H	-14.85	2,545.28	2,029.63	2,029.65	J13-5H	20.00	2,625.70	2,029.65	2,029.63
10	J13-6H	3,000.00	J13-4H	-11.96	2,551.93	2,076.48	2,269.29	J13-4H	14.00	2,611.86	2,076.50	2,076.48
11	J14-1H	3,000.00	J13-4H	-7.65	2,561.88	2,153.18	2,483.81	J13-4H	9.91	2,602.42	2,153.14	2,153.14
12	J7-1H	3,000.00	K7-7H	19.47	2,629.47	2,974.94	3,656.83	K7-7H	5.11	2,596.34	2,973.44	2,973.44
13	J7-2H	3,000.00	K7-7H	19.17	2,628.77	2,961.12	3,152.33	K7-7H	16.00	2,621.47	2,958.80	2,958.80
14	K10-2H	3,000.00	M9-1H	33.06	2,679.84	4,618.97	5,032.62	M9-1H	15.58	2,639.49	4,619.32	4,618.97
15	K12-1H	3,000.00	K12-1H	-84.18	2,330.73	1,731.41	1,731.55	K12-1H	20.00	2,571.16	1,731.55	1,731.41
16	K13-1H	3,000.00	K13-1H	47.24	2,648.02	4,329.62	4,326.50	K13-1H	20.00	2,585.16	4,326.49	4,326.49
17	K13-2H	3,000.00	K13-2H	21.76	2,646.76	3,119.28	3,118.93	K13-2H	20.00	2,642.70	3,118.89	3,118.89
18	K13-3H	3,000.00	K13-3H	-22.54	2,535.52	1,867.82	1,867.83	K13-3H	20.00	2,633.70	1,867.83	1,867.82
19	K13-4H	3,000.00	K13-4H	-6.85	2,584.19	2,014.38	2,014.39	K13-4H	20.00	2,646.16	2,014.36	2,014.36
20	K14-1H	3,000.00	K14-1H	-27.29	2,497.56	1,988.35	1,990.16	K14-1H	20.00	2,606.70	1,990.15	1,988.35
21	K14-6H	3,000.00	K14-6H	-171.35	2,135.54	1,332.82	1,333.12	K14-6H	20.00	2,577.16	1,333.11	1,332.82
22	K7-1H	3,000.00	K7-7H	19.12	2,628.66	2,958.93	3,051.83	K7-7H	18.05	2,626.21	2,956.49	2,956.49
23	K7-2H	3,000.00	K7-7H	19.84	2,630.32	2,992.18	3,421.57	K7-7H	10.97	2,609.86	2,991.71	2,991.71
24	K7-3H	3,000.00	K7-3H	-36.94	2,458.29	1,989.29	1,989.21	K7-3H	20.00	2,589.70	1,989.21	1,989.21
25	K7-4H	3,000.00	K7-7H	25.28	2,642.87	3,305.32	4,123.91	K7-7H	4.09	2,593.97	3,305.41	3,305.32
26	K7-5H	3,000.00	K7-5H	-8.24	2,516.52	2,385.32	2,385.33	K7-5H	20.00	2,581.70	2,385.33	2,385.32
27	K7-6H	3,000.00	K7-6H	15.76	2,610.92	2,827.41	2,827.45	K7-6H	20.00	2,620.70	2,827.41	2,827.41
28	K7-7H	3,000.00	K7-7H	17.82	2,625.66	2,895.60	2,895.66	K7-7H	20.00	2,630.70	2,895.60	2,895.60
29	K7-8H	3,000.00	K7-8H	-29.32	2,452.87	2,164.57	2,164.57	K7-8H	20.00	2,566.70	2,164.57	2,164.57
30	K7-9H	3,000.00	K7-9H	-58.20	2,393.23	1,877.54	1,877.45	K7-9H	20.00	2,573.70	1,877.45	1,877.45
31	K8-1H	3,000.00	K8-1H	-61.98	2,366.50	1,922.32	1,922.27	K8-1H	20.00	2,555.70	1,922.27	1,922.27
32	K8-2H	3,000.00	K7-7H	23.96	2,639.84	3,221.14	3,816.23	K7-7H	8.32	2,603.74	3,221.21	3,221.14
33	L10-1H	3,000.00	M9-1H	33.31	2,680.40	4,670.96	4,827.49	M9-1H	18.39	2,645.98	4,671.33	4,670.96
34	L10-2H	3,000.00	L10-2H	43.90	2,657.85	4,539.11	4,539.19	L10-2H	20.00	2,602.70	4,539.18	4,539.11
35	L10-4H	3,000.00	L10-8H	-107.30	2,307.90	1,463.77	1,488.21	L10-8H	18.56	2,598.38	1,463.43	1,463.43
36	L10-5H	3,000.00	L10-8H	-52.90	2,433.45	1,795.52	1,861.96	L10-8H	16.80	2,594.31	1,795.67	1,795.52
37	L10-6H	3,000.00	M9-1H	31.77	2,676.85	4,361.51	5,009.10	M9-1H	12.61	2,632.64	4,361.71	4,361.51
38	L10-7H	3,000.00	M9-1H	32.59	2,678.76	4,524.79	4,892.08	M9-1H	16.04	2,640.57	4,525.09	4,524.79
39	L10-8H	3,000.00	L10-8H	-227.93	2,029.52	1,098.12	1,097.63	L10-8H	20.00	2,601.70	1,097.63	1,097.63
40	L11-1H	3,000.00	M9-1H	33.49	2,680.83	4,705.10	4,839.09	M9-1H	18.63	2,646.53	4,705.49	4,705.10
41	L11-2H	3,000.00	K13-4H	34.23	2,678.99	4,628.49	5,510.32	K13-4H	9.07	2,620.94	4,629.29	4,628.49
42	L11-3H	3,000.00	M9-1H	33.44	2,680.72	4,694.53	5,238.28	M9-1H	14.16	2,636.22	4,694.90	4,694.53
43	L11-4H	3,000.00	L11-4H	-135.87	2,223.43	1,460.50	1,461.46	L11-4H	20.00	2,583.16	1,461.47	1,460.50
44	L11-5H	3,000.00	L11-5H	-24.46	2,505.56	2,083.00	2,082.98	L11-5H	20.00	2,608.16	2,082.99	2,082.99
45	L11-6H	3,000.00	L11-6H	48.10	2,650.00	4,523.81	4,523.85	L11-6H	20.00	2,585.16	4,523.84	4,523.81
46	L12-3H	3,000.00	M12-5H	32.63	2,657.86	3,820.25	3,914.66	M12-5H	18.29	2,624.75	3,820.37	3,820.25
47	L12-4H	3,000.00	K13-4H	32.69	2,675.43	4,330.04	5,486.84	K13-4H	4.36	2,610.07	4,330.46	4,330.04
48	L12-6H	3,000.00	L12-6H	37.04	2,646.03	3,931.20	3,931.23	L12-6H	20.00	2,606.70	3,931.23	3,931.20

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

	ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
49	L12-7H	3,000.00	L12-7H	44.20	2,657.55	4,502.23	4,502.20	L12-7H	20.00	2,601.70	4,502.21	4,502.21
50	L12-8H	3,000.00	L12-8H	25.55	2,624.50	3,249.07	3,249.43	L12-8H	20.00	2,611.70	3,249.43	3,249.07
51	L13-10H	3,000.00	L13-10H	34.91	2,616.57	3,546.61	3,546.01	L13-10H	20.00	2,582.16	3,546.00	3,546.00
52	L13-11H	3,000.00	M12-8H	41.92	2,700.29	6,885.29	7,040.60	M12-8H	18.71	2,646.73	6,886.43	6,885.29
53	L13-12H	3,000.00	L13-12H	47.12	2,663.75	4,692.88	4,692.88	L13-12H	20.00	2,601.16	4,692.89	4,692.88
54	L13-1H	3,000.00	K13-4H	31.57	2,672.85	4,132.33	4,999.11	K13-4H	8.08	2,618.64	4,132.55	4,132.33
55	L13-2H	3,000.00	K13-4H	30.22	2,669.75	3,949.82	5,164.60	K13-4H	1.98	2,604.58	3,949.98	3,949.82
56	L13-3H	3,000.00	M12-8H	33.10	2,679.92	4,377.09	4,546.83	M12-8H	17.95	2,644.97	4,377.32	4,377.09
57	L13-4H	3,000.00	M12-8H	28.01	2,668.19	3,667.61	4,247.76	M12-8H	11.48	2,630.04	3,667.63	3,667.61
58	L13-5H	3,000.00	M12-8H	33.75	2,681.42	4,434.97	5,464.74	M12-8H	6.86	2,619.37	4,435.04	4,434.97
59	L13-6H	3,000.00	K13-4H	32.25	2,674.43	4,219.50	4,287.66	K13-4H	19.16	2,644.22	4,219.71	4,219.50
60	L13-7H	3,000.00	M12-8H	39.83	2,695.45	5,971.99	6,760.22	M12-8H	12.35	2,632.04	5,972.47	5,971.99
61	L13-8H	3,000.00	L13-8H	56.63	2,678.23	5,784.44	5,784.50	L13-8H	20.00	2,593.70	5,784.52	5,784.44
62	L13-9H	3,000.00	L13-9H	36.83	2,646.53	3,906.48	3,902.66	L13-9H	20.00	2,607.70	3,902.64	3,902.64
63	L14-2H	3,000.00	L14-2H	-40.34	2,458.91	1,915.68	1,915.70	L14-2H	20.00	2,598.16	1,915.70	1,915.68
64	L14-3H	3,000.00	L14-3H	-15.38	2,529.51	2,147.72	2,147.67	L14-3H	20.00	2,611.16	2,147.67	2,147.67
65	L7-1H	3,000.00	L7-2H	1.47	2,556.93	2,496.67	2,614.33	L7-2H	15.92	2,590.29	2,496.67	2,496.67
66	L7-2H	3,000.00	L7-2H	-29.38	2,485.72	2,019.83	2,019.76	L7-2H	20.00	2,599.70	2,019.76	2,019.76
67	L7-3H	3,000.00	K7-7H	21.49	2,634.15	3,078.01	3,261.65	K7-7H	16.37	2,622.32	3,078.07	3,078.01
68	L7-4H	3,000.00	L7-4H	20.73	2,603.39	3,025.78	3,026.89	L7-4H	20.00	2,601.70	3,026.85	3,025.78
69	L7-5H	3,000.00	L7-5H	14.95	2,605.04	2,806.32	2,806.36	L7-5H	20.00	2,616.70	2,806.33	2,806.32
70	L8-1H	3,000.00	L8-1H	33.14	2,642.01	3,688.01	3,688.21	L8-1H	20.00	2,611.70	3,688.20	3,688.01
71	L9-1H	3,000.00	M9-1H	28.07	2,668.31	3,707.36	4,001.32	M9-1H	16.49	2,641.60	3,710.50	3,707.36
72	M11-1H	3,000.00	M11-3H	28.26	2,684.76	4,053.77	4,640.01	M11-3H	14.13	2,652.16	4,054.03	4,053.77
73	M11-2H	3,000.00	M11-2H	21.52	2,633.20	3,068.38	3,068.54	M11-2H	20.00	2,629.70	3,068.54	3,068.38
74	M11-3H	3,000.00	M11-3H	-121.30	2,339.60	993.82	994.05	M11-3H	20.00	2,665.70	994.05	993.82
75	M11-4H	3,000.00	M11-3H	-24.93	2,562.01	1,590.99	2,052.10	M11-3H	7.65	2,637.20	1,590.99	1,590.99
76	M11-5H	3,000.00	M11-3H	14.46	2,652.91	2,624.10	2,938.06	M11-3H	15.41	2,655.11	2,623.83	2,623.83
77	M11-6H	3,000.00	M11-6H	-0.06	2,557.40	2,492.39	2,492.03	M11-6H	20.00	2,603.70	2,492.03	2,492.03
78	M12-1H	3,000.00	M12-1H	28.57	2,651.47	3,495.43	3,496.52	M12-1H	20.00	2,631.70	3,496.55	3,495.43
79	M12-2H	3,000.00	M12-8H	-17.88	2,562.27	1,779.60	2,061.34	M12-8H	12.51	2,632.41	1,779.56	1,779.56
80	M12-3H	3,000.00	M12-8H	-50.38	2,487.28	1,420.77	1,610.60	M12-8H	13.63	2,634.99	1,420.73	1,420.73
81	M12-4H	3,000.00	M12-4H	25.78	2,673.03	3,463.68	3,463.78	M12-4H	20.00	2,659.70	3,463.78	3,463.68
82	M12-5H	3,000.00	M12-5H	14.55	2,616.11	2,770.86	2,770.46	M12-5H	20.00	2,628.70	2,770.46	2,770.46
83	M12-6H	3,000.00	M12-8H	-43.56	2,503.01	1,478.66	1,705.16	M12-8H	12.66	2,632.75	1,478.64	1,478.64
84	M12-7H	3,000.00	M12-8H	-71.01	2,439.67	1,280.73	1,299.17	M12-8H	19.33	2,648.15	1,280.67	1,280.67
85	M12-8H	3,000.00	M12-8H	-97.38	2,378.81	1,151.55	1,151.50	M12-8H	20.00	2,649.70	1,151.49	1,151.49
86	M13-1H	3,000.00	M13-1H	52.98	2,681.81	5,667.53	5,667.56	M13-1H	20.00	2,605.70	5,667.57	5,667.53
87	M13-2H	3,000.00	M13-2H	48.90	2,685.39	5,526.16	5,526.34	M13-2H	20.00	2,618.70	5,526.35	5,526.16
88	M13-3H	3,000.00	M13-3H	22.44	2,610.33	3,090.61	3,090.59	M13-3H	20.00	2,604.70	3,090.59	3,090.59
89	M13-4H	3,000.00	M13-4H	-134.69	2,268.14	1,198.11	1,198.10	M13-4H	20.00	2,625.16	1,198.10	1,198.10
90	M13-5H	3,000.00	M12-8H	9.62	2,625.75	2,458.30	2,898.44	M12-8H	11.77	2,630.70	2,458.19	2,458.19
91	M14-1H	3,000.00	M14-1H	17.70	2,610.84	2,913.77	2,913.71	M14-1H	20.00	2,616.16	2,913.72	2,913.72
92	M14-2H	3,000.00	M14-2H	24.75	2,621.12	3,188.71	3,188.53	M14-2H	20.00	2,610.16	3,188.53	3,188.53
93	M14-3H	3,000.00	M14-3H	21.66	2,620.60	3,067.14	3,067.09	M14-3H	20.00	2,616.76	3,067.10	3,067.10
94	M6-1H	3,000.00	M6-1H	25.11	2,613.49	3,201.95	3,202.00	M6-1H	20.00	2,601.70	3,201.97	3,201.95
95	M7-1H	3,000.00	M7-1H	24.50	2,609.09	3,170.91	3,170.96	M7-1H	20.00	2,598.70	3,170.93	3,170.91
96	M7-2H	3,000.00	M7-2H	7.11	2,583.95	2,583.71	2,583.71	M7-2H	20.00	2,613.70	2,583.71	2,583.71

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available Node Pressure	Critical Available Node Head	Adjusted Available Flow	Design Flow (gpm)
97		M8-1H	3,000.00	M8-1H	-20.63	2,533.92	1,967.64	1,967.47	M8-1H	20.00	2,627.70	1,967.47	1,967.47
98		M8-2H	3,000.00	M8-2H	29.95	2,661.13	3,721.81	3,721.82	M8-2H	20.00	2,638.16	3,721.83	3,721.81
99		M8-3H	3,000.00	M8-3H	29.28	2,660.07	3,662.99	3,663.00	M8-3H	20.00	2,638.66	3,663.00	3,662.99
100		M8-4H	3,000.00	O10-1H	28.56	2,693.46	4,433.65	4,687.71	O10-1H	18.27	2,669.71	4,435.95	4,433.65
101		M8-5H	3,000.00	M8-5H	35.16	2,674.15	4,411.14	4,411.67	M8-5H	20.00	2,639.16	4,411.65	4,411.14
102		M9-1H	3,000.00	M9-1H	16.18	2,640.88	2,779.70	2,779.78	M9-1H	20.00	2,649.70	2,779.76	2,779.70
103		N10-1H	3,000.00	N10-1H	-37.45	2,531.10	1,489.00	1,489.15	N10-1H	20.00	2,663.70	1,489.13	1,489.00
104		N11-1H	3,000.00	N11-1H	17.91	2,664.88	2,832.44	2,833.18	N11-1H	20.00	2,669.70	2,833.19	2,832.44
105		N11-2H	3,000.00	M11-3H	-36.75	2,534.73	1,472.78	1,488.83	M11-3H	19.61	2,664.80	1,474.17	1,472.78
106		N11-3H	3,000.00	M11-3H	-30.78	2,548.51	1,529.07	1,828.59	M11-3H	11.82	2,646.81	1,529.08	1,529.07
107		N12-1H	3,000.00	N11-1H	34.15	2,702.36	5,506.11	5,857.72	N11-1H	16.67	2,662.02	5,511.01	5,506.11
108		N13-1H	3,000.00	N11-1H	40.99	2,718.14	6,297.86	6,722.32	N11-1H	15.81	2,660.04	6,297.90	6,297.86
109		N13-2H	3,000.00	N13-2H	11.10	2,621.15	2,600.93	2,601.57	N13-2H	20.00	2,641.70	2,601.58	2,600.93
110		N13-3H	3,000.00	N13-3H	46.55	2,653.96	4,361.95	4,362.09	N13-3H	20.00	2,592.70	4,362.10	4,361.95
111		N14-1H	3,000.00	N14-1H	54.86	2,675.14	5,334.93	5,335.27	N14-1H	20.00	2,594.70	5,335.29	5,334.93
112		N14-2H	3,000.00	N14-2H	1.39	2,560.75	2,479.60	2,479.75	N14-2H	20.00	2,603.70	2,479.75	2,479.60
113		N14-3H	3,000.00	O12-1H	44.08	2,681.27	5,046.47	5,156.42	O12-1H	18.28	2,621.73	5,047.56	5,046.47
114		N15-1H	3,000.00	N15-1H	-85.55	2,361.10	1,572.00	1,572.34	N15-1H	20.00	2,604.70	1,572.35	1,572.00
115		N15-2H	3,000.00	N15-2H	10.91	2,581.71	2,714.70	2,714.54	N15-2H	20.00	2,602.70	2,714.54	2,714.54
116		N15-3H	3,000.00	N15-3H	-27.94	2,492.07	2,039.00	2,038.99	N15-3H	20.00	2,602.70	2,038.99	2,038.99
117		O10-1H	3,000.00	O10-1H	-103.73	2,388.14	880.19	880.21	O10-1H	20.00	2,673.70	880.21	880.19
118		O12-1H	3,000.00	O12-1H	-28.22	2,514.42	1,910.77	1,910.74	O12-1H	20.00	2,625.70	1,910.74	1,910.74
119		O13-1H	3,000.00	O12-1H	40.97	2,674.09	4,613.15	4,629.98	O12-1H	19.73	2,625.08	4,614.15	4,613.15
120		O13-2H	3,000.00	O13-2H	41.85	2,618.12	3,792.75	3,792.78	O13-2H	20.00	2,567.70	3,792.79	3,792.75
121		O8-1H	3,000.00	O8-1H	-127.33	2,327.14	875.85	875.87	O8-1H	20.00	2,667.16	875.87	875.85
122		O9-1H	3,000.00	O9-1H	-124.90	2,338.74	811.93	811.94	O9-1H	20.00	2,673.16	811.94	811.93
123		P13-1H	3,000.00	O12-1H	37.57	2,666.25	4,235.35	5,480.05	O12-1H	-5.50	2,566.84	4,235.99	4,235.35
124		P13-2H	3,000.00	O12-1H	38.63	2,668.69	4,367.24	4,663.84	O12-1H	14.76	2,613.61	4,367.95	4,367.24
125		P6-1H	3,000.00	P6-1H	-29.79	2,500.79	1,965.06	1,965.32	P6-1H	20.00	2,615.70	1,965.32	1,965.06
126		P6-2H	3,000.00	P6-2H	-143.52	2,261.31	1,125.38	1,125.31	P6-2H	20.00	2,638.70	1,125.31	1,125.31
127		Q10-1H	3,000.00	Q10-1H	15.57	2,527.93	2,905.95	2,905.99	Q10-1H	20.00	2,538.16	2,906.00	2,905.95
128		Q10-2H	3,000.00	Q10-2H	-35.66	2,412.25	2,213.21	2,213.97	Q10-2H	20.00	2,540.70	2,213.98	2,213.21
129		Q10-3H	3,000.00	Q10-3H	9.85	2,511.26	2,800.73	2,800.90	Q10-3H	20.00	2,534.70	2,800.89	2,800.73
130		Q11-1H	3,000.00	P6-2H	28.44	2,658.18	3,642.39	3,828.27	P6-2H	17.22	2,632.27	3,642.43	3,642.39
131		R7-1H	3,000.00	R7-1H	-11.88	2,490.13	2,409.75	2,410.26	R7-1H	20.00	2,563.70	2,410.26	2,409.75
132		R9-1H	3,000.00	R9-1H	-14.96	2,465.01	2,417.76	2,418.34	R9-1H	20.00	2,545.70	2,418.33	2,417.76

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	9,206.22	26.12	684.59	210.74	Open
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-672.02	1.91	1.95	1.65	Open
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.40	0.23	0.00	0.04	Open
4		P-100	J-239	J-238	960.70	8.00	110.00	-29.62	0.19	0.04	0.04	Open
5		P-101	J-245	J-238	149.26	8.00	110.00	34.74	0.22	0.01	0.05	Open
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7		P-103	J-233	J-158	215.33	8.00	110.00	103.34	0.66	0.08	0.37	Open
8		P-104	J-255	J-122	328.78	8.00	110.00	-14.44	0.09	0.00	0.01	Open
9		P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10		P-106	J-157	J-170	353.94	8.00	110.00	87.98	0.56	0.10	0.28	Open
11		P-108	J-168	J72	163.38	8.00	110.00	5.47	0.03	0.00	0.00	Open
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13		P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14		P-113	J76	J-244	237.08	12.00	110.00	18.24	0.05	0.00	0.00	Open
15		P-114	J-244	J-131	21.10	12.00	110.00	13.12	0.04	0.00	0.00	Open
16		P-115	J-131	J-255	34.41	12.00	110.00	2.88	0.01	0.00	0.00	Open
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18		P-117	J-168	J74	63.55	8.00	110.00	-10.59	0.07	0.00	0.01	Open
19		P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20		P-119	J-201	J-170	17.29	12.00	110.00	-29.77	0.08	0.00	0.00	Open
21		P-12	J-114	J-115	298.01	10.00	110.00	199.37	0.81	0.13	0.42	Open
22		P-120	J-241	J-201	61.98	8.00	110.00	-19.53	0.12	0.00	0.02	Open
23		P-121	J-158	J-157	92.45	8.00	110.00	98.22	0.63	0.03	0.34	Open
24		P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26		P-124	J-236	J42	42.81	8.00	110.00	-1,175.87	7.51	1.44	33.60	Open
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28		P-127	J-211	J-181	330.78	8.00	110.00	-710.63	4.54	4.37	13.22	Open
29		P-128	J-212	J-190	143.39	12.00	110.00	-220.56	0.63	0.03	0.21	Open
30		P-129	J-231	J-150	227.08	8.00	110.00	-253.97	1.62	0.45	1.97	Open
31		P-130	J-141	J-205	202.64	8.00	110.00	168.20	1.07	0.19	0.92	Open
32		P-131	J-115	J-205	245.54	8.00	110.00	177.01	1.13	0.25	1.01	Open
33		P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34		P-133	J-153	J-152	97.97	12.00	110.00	199.70	0.57	0.02	0.18	Open
35		P-134	J-192	J-191	110.45	8.00	110.00	179.22	1.14	0.11	1.03	Open
36		P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.98	1.08	0.02	0.92	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.34	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.58	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-384.23	1.57	0.34	1.43	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	171.49	1.09	0.12	0.95	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-392.60	1.11	0.11	0.61	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-387.48	1.10	0.13	0.60	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-238.61	1.52	0.30	1.75	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-228.37	1.46	0.03	1.62	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-243.73	1.56	0.10	1.82	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	171.44	1.09	0.13	0.95	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	204.49	1.31	0.20	1.32	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	300.66	1.92	0.91	2.69	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	90.64	0.58	0.09	0.29	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-176.56	1.13	0.15	1.00	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-91.05	0.58	0.04	0.29	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	197.09	1.26	0.02	1.24	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-526.27	2.15	0.61	2.56	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-508.42	3.25	1.56	7.11	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	176.61	1.13	0.10	1.00	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-191.97	1.23	0.02	1.17	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	173.32	1.11	0.01	0.96	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-714.07	2.92	2.97	4.50	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	340.09	2.17	0.75	3.38	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	162.20	1.04	0.02	0.86	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-346.13	2.21	0.16	3.49	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,798.89	5.10	3.50	10.25	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.00	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-379.11	1.55	0.40	1.39	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-361.49	2.31	0.17	3.78	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,406.67	3.99	0.17	6.50	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-376.85	2.41	0.58	4.09	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,788.65	5.07	0.53	10.14	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-356.37	2.27	0.73	3.68	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.68	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-269.33	1.72	0.05	2.19	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-259.09	1.65	0.02	2.04	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-725.99	4.63	0.30	13.76	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	720.87	4.60	1.81	13.57	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	10.00	110.00	167.91	0.69	0.36	0.31	Open
100		P-196	J28	J26	390.87	12.00	110.00	4.04	0.01	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	162.79	1.04	0.02	0.85	Open
102		P-198	J-249	J-254	108.97	10.00	110.00	132.06	0.54	0.02	0.20	Open
103		P-199	J-254	J-177	467.39	10.00	110.00	126.94	0.52	0.09	0.18	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-536.51	2.19	0.34	2.65	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	10.00	110.00	-28.71	0.12	0.01	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	85.97	0.35	0.00	0.09	Open
110		P-205	J-206	J-207	208.07	10.00	110.00	29.12	0.12	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-109.43	0.70	0.40	0.41	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	-21.56	0.06	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	-11.32	0.03	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	683.35	2.79	2.31	4.15	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	-16.44	0.05	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-542.08	1.54	0.05	1.12	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.00	Open
122		P-216	J-293	J-294	1,100.07	10.00	110.00	408.95	1.67	1.76	1.60	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	10.00	110.00	388.47	1.59	1.04	1.46	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	395.78	1.62	0.36	1.51	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	10.00	110.00	403.83	1.65	0.08	1.57	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.00	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	10.00	110.00	367.98	1.50	1.38	1.32	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	282.46	1.15	0.10	0.81	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	29.11	0.33	0.08	0.14	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	18.87	0.21	0.01	0.06	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	6.00	110.00	15.36	0.17	0.00	0.04	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-356.42	1.46	0.85	1.24	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-382.34	4.34	7.05	17.03	Open
146		P-242	J-230	N13-2H	414.06	8.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	167.32	1.07	0.68	0.91	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.01	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-413.06	4.69	1.11	19.65	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	407.94	4.63	8.43	19.20	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-387.46	4.40	2.47	17.46	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	498.18	3.18	0.13	6.85	Open
159		P-253	J-342	J-277	166.27	8.00	110.00	10.24	0.07	0.00	0.01	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	8.00	110.00	-77.99	0.50	0.18	0.22	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	36.01	0.41	0.16	0.21	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	30.89	0.35	0.04	0.16	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	356.56	1.01	0.38	0.51	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	439.67	1.25	0.33	0.75	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	460.15	1.31	0.12	0.82	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-44.99	0.51	0.11	0.32	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.01	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	60.35	0.68	0.02	0.56	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	347.50	2.22	4.44	3.51	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-65.47	0.74	0.13	0.65	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-210.32	0.60	0.01	0.19	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.61	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	12.00	110.00	12.20	0.03	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-341.20	2.18	5.45	3.40	Open
186		P-281	J-273	J-318	140.95	12.00	110.00	1.96	0.01	0.00	0.00	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.01	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.25	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.49	0.23	0.02	0.08	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.01	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.00	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	55.54	0.35	0.15	0.12	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.16	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.28	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.52	0.69	0.00	0.57	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	151.00	1.71	1.57	3.05	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-177.54	0.50	0.05	0.14	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.49	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-215.44	0.61	0.06	0.20	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-174.47	1.98	0.30	3.99	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-169.35	1.92	0.26	3.77	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	156.12	1.77	0.20	3.24	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-161.25	1.83	0.07	3.44	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.00	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.24	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-188.68	2.14	0.05	4.60	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.12	0.06	0.00	0.01	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-62.52	0.40	0.05	0.15	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.01	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	8.00	110.00	25.61	0.16	0.00	0.03	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.08	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.00	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-31.80	0.09	0.00	0.01	Open
237		P-330	J-266	J-313	206.46	10.00	110.00	2.54	0.01	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	10.00	110.00	-23.59	0.10	0.00	0.01	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	10.00	110.00	12.78	0.05	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	10.00	110.00	7.66	0.03	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	123.18	0.79	0.04	0.51	Open
248		P-340	J-287	J-206	239.33	10.00	110.00	47.02	0.19	0.01	0.03	Open
249		P-341	J-178	J-287	70.36	10.00	110.00	52.14	0.21	0.00	0.03	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.73	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.85	0.41	0.01	0.22	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253		P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.01	Open
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255		P-347	J-111	J-284	43.43	6.00	110.00	34.23	0.39	0.01	0.20	Open
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257		P-349	J-265	J-264	236.64	8.00	110.00	-10.24	0.07	0.00	0.01	Open
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259		P-350	J-265	J-265A	252.43	8.00	110.00	5.12	0.03	0.00	0.00	Open
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262		P-353	J-281	J-282	60.97	6.00	110.00	-40.04	0.45	0.02	0.26	Open
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264		P-355	J-123	J50	205.02	6.00	110.00	-29.80	0.34	0.03	0.15	Open
265		P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266		P-357	J-285	J-306	386.52	6.00	110.00	23.99	0.27	0.04	0.10	Open
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268		P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269		P-361	J-295	J-295A	196.76	12.00	110.00	440.77	1.25	0.15	0.76	Open
270		P-361A	J-295A	J-239	291.39	12.00	110.00	435.65	1.24	0.22	0.74	Open
271		P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272		P-363	J-336	J-345	166.85	10.00	110.00	373.10	1.52	0.23	1.35	Open
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274		P-369	J-278	J-295	165.68	12.00	110.00	445.89	1.26	0.13	0.77	Open
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.02	Open
278		P-371	J-358	J64	110.10	8.00	110.00	-1,165.63	7.44	3.64	33.06	Open
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280		P-374	J-350	J-153	30.43	12.00	110.00	-182.66	0.52	0.00	0.15	Open
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284		P-378J	J-378	J-299	400.51	6.00	110.00	-184.71	2.10	1.77	4.43	Open
285		P-379	J-119	J-359	917.88	8.00	110.00	86.22	0.55	0.24	0.27	Open
286		P-38	J-183	J-186	1,090.53	8.00	110.00	357.91	2.28	4.05	3.71	Open
287		P-380	J-119	J-359	917.88	8.00	110.00	86.22	0.55	0.24	0.27	Open
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	272.09	1.74	0.67	2.23	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	266.97	1.70	0.23	2.16	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	10.00	110.00	414.07	1.69	2.00	1.64	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	408.33	2.61	3.03	4.74	Open
301		P-390	J-315	J46	657.48	10.00	110.00	351.44	1.44	0.80	1.21	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-15.53	0.18	0.06	0.05	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-20.65	0.23	0.03	0.08	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-25.77	0.16	0.03	0.03	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	352.62	2.25	1.78	3.61	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	451.01	1.28	0.06	0.79	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-536.96	1.52	0.42	1.09	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	357.74	2.28	7.54	3.71	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	736.23	4.70	0.96	14.12	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.56	0.42	0.01	0.16	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	964.24	6.15	8.90	23.27	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	287.45	1.83	1.36	2.47	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.24	0.07	0.00	0.00	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,814.25	5.15	5.76	10.41	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.08	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.20	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.32	0.36	0.00	0.12	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.84	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.84	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.00	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,407.53	6.83	8.71	17.58	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,819.37	5.16	0.15	10.46	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,860.33	5.28	1.58	10.90	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,855.21	5.26	4.06	10.85	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,412.66	6.84	4.11	17.65	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-292.57	1.87	0.23	2.56	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-389.35	1.59	0.34	1.46	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,210.73	7.73	10.10	35.47	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	756.71	4.83	7.11	14.85	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	751.59	4.80	2.09	14.67	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.73	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.03	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-448.91	2.87	1.56	5.65	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363		P-9	J-113	J-104	183.55	10.00	110.00	-404.71	1.65	0.29	1.57	Open
364		P-90	J-133	J-134	116.30	8.00	110.00	251.61	1.61	0.22	1.93	Open
365		P-93	J-209	J-247	44.60	8.00	110.00	-282.33	1.80	0.11	2.39	Open
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367		P-95	J-221	J-162	263.63	8.00	110.00	402.82	2.57	1.22	4.62	Open
368		P-96	J-163	J-162	264.20	8.00	110.00	-397.70	2.54	1.19	4.51	Open
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370		P-98	J-172	J-163	39.90	8.00	110.00	-392.58	2.51	0.18	4.41	Open
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,160.50	7.41	2.76	32.79	Open
373		P-J106	J-252	J-106	417.04	8.00	110.00	192.40	1.23	0.49	1.18	Open
374		P-J286	J-363	J-286	10.63	6.00	110.00	80.83	0.92	0.01	0.94	Open
375		P-J335	J-335	J-286	287.42	6.00	110.00	-75.71	0.86	0.24	0.85	Open
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.00	Open
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,679.71	23.49	13.14	277.90	Open
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	-5,526.51	35.27	43.56	590.24	Open
393		P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,710.35	7.69	6.07	21.89	Open
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395		P126	J-242	J-376	11.13	8.00	110.00	503.30	3.21	0.08	6.98	Open
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397		P128	J-344	J-393	9.32	12.00	110.00	-167.30	0.47	0.00	0.13	Open
398		P130	J10	J14	116.51	10.00	110.00	351.30	1.44	0.14	1.21	Open
399		P132	J14	M8-2H	217.35	8.00	110.00	101.35	0.65	0.08	0.36	Open
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	101.35	0.65	0.09	0.36	Open
401		P136	M8-3H	J16	275.97	8.00	110.00	101.35	0.65	0.10	0.36	Open
402		P138	J16	J12	16.19	10.00	110.00	341.06	1.39	0.02	1.15	Open
403		P140	J16	M8-4H	42.30	10.00	110.00	-244.83	1.00	0.03	0.62	Open
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-244.83	1.00	0.17	0.62	Open
405		P144	M8-5H	J14	116.30	10.00	110.00	-244.83	1.00	0.07	0.62	Open
406		P146	J12	J-102	126.72	10.00	110.00	335.94	1.37	0.14	1.11	Open
407		P148	J20	J22	6.79	12.00	110.00	-42.04	0.12	0.00	0.00	Open
408		P150	J22	J-161	73.04	8.00	110.00	-47.16	0.30	0.01	0.09	Open
409		P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.00	Open
410		P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.00	Open
411		P156	J32	J40	349.41	12.00	110.00	10.77	0.03	0.00	0.00	Open
412		P158	J30	J28	652.66	12.00	110.00	14.28	0.04	0.00	0.00	Open
413		P160	J-313	J32	17.72	6.00	110.00	21.01	0.24	0.00	0.08	Open
414		P162	J30	J-207	49.17	12.00	110.00	-15.22	0.04	0.00	0.00	Open
415		P164	J30	J36	31.14	12.00	110.00	-3.66	0.01	0.00	0.00	Open
416		P166	J36	J-207	18.03	8.00	110.00	-8.78	0.06	0.00	0.00	Open
417		P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418		P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422		P178	J44	J-236	15.32	8.00	110.00	-1,170.75	7.47	0.51	33.33	Open
423		P180	J42	J-190	51.62	8.00	110.00	-1,180.99	7.54	1.75	33.87	Open
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425		P184	J48	J46	1,260.92	6.00	110.00	72.87	0.83	1.00	0.79	Open
426		P186	J46	J-366	444.59	10.00	110.00	419.19	1.71	0.75	1.68	Open
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428		P190	J40	J38	318.75	12.00	110.00	5.64	0.02	0.00	0.00	Open
429		P192	J38	J30	286.67	12.00	110.00	0.52	0.00	0.00	0.00	Open
430		P194	J50	J-281	85.58	6.00	110.00	-34.92	0.40	0.02	0.20	Open
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432		P198	J52	J54	266.38	8.00	110.00	20.48	0.13	0.00	0.02	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.43	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.31	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.01	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,829.61	5.19	0.37	10.57	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,165.63	7.44	9.74	33.06	Open
445		P224	J-344	J-106	395.17	12.00	110.00	313.18	0.89	0.16	0.40	Open
446		P226	J-106	J-104	393.05	12.00	110.00	500.47	1.42	0.38	0.96	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.85	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.91	0.04	0.00	0.00	Open
449		P232	J74	J-241	28.57	12.00	110.00	-9.29	0.03	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	12.04	0.03	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	28.94	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-21.50	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-1.30	0.00	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-22.80	0.06	0.00	0.00	Open
456		P246	J78	J84	490.51	12.00	110.00	12.04	0.03	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	-1.44	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	7.44	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	7.44	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	4.60	0.05	0.00	0.00	Open
461		P256	J78	J76	5.94	12.00	110.00	-34.84	0.10	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	53.09	0.34	0.00	0.11	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.03	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.01	Open

High Zone 3 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-1,075.23	6.86	5.24	28.47	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pump Report

	ID	Elevation (ft)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (gpm)	Head Gain (ft)	Status	Setting	Available NPSH (ft)	Cavitation Index
1	PUMP5	2,205.70	131.22	222.00	0.00	0.00	Closed	0.00	0.00	0.00
2	PUMP6	2,134.00	27.97	248.79	0.00	0.00	Closed	0.00	0.00	0.00
3	PUMP8	1,956.00	25.61	348.73	3,713.44	745.72	Open	1.00	92.73	0.00
4	TRANSF	2,629.54	7.57	28.46	0.00	0.00	Closed	0.00	0.00	0.00

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Tank Report

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	% Full (%)	Level (ft)
1	EL-OBS-HILL-TANK	1,149.63	2,691.54	2,692.52	4.90	0.98
2	FAIRWAYTANK	-8,019.83	2,679.54	2,690.56	34.44	11.02
3	OBS-HILL-TANK-1-2	0.00	2,629.54	2,647.00	79.36	17.46

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
1		J-M12-6H	3,000.00	M12-8H	-47.54	2,493.82	1,339.13	1,642.07	M12-8H	10.66	2,628.15	1,339.00	1,339.00
2		J12-5H	3,000.00	J12-5H	-190.23	2,117.53	1,096.83	1,096.83	J12-5H	20.00	2,602.70	1,096.82	1,096.82
3		J12-6H	3,000.00	J12-6H	-221.99	2,036.67	1,068.16	1,068.15	J12-6H	20.00	2,595.16	1,068.16	1,068.16
4		J12-8H	3,000.00	J12-8H	-255.89	1,961.45	992.75	992.72	J12-8H	20.00	2,598.16	992.73	992.73
5		J13-1H	3,000.00	J13-4H	-16.22	2,542.12	1,930.37	2,253.70	J13-4H	10.25	2,603.20	1,930.37	1,930.37
6		J13-2H	3,000.00	J13-2H	-49.71	2,458.81	1,599.14	1,599.16	J13-2H	20.00	2,619.70	1,599.16	1,599.14
7		J13-3H	3,000.00	J13-3H	-91.43	2,354.52	1,379.67	1,381.05	J13-3H	20.00	2,611.70	1,381.04	1,379.67
8		J13-4H	3,000.00	J13-4H	-19.63	2,534.23	1,878.91	1,878.94	J13-4H	20.00	2,625.70	1,878.91	1,878.91
9		J13-5H	3,000.00	J13-5H	-18.83	2,536.08	1,890.79	1,890.82	J13-5H	20.00	2,625.70	1,890.79	1,890.79
10		J13-6H	3,000.00	J13-4H	-15.95	2,542.73	1,934.63	2,141.68	J13-4H	13.91	2,611.64	1,934.62	1,934.62
11		J14-1H	3,000.00	J13-4H	-11.64	2,552.69	2,006.27	2,379.01	J13-4H	9.16	2,600.67	2,006.26	2,006.26
12		J7-1H	3,000.00	K7-7H	15.26	2,619.75	2,755.85	3,512.20	K7-7H	4.28	2,594.43	2,755.87	2,755.85
13		J7-2H	3,000.00	K7-7H	14.96	2,619.06	2,742.25	2,977.79	K7-7H	15.41	2,620.10	2,742.26	2,742.25
14		K10-2H	3,000.00	M9-1H	28.89	2,670.22	4,192.15	4,809.45	M9-1H	13.92	2,635.66	4,192.47	4,192.15
15		K12-1H	3,000.00	K12-1H	-88.18	2,321.50	1,663.30	1,663.20	K12-1H	20.00	2,571.16	1,663.20	1,663.20
16		K13-1H	3,000.00	K13-1H	43.18	2,638.66	4,163.21	4,159.71	K13-1H	20.00	2,585.16	4,159.71	4,159.71
17		K13-2H	3,000.00	K13-2H	17.78	2,637.57	2,842.16	2,843.01	K13-2H	20.00	2,642.70	2,842.98	2,842.16
18		K13-3H	3,000.00	K13-3H	-26.52	2,526.33	1,726.05	1,726.06	K13-3H	20.00	2,633.70	1,726.06	1,726.05
19		K13-4H	3,000.00	K13-4H	-10.84	2,574.99	1,829.04	1,829.06	K13-4H	20.00	2,646.16	1,829.06	1,829.04
20		K14-1H	3,000.00	K14-1H	-31.28	2,488.36	1,880.44	1,882.27	K14-1H	20.00	2,606.70	1,882.25	1,880.44
21		K14-6H	3,000.00	K14-6H	-175.34	2,126.35	1,275.65	1,275.77	K14-6H	20.00	2,577.16	1,275.77	1,275.65
22		K7-1H	3,000.00	K7-7H	14.91	2,618.95	2,740.07	2,879.15	K7-7H	17.32	2,624.52	2,740.09	2,740.07
23		K7-2H	3,000.00	K7-7H	15.63	2,620.60	2,772.76	3,251.86	K7-7H	10.46	2,608.68	2,772.76	2,772.76
24		K7-3H	3,000.00	K7-3H	-41.15	2,448.58	1,893.67	1,893.48	K7-3H	20.00	2,589.70	1,893.48	1,893.48
25		K7-4H	3,000.00	K7-7H	21.07	2,633.16	3,063.84	3,952.41	K7-7H	3.47	2,592.54	3,063.91	3,063.84
26		K7-5H	3,000.00	K7-5H	-12.45	2,506.81	2,280.06	2,280.03	K7-5H	20.00	2,581.70	2,280.04	2,280.04
27		K7-6H	3,000.00	K7-6H	11.56	2,601.21	2,645.53	2,645.55	K7-6H	20.00	2,620.70	2,645.54	2,645.53
28		K7-7H	3,000.00	K7-7H	13.61	2,615.95	2,683.61	2,683.63	K7-7H	20.00	2,630.70	2,683.63	2,683.61
29		K7-8H	3,000.00	K7-8H	-33.53	2,443.16	2,078.28	2,078.22	K7-8H	20.00	2,566.70	2,078.22	2,078.22
30		K7-9H	3,000.00	K7-9H	-62.41	2,383.52	1,797.68	1,797.49	K7-9H	20.00	2,573.70	1,797.49	1,797.49
31		K8-1H	3,000.00	K8-1H	-66.19	2,356.79	1,850.53	1,850.42	K8-1H	20.00	2,555.70	1,850.41	1,850.41
32		K8-2H	3,000.00	K7-7H	19.75	2,630.13	2,986.64	3,665.61	K7-7H	7.25	2,601.26	2,985.69	2,985.69
33		L10-1H	3,000.00	M9-1H	29.14	2,670.79	4,242.08	4,624.59	M9-1H	16.37	2,641.31	4,242.44	4,242.08
34		L10-2H	3,000.00	M9-1H	28.96	2,670.36	4,206.25	4,323.87	M9-1H	18.92	2,647.21	4,206.58	4,206.25
35		L10-4H	3,000.00	L10-8H	-111.34	2,298.59	1,387.43	1,415.48	L10-8H	18.42	2,598.05	1,386.92	1,386.92
36		L10-5H	3,000.00	L10-8H	-56.94	2,424.13	1,704.54	1,775.37	L10-8H	16.74	2,594.17	1,704.38	1,704.38
37		L10-6H	3,000.00	M9-1H	27.60	2,667.25	3,946.38	4,766.21	M9-1H	11.42	2,629.90	3,946.47	3,946.38
38		L10-7H	3,000.00	M9-1H	28.42	2,669.14	4,101.85	4,659.74	M9-1H	14.48	2,636.97	4,102.07	4,101.85
39		L10-8H	3,000.00	L10-8H	-231.96	2,020.20	1,039.80	1,039.75	L10-8H	20.00	2,601.70	1,039.75	1,039.75
40		L11-1H	3,000.00	M9-1H	29.33	2,671.24	4,277.03	4,637.66	M9-1H	16.59	2,641.82	4,277.42	4,277.03
41		L11-2H	3,000.00	K13-4H	30.27	2,669.85	4,262.77	5,294.66	K13-4H	8.01	2,618.49	4,263.64	4,262.77
42		L11-3H	3,000.00	M9-1H	29.28	2,671.11	4,265.53	5,013.71	M9-1H	12.57	2,632.55	4,265.91	4,265.53
43		L11-4H	3,000.00	L11-4H	-139.86	2,214.23	1,401.75	1,401.75	L11-4H	20.00	2,583.16	1,401.75	1,401.75
44		L11-5H	3,000.00	L11-5H	-28.45	2,496.35	1,970.93	1,970.85	L11-5H	20.00	2,608.16	1,970.85	1,970.85
45		L11-6H	3,000.00	K13-4H	30.37	2,670.08	4,302.03	4,341.87	K13-4H	19.61	2,645.25	4,302.82	4,302.03

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
46		L12-3H	3,000.00	M12-5H	28.51	2,648.33	3,588.65	3,722.04	M12-5H	17.76	2,623.53	3,588.78	3,588.65
47		L12-4H	3,000.00	K13-4H	28.71	2,666.26	3,979.93	5,254.04	K13-4H	3.86	2,608.91	3,980.33	3,979.93
48		L12-6H	3,000.00	L12-6H	33.04	2,636.79	3,738.87	3,735.23	L12-6H	20.00	2,606.70	3,735.23	3,735.23
49		L12-7H	3,000.00	L12-7H	40.20	2,648.31	4,286.70	4,286.68	L12-7H	20.00	2,601.70	4,286.71	4,286.70
50		L12-8H	3,000.00	L12-8H	21.54	2,615.26	3,070.60	3,070.65	L12-8H	20.00	2,611.70	3,070.64	3,070.60
51		L13-10H	3,000.00	L13-10H	30.85	2,607.21	3,408.33	3,407.88	L13-10H	20.00	2,582.16	3,407.87	3,407.87
52		L13-11H	3,000.00	M12-8H	37.72	2,690.60	6,382.43	6,734.31	M12-8H	17.27	2,643.40	6,385.97	6,382.43
53		L13-12H	3,000.00	L13-12H	43.06	2,654.37	4,486.14	4,486.15	L13-12H	20.00	2,601.16	4,486.16	4,486.14
54		L13-1H	3,000.00	K13-4H	27.58	2,663.66	3,794.27	4,772.20	K13-4H	7.46	2,617.22	3,794.45	3,794.27
55		L13-2H	3,000.00	K13-4H	26.24	2,660.55	3,620.29	4,933.86	K13-4H	1.82	2,604.20	3,620.40	3,620.29
56		L13-3H	3,000.00	M12-8H	29.19	2,670.91	4,031.70	4,330.38	M12-8H	16.66	2,641.98	4,031.93	4,031.70
57		L13-4H	3,000.00	M12-8H	24.04	2,659.02	3,360.37	4,033.03	M12-8H	10.84	2,628.57	3,358.39	3,358.39
58		L13-5H	3,000.00	M12-8H	29.71	2,672.10	4,079.27	5,219.79	M12-8H	6.15	2,617.73	4,079.37	4,079.27
59		L13-6H	3,000.00	K13-4H	28.25	2,665.20	3,877.54	4,083.50	K13-4H	17.65	2,640.73	3,877.70	3,877.54
60		L13-7H	3,000.00	M12-8H	35.74	2,686.03	5,522.86	6,484.88	M12-8H	11.20	2,629.38	5,523.90	5,522.86
61		L13-8H	3,000.00	M12-8H	35.81	2,686.18	5,503.33	5,552.96	M12-8H	19.59	2,648.75	5,503.96	5,503.33
62		L13-9H	3,000.00	L13-9H	32.85	2,637.34	3,714.52	3,711.63	L13-9H	20.00	2,607.70	3,711.62	3,711.61
63		L14-2H	3,000.00	L14-2H	-44.39	2,449.55	1,826.70	1,826.72	L14-2H	20.00	2,598.16	1,826.73	1,826.70
64		L14-3H	3,000.00	L14-3H	-19.20	2,520.68	2,037.95	2,037.86	L14-3H	20.00	2,611.16	2,037.87	2,037.87
65		L7-1H	3,000.00	L7-2H	-2.74	2,547.22	2,368.15	2,502.00	L7-2H	15.57	2,589.46	2,368.13	2,368.13
66		L7-2H	3,000.00	L7-2H	-33.59	2,476.02	1,913.60	1,913.39	L7-2H	20.00	2,599.70	1,913.39	1,913.39
67		L7-3H	3,000.00	K7-7H	17.29	2,624.44	2,853.21	3,098.58	K7-7H	15.40	2,620.09	2,853.21	2,853.21
68		L7-4H	3,000.00	L7-4H	16.52	2,593.67	2,869.50	2,869.54	L7-4H	20.00	2,601.70	2,869.55	2,869.50
69		L7-5H	3,000.00	L7-5H	10.73	2,595.31	2,634.65	2,634.66	L7-5H	20.00	2,616.70	2,634.65	2,634.65
70		L8-1H	3,000.00	L8-1H	28.92	2,632.29	3,480.67	3,480.74	L8-1H	20.00	2,611.70	3,480.74	3,480.67
71		L9-1H	3,000.00	M9-1H	23.95	2,658.82	3,359.78	3,707.57	M9-1H	15.96	2,640.38	3,360.38	3,359.78
72		M11-1H	3,000.00	M11-3H	24.14	2,675.26	3,578.27	4,431.01	M11-3H	12.26	2,647.83	3,578.59	3,578.27
73		M11-2H	3,000.00	M11-2H	17.65	2,624.26	2,890.35	2,890.59	M11-2H	20.00	2,629.70	2,890.60	2,890.35
74		M11-3H	3,000.00	M11-3H	-125.43	2,330.07	879.20	878.65	M11-3H	20.00	2,665.70	878.66	878.66
75		M11-4H	3,000.00	M11-3H	-29.09	2,552.40	1,401.60	1,927.51	M11-3H	6.99	2,635.66	1,401.57	1,401.57
76		M11-5H	3,000.00	M11-3H	10.32	2,643.36	2,288.88	2,795.46	M11-3H	13.38	2,650.42	2,288.75	2,288.75
77		M11-6H	3,000.00	M11-6H	-4.05	2,548.19	2,374.95	2,373.57	M11-6H	20.00	2,603.70	2,373.58	2,373.58
78		M12-1H	3,000.00	M12-1H	24.55	2,642.20	3,271.91	3,272.54	M12-1H	20.00	2,631.70	3,272.55	3,271.91
79		M12-2H	3,000.00	M12-8H	-21.87	2,553.08	1,610.05	1,913.49	M12-8H	12.47	2,632.31	1,610.02	1,610.02
80		M12-3H	3,000.00	M12-8H	-54.36	2,478.09	1,287.58	1,510.06	M12-8H	12.93	2,633.39	1,287.46	1,287.46
81		M12-4H	3,000.00	M12-4H	21.91	2,664.11	3,165.48	3,163.81	M12-4H	20.00	2,659.70	3,163.80	3,163.80
82		M12-5H	3,000.00	M12-5H	10.46	2,606.69	2,591.40	2,591.38	M12-5H	20.00	2,628.70	2,591.39	2,591.39
83		M12-6H	3,000.00	M12-8H	-47.54	2,493.82	1,339.13	1,588.42	M12-8H	12.41	2,632.18	1,339.01	1,339.01
84		M12-7H	3,000.00	M12-8H	-74.99	2,430.48	1,163.13	1,183.49	M12-8H	19.30	2,648.08	1,162.99	1,162.99
85		M12-8H	3,000.00	M12-8H	-101.36	2,369.62	1,048.44	1,048.32	M12-8H	20.00	2,649.70	1,048.32	1,048.32
86		M13-1H	3,000.00	M13-1H	48.93	2,672.47	5,424.39	5,424.60	M13-1H	20.00	2,605.70	5,424.62	5,424.39
87		M13-2H	3,000.00	M13-2H	44.83	2,676.01	5,263.37	5,263.83	M13-2H	20.00	2,618.70	5,263.84	5,263.37
88		M13-3H	3,000.00	M13-3H	18.44	2,601.10	2,940.69	2,940.68	M13-3H	20.00	2,604.70	2,940.68	2,940.68
89		M13-4H	3,000.00	M13-4H	-138.68	2,258.96	1,122.41	1,122.39	M13-4H	20.00	2,625.16	1,122.38	1,122.38
90		M13-5H	3,000.00	M12-8H	5.64	2,616.56	2,213.63	2,701.27	M12-8H	11.71	2,630.57	2,213.74	2,213.63

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Hydrant Report

		ID	Total Demand (gpm)	Critical Fire Node ID	Critical Fire Node Pressure	Critical Fire Node Head	Adjusted Fire-Flow	Available Flow at Hydrant	Critical Available	Critical Available	Critical Available Node	Adjusted Available Flow	Design Flow (gpm)
91		M14-1H	3,000.00	M14-1H	13.63	2,601.46	2,752.71	2,752.17	M14-1H	20.00	2,616.16	2,752.17	2,752.17
92		M14-2H	3,000.00	M14-2H	20.68	2,611.74	3,028.13	3,028.11	M14-2H	20.00	2,610.16	3,028.12	3,028.12
93		M14-3H	3,000.00	M14-3H	17.60	2,611.22	2,899.59	2,899.45	M14-3H	20.00	2,616.76	2,899.46	2,899.46
94		M6-1H	3,000.00	M6-1H	20.90	2,603.76	3,034.75	3,036.30	M6-1H	20.00	2,601.70	3,036.27	3,034.75
95		M7-1H	3,000.00	K7-7H	20.04	2,630.80	3,002.29	3,011.22	K7-7H	19.85	2,630.35	3,002.51	3,002.29
96		M7-2H	3,000.00	M7-2H	2.89	2,574.22	2,432.46	2,432.43	M7-2H	20.00	2,613.70	2,432.43	2,432.43
97		M8-1H	3,000.00	M8-1H	-24.84	2,524.20	1,827.04	1,826.57	M8-1H	20.00	2,627.70	1,826.57	1,826.57
98		M8-2H	3,000.00	M8-2H	25.66	2,651.22	3,428.88	3,428.87	M8-2H	20.00	2,638.16	3,428.85	3,428.85
99		M8-3H	3,000.00	M8-3H	24.98	2,650.16	3,372.08	3,372.09	M8-3H	20.00	2,638.66	3,372.09	3,372.08
100		M8-4H	3,000.00	O10-1H	24.34	2,683.71	3,789.08	4,321.10	O10-1H	16.63	2,665.91	3,789.04	3,789.04
101		M8-5H	3,000.00	O10-1H	24.52	2,684.12	3,836.73	4,057.70	O10-1H	18.66	2,670.61	3,836.79	3,836.73
102		M9-1H	3,000.00	M9-1H	12.05	2,631.35	2,522.44	2,522.60	M9-1H	20.00	2,649.70	2,522.59	2,522.44
103		N10-1H	3,000.00	N10-1H	-41.58	2,521.58	1,320.35	1,319.73	N10-1H	20.00	2,663.70	1,319.73	1,319.73
104		N11-1H	3,000.00	N11-1H	13.99	2,655.83	2,481.99	2,479.55	N11-1H	20.00	2,669.70	2,479.51	2,479.51
105		N11-2H	3,000.00	M11-3H	-40.88	2,525.19	1,303.54	1,324.25	M11-3H	19.50	2,664.55	1,303.55	1,303.54
106		N11-3H	3,000.00	M11-3H	-34.93	2,538.92	1,349.56	1,696.09	M11-3H	11.33	2,645.70	1,349.55	1,349.55
107		N12-1H	3,000.00	N11-1H	30.08	2,692.96	5,039.77	5,571.37	N11-1H	15.68	2,659.74	5,043.52	5,039.77
108		N13-1H	3,000.00	O9-1H	27.80	2,691.17	5,673.32	6,475.48	O9-1H	15.81	2,663.48	5,673.41	5,673.32
109		N13-2H	3,000.00	N13-2H	7.00	2,611.70	2,413.94	2,413.94	N13-2H	20.00	2,641.70	2,413.94	2,413.94
110		N13-3H	3,000.00	N13-3H	42.49	2,644.61	4,193.14	4,193.32	N13-3H	20.00	2,592.70	4,193.34	4,193.14
111		N14-1H	3,000.00	N14-1H	50.80	2,665.78	5,132.54	5,132.92	N14-1H	20.00	2,594.70	5,132.91	5,132.54
112		N14-2H	3,000.00	N14-2H	-2.65	2,551.41	2,360.75	2,360.08	N14-2H	20.00	2,603.70	2,360.07	2,360.07
113		N14-3H	3,000.00	O12-1H	40.04	2,671.95	4,789.53	4,977.18	O12-1H	17.20	2,619.23	4,791.19	4,789.53
114		N15-1H	3,000.00	N15-1H	-89.58	2,351.79	1,497.49	1,497.39	N15-1H	20.00	2,604.70	1,497.39	1,497.39
115		N15-2H	3,000.00	N15-2H	6.87	2,572.40	2,583.67	2,583.57	N15-2H	20.00	2,602.70	2,583.57	2,583.57
116		N15-3H	3,000.00	N15-3H	-31.97	2,482.75	1,942.86	1,942.84	N15-3H	20.00	2,602.70	1,942.85	1,942.85
117		O10-1H	3,000.00	O10-1H	-107.90	2,378.51	717.10	717.10	O10-1H	20.00	2,673.70	717.10	717.10
118		O12-1H	3,000.00	O12-1H	-32.20	2,505.22	1,799.72	1,799.68	O12-1H	20.00	2,625.70	1,799.68	1,799.68
119		O13-1H	3,000.00	O12-1H	36.95	2,664.82	4,369.83	4,493.26	O12-1H	18.06	2,621.21	4,370.86	4,369.83
120		O13-2H	3,000.00	O13-2H	37.84	2,608.86	3,665.47	3,661.90	O13-2H	20.00	2,567.70	3,661.88	3,661.88
121		O8-1H	3,000.00	O8-1H	-131.51	2,317.50	739.38	739.39	O8-1H	20.00	2,667.16	739.39	739.38
122		O9-1H	3,000.00	O9-1H	-129.08	2,329.11	662.00	661.97	O9-1H	20.00	2,673.16	661.96	661.96
123		P13-1H	3,000.00	O12-1H	33.61	2,657.11	4,000.03	5,357.37	O12-1H	-6.55	2,564.42	4,000.42	4,000.03
124		P13-2H	3,000.00	P6-2H	30.52	2,662.97	4,054.42	4,548.39	P6-2H	13.69	2,624.13	4,054.63	4,054.42
125		P6-1H	3,000.00	P6-1H	-33.89	2,491.33	1,856.33	1,856.67	P6-1H	20.00	2,615.70	1,856.67	1,856.33
126		P6-2H	3,000.00	P6-2H	-147.64	2,251.80	1,040.47	1,040.35	P6-2H	20.00	2,638.70	1,040.35	1,040.35
127		Q10-1H	3,000.00	Q10-1H	11.62	2,518.81	2,819.65	2,819.82	Q10-1H	20.00	2,538.16	2,819.82	2,819.65
128		Q10-2H	3,000.00	Q10-2H	-39.61	2,403.13	2,146.76	2,147.72	Q10-2H	20.00	2,540.70	2,147.72	2,146.76
129		Q10-3H	3,000.00	Q10-3H	5.90	2,502.15	2,719.50	2,719.83	Q10-3H	20.00	2,534.70	2,719.83	2,719.50
130		Q11-1H	3,000.00	P6-2H	24.27	2,648.56	3,341.89	3,725.08	P6-2H	14.58	2,626.19	3,340.53	3,340.53
131		R7-1H	3,000.00	R7-1H	-15.88	2,480.89	2,325.71	2,326.38	R7-1H	20.00	2,563.70	2,326.38	2,325.71
132		R9-1H	3,000.00	R9-1H	-18.93	2,455.84	2,342.82	2,343.56	R9-1H	20.00	2,545.70	2,343.55	2,342.82

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
1		12-IN-TRANSMISSION	FAIRWAYTANK	PUMP8	3,248.50	12.00	110.00	9,139.67	25.93	675.45	207.93	Open
2		P-1	J-103	J-102	1,176.22	12.00	110.00	-699.51	1.98	2.10	1.78	Open
3		P-10	J-128	J-127	45.45	10.00	110.00	-55.40	0.23	0.00	0.04	Open
4		P-100	J-239	J-238	960.70	8.00	110.00	-30.59	0.20	0.04	0.04	Open
5		P-101	J-245	J-238	149.26	8.00	110.00	35.72	0.23	0.01	0.05	Open
6		P-102	J-245	N15-3H	502.15	8.00	110.00	0.00	0.00	0.00	0.00	Open
7		P-103	J-233	J-158	215.33	8.00	110.00	103.33	0.66	0.08	0.37	Open
8		P-104	J-255	J-122	328.78	8.00	110.00	-14.44	0.09	0.00	0.01	Open
9		P-105	J-131	J-132	317.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
10		P-106	J-157	J-170	353.94	8.00	110.00	87.97	0.56	0.10	0.28	Open
11		P-108	J-168	J72	163.38	8.00	110.00	5.47	0.03	0.00	0.00	Open
12		P-11	J-113	L11-3H	9.27	10.00	110.00	0.00	0.00	0.00	0.00	Open
13		P-110	J-199	J-200	72.73	8.00	110.00	-5.12	0.03	0.00	0.00	Open
14		P-113	J76	J-244	237.08	12.00	110.00	18.24	0.05	0.00	0.00	Open
15		P-114	J-244	J-131	21.10	12.00	110.00	13.12	0.04	0.00	0.00	Open
16		P-115	J-131	J-255	34.41	12.00	110.00	2.88	0.01	0.00	0.00	Open
17		P-116	J-244	J13-6H	9.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
18		P-117	J-168	J74	63.55	8.00	110.00	-10.59	0.07	0.00	0.00	Open
19		P-118	J-168	J13-4H	11.66	8.00	110.00	0.00	0.00	0.00	0.00	Open
20		P-119	J-201	J-170	17.29	12.00	110.00	-29.77	0.08	0.00	0.00	Open
21		P-12	J-114	J-115	298.01	10.00	110.00	205.92	0.84	0.13	0.45	Open
22		P-120	J-241	J-201	61.98	8.00	110.00	-19.53	0.12	0.00	0.02	Open
23		P-121	J-158	J-157	92.45	8.00	110.00	98.21	0.63	0.03	0.34	Open
24		P-122	J-157	J-196	105.49	8.00	110.00	5.12	0.03	0.00	0.00	Open
25		P-123	J-158	K13-4H	46.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
26		P-124	J-236	J42	42.81	8.00	110.00	-1,165.00	7.44	1.41	33.03	Open
27		P-126	L11-5H	J-371	377.96	8.00	110.00	10.24	0.07	0.00	0.01	Open
28		P-127	J-211	J-181	330.78	8.00	110.00	-717.42	4.58	4.45	13.46	Open
29		P-128	J-212	J-190	143.39	12.00	110.00	-228.90	0.65	0.03	0.22	Open
30		P-129	J-231	J-150	227.08	8.00	110.00	-267.19	1.71	0.49	2.16	Open
31		P-130	J-141	J-205	202.64	8.00	110.00	174.59	1.11	0.20	0.98	Open
32		P-131	J-115	J-205	245.54	8.00	110.00	183.58	1.17	0.26	1.08	Open
33		P-132	J-135	J-240	94.59	8.00	110.00	5.12	0.03	0.00	0.00	Open
34		P-133	J-153	J-152	97.97	12.00	110.00	199.69	0.57	0.02	0.17	Open
35		P-134	J-192	J-191	110.45	8.00	110.00	179.21	1.14	0.11	1.03	Open
36		P-135	J-191	J-213	168.15	8.00	110.00	5.12	0.03	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
37		P-136	J-233	J-191	22.28	8.00	110.00	-168.97	1.08	0.02	0.93	Open
38		P-137	J-129	J-192	239.03	12.00	110.00	184.33	0.52	0.04	0.15	Open
39		P-138	J-192	K13-2H	29.26	8.00	110.00	0.00	0.00	0.00	0.00	Open
40		P-139	J-152	J-129	359.71	12.00	110.00	194.57	0.55	0.06	0.17	Open
41		P-14	J-124	J-112	235.96	10.00	110.00	-399.62	1.63	0.36	1.54	Open
42		P-140	J-129	J-130	160.33	8.00	110.00	5.12	0.03	0.00	0.00	Open
43		P-141	J-152	L13-2H	9.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
44		P-142	J-174	J-202	125.70	8.00	110.00	172.10	1.10	0.12	0.96	Open
45		P-143	J-149	J-187	185.18	12.00	110.00	-414.17	1.17	0.13	0.68	Open
46		P-144	J-153	J-149	224.22	12.00	110.00	-409.05	1.16	0.15	0.66	Open
47		P-145	J-149	L13-6H	24.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
48		P-146	J-375	J-188	169.96	8.00	110.00	-251.83	1.61	0.33	1.94	Open
49		P-146A	J-187	J-375	20.98	8.00	110.00	-241.59	1.54	0.04	1.79	Open
50		P-147	J-212	L13-7H	14.62	8.00	110.00	0.00	0.00	0.00	0.00	Open
51		P-148	J-188	J-231	56.77	8.00	110.00	-256.95	1.64	0.11	2.01	Open
52		P-149	J-188	L13-3H	25.49	8.00	110.00	0.00	0.00	0.00	0.00	Open
53		P-15	J-112	K10-2H	9.05	10.00	110.00	0.00	0.00	0.00	0.00	Open
54		P-150	J-185	J-115	140.14	8.00	110.00	177.86	1.14	0.14	1.02	Open
55		P-151	J-146	J-114	148.95	8.00	110.00	211.04	1.35	0.21	1.39	Open
56		P-152	J-252	J-146	340.09	8.00	110.00	307.49	1.96	0.95	2.80	Open
57		P-154	J-104	J-145	309.87	8.00	110.00	96.77	0.62	0.10	0.33	Open
58		P-155	J-104	L11-2H	20.44	8.00	110.00	0.00	0.00	0.00	0.00	Open
59		P-156	J-185	J-145	145.41	8.00	110.00	-182.98	1.17	0.16	1.07	Open
60		P-157	J-145	J-146	147.46	8.00	110.00	-91.33	0.58	0.04	0.29	Open
61		P-158	J-185	L11-1H	4.50	8.00	110.00	0.00	0.00	0.00	0.00	Open
62		P-159	J-211	J-210	17.79	8.00	110.00	197.70	1.26	0.02	1.24	Open
63		P-16	J-118	J-117	237.90	10.00	110.00	-547.79	2.24	0.66	2.75	Open
64		P-160	J-242	J-211	220.05	8.00	110.00	-514.59	3.28	1.60	7.27	Open
65		P-164	J-197	J-174	100.44	8.00	110.00	177.22	1.13	0.10	1.01	Open
66		P-165	J-174	L12-6H	15.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
67		P-166	J-197	J-198	101.26	8.00	110.00	5.12	0.03	0.00	0.00	Open
68		P-167	J-210	L12-7H	15.13	8.00	110.00	0.00	0.00	0.00	0.00	Open
69		P-168	J-197	J-210	16.45	8.00	110.00	-192.58	1.23	0.02	1.17	Open
70		P-169	J-142	J-141	14.70	8.00	110.00	179.71	1.15	0.02	1.03	Open
71		P-17	J-119	J-121	661.27	10.00	110.00	-742.43	3.03	3.20	4.84	Open
72		P-170	L10-1H	J-141	5.61	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
73		P-171	J-121	L10-6H	9.43	8.00	110.00	0.00	0.00	0.00	0.00	Open
74		P-172	J-205	J-121	222.07	8.00	110.00	353.05	2.25	0.80	3.62	Open
75		P-173	J-205	L10-2H	23.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
76		P-174	J-243	L9-1H	5.48	8.00	110.00	0.00	0.00	0.00	0.00	Open
77		P-175	J-243	J-118	25.00	8.00	110.00	169.04	1.08	0.02	0.93	Open
78		P-176	J-257	J-214	47.06	8.00	110.00	-359.35	2.29	0.18	3.74	Open
79		P-177	J-154	J-155	341.59	12.00	110.00	-1,809.57	5.13	3.54	10.36	Open
80		P-178	J-148	J-193	255.40	8.00	110.00	10.24	0.07	0.00	0.01	Open
81		P-179	J-214	J-215	156.54	8.00	110.00	5.12	0.03	0.00	0.00	Open
82		P-18	J-121	J-124	286.05	10.00	110.00	-394.50	1.61	0.43	1.50	Open
83		P-180	J-147	J-148	45.75	8.00	110.00	-374.72	2.39	0.18	4.04	Open
84		P-181	J-190	J-189	25.98	12.00	110.00	-1,404.14	3.98	0.17	6.47	Open
85		P-182	J-148	J-189	142.70	8.00	110.00	-390.08	2.49	0.62	4.35	Open
86		P-183	J-154	J-228	71.88	8.00	110.00	5.12	0.03	0.00	0.00	Open
87		P-184	J-189	J-154	51.91	12.00	110.00	-1,799.33	5.10	0.53	10.25	Open
88		P-185	J-214	J-147	198.83	8.00	110.00	-369.59	2.36	0.78	3.94	Open
89		P-186	J-147	L13-5H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
90		P-187	J-257	J-258	155.58	8.00	110.00	71.68	0.46	0.03	0.19	Open
91		P-188	J-151	J-257	23.86	8.00	110.00	-282.55	1.80	0.06	2.39	Open
92		P-189	J-150	J-151	8.98	8.00	110.00	-272.31	1.74	0.02	2.23	Open
93		P-19	J-124	L10-7H	11.22	10.00	110.00	0.00	0.00	0.00	0.00	Open
94		P-190	J-150	L13-4H	34.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
95		P-191	J-144	J-262	92.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
96		P-192	J-143	J-144	21.60	8.00	110.00	-732.78	4.68	0.30	13.99	Open
97		P-193	J-143	J-181	133.07	8.00	110.00	727.66	4.64	1.84	13.81	Open
98		P-194	J-143	L12-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
99		P-195	J-116	J-227	1,151.95	10.00	110.00	172.17	0.70	0.37	0.32	Open
100		P-196	J28	J26	390.87	12.00	110.00	8.31	0.02	0.00	0.00	Open
101		P-197	J-227	J-249	20.05	8.00	110.00	167.05	1.07	0.02	0.90	Open
102		P-198	J-249	J-254	108.97	10.00	110.00	136.32	0.56	0.02	0.21	Open
103		P-199	J-254	J-177	467.39	10.00	110.00	131.20	0.54	0.09	0.20	Open
104		P-20	J-117	J-119	128.15	10.00	110.00	-558.03	2.28	0.37	2.85	Open
105		P-200	J-254	K8-2H	73.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
106		P-201	J-227	K7-4H	8.16	8.00	110.00	0.00	0.00	0.00	0.00	Open
107		P-202	J-136	J-178	684.02	10.00	110.00	-30.22	0.12	0.01	0.01	Open
108		P-203	J-136	J7-1H	43.39	8.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
109		P-204	J-177	J-178	21.41	10.00	110.00	90.24	0.37	0.00	0.10	Open
110		P-205	J-206	J-207	208.07	10.00	110.00	31.61	0.13	0.00	0.01	Open
111		P-206	J-207	K7-7H	5.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
112		P-207	J-250	J-116	974.28	8.00	110.00	-113.99	0.73	0.43	0.45	Open
113		P-208	J-175	J-176	367.24	12.00	110.00	-17.29	0.05	0.00	0.00	Open
114		P-209	J26	J-195	293.04	12.00	110.00	-7.05	0.02	0.00	0.00	Open
115		P-21	J-118	J-110	557.62	10.00	110.00	711.71	2.91	2.49	4.47	Open
116		P-210	J-194	L7-3H	21.92	8.00	110.00	0.00	0.00	0.00	0.00	Open
117		P-211	J-195	J-175	305.36	12.00	110.00	-12.17	0.03	0.00	0.00	Open
118		P-212	J-195	L7-4H	129.79	8.00	110.00	0.00	0.00	0.00	0.00	Open
119		P-213	J-175	L7-5H	125.36	8.00	110.00	0.00	0.00	0.00	0.00	Open
120		P-214	J-260	J-229	46.84	12.00	110.00	-550.39	1.56	0.05	1.14	Open
121		P-215	J-113	J-135	11.43	8.00	110.00	10.24	0.07	0.00	0.00	Open
122		P-216	J-293	J-294	1,100.07	10.00	110.00	417.26	1.70	1.83	1.66	Open
123		P-217	J-293	Q11-1H	5.64	6.00	110.00	0.00	0.00	0.00	0.00	Open
124		P-218	J-334	J-343	2,036.73	6.00	110.00	5.12	0.06	0.01	0.01	Open
125		P-219	J-310	J-336	710.86	10.00	110.00	396.78	1.62	1.08	1.52	Open
126		P-22	J-110	J-111	241.32	10.00	110.00	415.31	1.70	0.40	1.65	Open
127		P-220	J-310	J-311	189.35	8.00	110.00	10.24	0.07	0.00	0.01	Open
128		P-221	J-294	J-310	50.46	10.00	110.00	412.14	1.68	0.08	1.63	Open
129		P-222	J-294	Q10-3H	74.86	6.00	110.00	0.00	0.00	0.00	0.00	Open
130		P-222J	J-164	J-222	122.72	8.00	110.00	5.12	0.03	0.00	0.00	Open
131		P-223	J-311	J-332	149.01	6.00	110.00	5.12	0.06	0.00	0.00	Open
132		P-224	J-311	Q10-1H	5.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
133		P-225	J-332	Q10-2H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
134		P-226	J-345	J-125	1,043.90	10.00	110.00	376.30	1.54	1.43	1.37	Open
135		P-227	J-125	R7-1H	65.58	6.00	110.00	0.00	0.00	0.00	0.00	Open
136		P-23	J-110	J-116	126.11	10.00	110.00	291.27	1.19	0.11	0.85	Open
137		P-230	J-285	M8-1H	14.85	6.00	110.00	0.00	0.00	0.00	0.00	Open
138		P-231	J-284	J-285	570.74	6.00	110.00	29.48	0.33	0.08	0.15	Open
139		P-232	J-306	J-250	165.38	6.00	110.00	19.24	0.22	0.01	0.07	Open
140		P-236	J-184	P6-2H	362.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
141		P-237	J-246	P6-1H	36.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
142		P-238	J-289	J-342	25.70	6.00	110.00	15.36	0.17	0.00	0.05	Open
143		P-239	J-315	P13-1H	11.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
144		P-24	J10	J-111	680.53	10.00	110.00	-375.59	1.53	0.93	1.37	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
145		P-241	J-261	J-267	413.65	6.00	110.00	-390.27	4.43	7.32	17.69	Open
146		P-242	J-230	N13-2H	414.06	8.00	110.00	0.00	0.00	0.00	0.00	Open
147		P-243-359	J-359	J-243	751.40	8.00	110.00	174.16	1.11	0.73	0.98	Open
148		P-244	J-234	J-303	166.84	6.00	110.00	5.12	0.06	0.00	0.01	Open
149		P-245	J-256	J-319	245.42	6.00	110.00	5.12	0.06	0.00	0.01	Open
150		P-246	J-325	M11-5H	23.87	6.00	110.00	0.00	0.00	0.00	0.00	Open
151		P-247	J-325	J-171	56.56	6.00	110.00	-421.00	4.78	1.15	20.36	Open
152		P-248	J-325	J-221	438.70	6.00	110.00	415.88	4.72	8.73	19.90	Open
153		P-249	J-172	M11-3H	249.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
154		P-25	J-122	J-123	485.29	10.00	110.00	-24.68	0.10	0.00	0.01	Open
155		P-250	J-267	J-172	141.60	6.00	110.00	-395.39	4.49	2.57	18.12	Open
156		P-251	J-267	N10-1H	5.32	6.00	110.00	0.00	0.00	0.00	0.00	Open
157		P-252	J-277	J-314	188.74	6.00	110.00	5.12	0.06	0.00	0.01	Open
158		P-252J	J-376	J-252	18.85	8.00	110.00	504.35	3.22	0.13	6.99	Open
159		P-253	J-342	J-277	166.27	8.00	110.00	10.24	0.07	0.00	0.00	Open
160		P-254	J-342	O13-1H	15.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
161		P-255	J-277	O13-2H	4.93	6.00	110.00	0.00	0.00	0.00	0.00	Open
162		P-256	J48	J-302	810.53	8.00	110.00	-79.42	0.51	0.19	0.23	Open
163		P-257	J-261	J-317	748.38	6.00	110.00	35.64	0.40	0.16	0.21	Open
164		P-258	J-317	J-324	236.04	6.00	110.00	30.52	0.35	0.04	0.16	Open
165		P-259	J-317	O10-1H	8.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
166		P-259J	J-155	J-164	21.04	8.00	110.00	10.24	0.07	0.00	0.00	Open
167		P-260	J-302	J-315	743.33	12.00	110.00	363.44	1.03	0.39	0.53	Open
168		P-261	J-289	J-302	435.87	12.00	110.00	447.99	1.27	0.34	0.78	Open
169		P-263	J-239	J-289	143.17	12.00	110.00	468.47	1.33	0.12	0.85	Open
170		P-264	J-238	N15-2H	17.01	6.00	110.00	0.00	0.00	0.00	0.00	Open
171		P-265	J-245	J-341	285.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
172		P-266	J-245	J-274	336.66	6.00	110.00	-45.96	0.52	0.11	0.34	Open
173		P-267	J-274	J-275	98.71	6.00	110.00	5.12	0.06	0.00	0.00	Open
174		P-268	J-274	J-300	190.70	6.00	110.00	5.12	0.06	0.00	0.01	Open
175		P-269	J-316	J-274	29.78	6.00	110.00	61.32	0.70	0.02	0.57	Open
176		P-27	J-184	J-183	1,262.55	8.00	110.00	355.81	2.27	4.64	3.67	Open
177		P-270	J-316	N14-2H	4.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
178		P-271	J-316	J-335	200.25	6.00	110.00	-66.44	0.75	0.13	0.67	Open
179		P-272	J-335	J-338	749.12	6.00	110.00	5.12	0.06	0.00	0.01	Open
180		P-272J	J-299	J-272	49.13	12.00	110.00	-218.66	0.62	0.01	0.20	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
181		P-276	J-200	J-279	216.42	6.00	110.00	25.60	0.29	0.02	0.11	Open
182		P-277	J-241	J-340	275.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
183		P-278	J13-2H	J86	105.55	6.00	110.00	0.00	0.00	0.00	0.00	Open
184		P-279	J-255	J-273	193.84	12.00	110.00	12.20	0.03	0.00	0.00	Open
185		P-28	J-102	J-261	1,603.90	8.00	110.00	-349.52	2.23	5.70	3.55	Open
186		P-281	J-273	J-318	140.95	12.00	110.00	1.96	0.01	0.00	0.00	Open
187		P-282	J-273	J-328	16.64	6.00	110.00	5.12	0.06	0.00	0.00	Open
188		P-283	J84	J13-1H	4.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
189		P-284	J-204	J13-5H	148.19	12.00	110.00	0.00	0.00	0.00	0.00	Open
190		P-285	J90	J-280	39.95	6.00	110.00	-10.24	0.12	0.00	0.02	Open
191		P-286	J-279	J13-3H	7.82	6.00	110.00	0.00	0.00	0.00	0.00	Open
192		P-287	J-279	J-280	226.18	6.00	110.00	20.48	0.23	0.02	0.08	Open
193		P-288	J-280	J-304	73.91	6.00	110.00	5.12	0.06	0.00	0.01	Open
194		P-289	J-276	J-339	102.83	6.00	110.00	5.12	0.06	0.00	0.00	Open
195		P-29	J-160	J-186	1,300.95	8.00	110.00	64.72	0.41	0.20	0.16	Open
196		P-290	J-276	J12-5H	37.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
197		P-291	J-282	J-301	193.58	6.00	110.00	-45.16	0.51	0.06	0.33	Open
198		P-292	J-283	L10-8H	360.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
199		P-294	J-301	J-128	174.52	6.00	110.00	-50.28	0.57	0.07	0.40	Open
200		P-295	J-301	K13-3H	17.91	6.00	110.00	0.00	0.00	0.00	0.00	Open
201		P-296	J-127	J-233	8.09	6.00	110.00	-60.52	0.69	0.00	0.54	Open
202		P-297	J-320	J-344	514.42	6.00	110.00	151.62	1.72	1.58	3.07	Open
203		P-298	J-393	J-350	383.14	12.00	110.00	-199.11	0.56	0.07	0.17	Open
204		P-299	J-164	M13-1H	11.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
205		P-299J	J-299	J-380	394.60	12.00	110.00	20.48	0.06	0.00	0.00	Open
206		P-30	J-176	J-226	104.98	8.00	110.00	5.12	0.03	0.00	0.00	Open
207		P-301	J-272	J-212	319.55	12.00	110.00	-223.78	0.63	0.07	0.22	Open
208		P-303	J-272	L13-8H	9.66	6.00	110.00	0.00	0.00	0.00	0.00	Open
209		P-304	J-288	J-378	74.49	6.00	110.00	-182.82	2.07	0.32	4.34	Open
210		P-305	J-288	L13-9H	8.71	6.00	110.00	0.00	0.00	0.00	0.00	Open
211		P-306	J-187	J-288	69.43	6.00	110.00	-177.70	2.02	0.29	4.12	Open
212		P-307	J-202	J-309	159.54	6.00	110.00	5.12	0.06	0.00	0.01	Open
213		P-308	J-321	J-320	62.24	6.00	110.00	156.74	1.78	0.20	3.27	Open
214		P-309	J-321	J-202	20.82	6.00	110.00	-161.86	1.84	0.07	3.47	Open
215		P-31	J-161	J-218	86.18	8.00	110.00	10.24	0.07	0.00	0.01	Open
216		P-310	J-321	L12-8H	10.79	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
217		P-312	J-231	J-348	337.95	6.00	110.00	5.12	0.06	0.00	0.01	Open
218		P-313	J-197	J-271	101.59	6.00	110.00	5.12	0.06	0.00	0.01	Open
219		P-314	J-142	J-298	291.39	6.00	110.00	10.24	0.12	0.01	0.02	Open
220		P-315	J-142	J-115	10.29	6.00	110.00	-195.07	2.21	0.05	4.91	Open
221		P-316	J-298	J-283	161.88	6.00	110.00	5.12	0.06	0.00	0.01	Open
222		P-317	J-298	L10-5H	5.05	6.00	110.00	0.00	0.00	0.00	0.00	Open
223		P-318	J-283	L10-4H	17.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
224		P-319	J-117	J-305	201.95	6.00	110.00	5.12	0.06	0.00	0.00	Open
225		P-32	J-161	J-160	312.38	8.00	110.00	-58.26	0.37	0.04	0.13	Open
226		P-320	J-151	J-327	128.04	6.00	110.00	5.12	0.06	0.00	0.01	Open
227		P-321	J-181	J-333	75.58	6.00	110.00	5.12	0.06	0.00	0.00	Open
228		P-322	J-264	J-330	180.35	6.00	110.00	10.24	0.12	0.00	0.02	Open
229		P-323	J-249	J-264	162.11	8.00	110.00	25.60	0.16	0.00	0.03	Open
230		P-324	J-296	J-308	102.50	6.00	110.00	-25.60	0.29	0.01	0.11	Open
231		P-325	J-270	K8-1H	5.60	6.00	110.00	0.00	0.00	0.00	0.00	Open
232		P-326	J-296	J-297	17.70	6.00	110.00	20.48	0.23	0.00	0.08	Open
233		P-327	J-297	J-337	338.49	6.00	110.00	5.12	0.06	0.00	0.01	Open
234		P-328	J-296	K7-8H	5.19	6.00	110.00	0.00	0.00	0.00	0.00	Open
235		P-329	J-270	J-351	32.21	6.00	110.00	5.12	0.06	0.00	0.00	Open
236		P-33	J-176	J20	183.58	12.00	110.00	-27.54	0.08	0.00	0.01	Open
237		P-330	J-266	J-313	206.46	10.00	110.00	2.81	0.01	0.00	0.00	Open
238		P-331	J32	J-322	47.22	6.00	110.00	5.12	0.06	0.00	0.01	Open
239		P-332	J-313	J-136	281.66	10.00	110.00	-25.10	0.10	0.00	0.01	Open
240		P-333	J-313	J7-2H	8.43	6.00	110.00	0.00	0.00	0.00	0.00	Open
241		P-334	J-206	J-292	180.91	10.00	110.00	13.05	0.05	0.00	0.00	Open
242		P-335	J-308	K7-9H	186.47	6.00	110.00	0.00	0.00	0.00	0.00	Open
243		P-336	J-292	J-266	321.44	10.00	110.00	7.93	0.03	0.00	0.00	Open
244		P-337	J-266	K7-1H	10.11	6.00	110.00	0.00	0.00	0.00	0.00	Open
245		P-338	J-292	K7-6H	14.36	6.00	110.00	0.00	0.00	0.00	0.00	Open
246		P-339	J-307	K7-5H	104.59	6.00	110.00	0.00	0.00	0.00	0.00	Open
247		P-34	J-250	J-160	70.87	8.00	110.00	128.10	0.82	0.04	0.55	Open
248		P-340	J-287	J-206	239.33	10.00	110.00	49.78	0.20	0.01	0.03	Open
249		P-341	J-178	J-287	70.36	10.00	110.00	54.90	0.22	0.00	0.04	Open
250		P-342	J-308	J-307	76.16	6.00	110.00	-30.72	0.35	0.01	0.16	Open
251		P-343	J-287	K7-2H	8.37	6.00	110.00	0.00	0.00	0.00	0.00	Open
252		P-344	J-177	J-307	38.56	6.00	110.00	35.84	0.41	0.01	0.22	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
253		P-345	J-330	J-331	66.36	6.00	110.00	5.12	0.06	0.00	0.01	Open
254		P-346	J-330	K7-3H	4.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
255		P-347	J-111	J-284	43.43	6.00	110.00	34.60	0.39	0.01	0.20	Open
256		P-348	J-284	L8-1H	6.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
257		P-349	J-265	J-264	236.64	8.00	110.00	-10.24	0.07	0.00	0.00	Open
258		P-35	J-226	M7-1H	5.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
259		P-350	J-265	J-265A	252.43	8.00	110.00	5.12	0.03	0.00	0.00	Open
260		P-351	J-265	L7-1H	17.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
261		P-352	J-352	J-122	632.68	6.00	110.00	-5.12	0.06	0.00	0.01	Open
262		P-353	J-281	J-282	60.97	6.00	110.00	-40.04	0.45	0.02	0.26	Open
263		P-354	J-282	K14-1H	25.27	6.00	110.00	0.00	0.00	0.00	0.00	Open
264		P-355	J-123	J50	205.02	6.00	110.00	-29.80	0.34	0.03	0.15	Open
265		P-356	J-297	J-270	92.80	6.00	110.00	10.24	0.12	0.00	0.02	Open
266		P-357	J-285	J-306	386.52	6.00	110.00	24.36	0.28	0.04	0.10	Open
267		P-358	J-334	R9-1H	59.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
268		P-36	J-218	J-251	182.80	8.00	110.00	5.12	0.03	0.00	0.00	Open
269		P-361	J-295	J-295A	196.76	12.00	110.00	448.11	1.27	0.15	0.78	Open
270		P-361A	J-295A	J-239	291.39	12.00	110.00	442.99	1.26	0.22	0.76	Open
271		P-362	J-336	J-334	237.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
272		P-363	J-336	J-345	166.85	10.00	110.00	381.42	1.56	0.23	1.41	Open
273		P-368J	J-365	J-368	170.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
274		P-369	J-278	J-295	165.68	12.00	110.00	453.23	1.29	0.13	0.80	Open
275		P-37	J-218	M6-1H	18.02	8.00	110.00	0.00	0.00	0.00	0.00	Open
276		P-370	J-278	N13-3H	43.00	6.00	110.00	0.00	0.00	0.00	0.00	Open
277		P-370J	L11-5H	J-370	12.93	6.00	110.00	5.12	0.06	0.00	0.00	Open
278		P-371	J-358	J64	110.10	8.00	110.00	-1,154.75	7.37	3.58	32.49	Open
279		P-373J	J-371	J-373	247.61	6.00	110.00	5.12	0.06	0.00	0.01	Open
280		P-374	J-350	J-153	30.43	12.00	110.00	-204.23	0.58	0.01	0.18	Open
281		P-375	J-350	L13-1H	8.42	6.00	110.00	0.00	0.00	0.00	0.00	Open
282		P-377	J-306	M7-2H	11.35	6.00	110.00	0.00	0.00	0.00	0.00	Open
283		P-378	J-344	L12-4H	3.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
284		P-378J	J-378	J-299	400.51	6.00	110.00	-193.06	2.19	1.92	4.81	Open
285		P-379	J-119	J-359	917.88	8.00	110.00	89.64	0.57	0.26	0.29	Open
286		P-38	J-183	J-186	1,090.53	8.00	110.00	365.84	2.34	4.22	3.87	Open
287		P-380	J-119	J-359	917.88	8.00	110.00	89.64	0.57	0.26	0.29	Open
288		P-381	J-359	M9-1H	7.15	6.00	110.00	0.00	0.00	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
289		P-381J	J-380	J-381	39.90	6.00	110.00	5.12	0.06	0.00	0.01	Open
290		P-382	J-221	M11-4H	9.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
291		P-383	J-133	J-362	231.50	8.00	110.00	10.24	0.07	0.00	0.01	Open
292		P-384	J-362	J-140	96.16	8.00	110.00	5.12	0.03	0.00	0.00	Open
293		P-384J	J-380	J-384	257.09	12.00	110.00	5.12	0.01	0.00	0.00	Open
294		P-385	J-362	M11-2H	13.97	8.00	110.00	0.00	0.00	0.00	0.00	Open
295		P-386	J-209	J-364	299.67	8.00	110.00	276.42	1.76	0.69	2.30	Open
296		P-386J	J-380	J-386	244.75	6.00	110.00	5.12	0.06	0.00	0.01	Open
297		P-387	J-364	J-133	108.75	8.00	110.00	271.30	1.73	0.24	2.22	Open
298		P-388	J-364	M12-4H	10.09	8.00	110.00	0.00	0.00	0.00	0.00	Open
299		P-389	J-366	J-293	1,219.68	10.00	110.00	422.38	1.73	2.07	1.70	Open
300		P-39	J-186	J-103	638.49	8.00	110.00	425.45	2.72	3.26	5.11	Open
301		P-390	J-315	J46	657.48	10.00	110.00	358.32	1.46	0.82	1.25	Open
302		P-391	J-366	P13-2H	9.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
303		P-392	N15-1H	J-341	26.73	8.00	110.00	0.00	0.00	0.00	0.00	Open
304		P-393	J-122	J14-1H	15.59	8.00	110.00	0.00	0.00	0.00	0.00	Open
305		P-395J	J-393	J-395	437.00	6.00	110.00	5.12	0.06	0.00	0.01	Open
306		P-396	K12-1H	J-395	20.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
307		P-396J	J-183	J-396	1,240.67	6.00	110.00	-15.15	0.17	0.05	0.04	Open
308		P-397J	J-396	J-397	453.13	6.00	110.00	-20.28	0.23	0.03	0.07	Open
309		P-398	J-397	J-324	1,140.92	8.00	110.00	-25.40	0.16	0.03	0.03	Open
310		P-40	J-246	J-184	493.82	8.00	110.00	360.93	2.30	1.86	3.77	Open
311		P-401	J-363	J-278	74.61	12.00	110.00	458.35	1.30	0.06	0.81	Open
312		P-402	J-363	J-260	380.17	12.00	110.00	-545.27	1.55	0.43	1.12	Open
313		P-41	J-125	J-246	2,032.66	8.00	110.00	366.05	2.34	7.87	3.87	Open
314		P-42	J-217	J-220	115.87	8.00	110.00	5.12	0.03	0.00	0.00	Open
315		P-43	J-165	J-144	67.95	8.00	110.00	743.02	4.74	0.98	14.36	Open
316		P-44	J-258	J-256	36.00	8.00	110.00	66.56	0.42	0.01	0.16	Open
317		P-45	J-165	J-217	185.69	8.00	110.00	10.24	0.07	0.00	0.01	Open
318		P-46	J-385	J-134	382.32	8.00	110.00	974.65	6.22	9.07	23.73	Open
319		P-47	J-224	J-247	550.17	8.00	110.00	291.78	1.86	1.40	2.54	Open
320		P-48	J-234	J-235	281.08	8.00	110.00	5.12	0.03	0.00	0.00	Open
321		P-49	J-166	J-169	217.82	8.00	110.00	10.24	0.07	0.00	0.00	Open
322		P-50	J-155	J-137	552.95	12.00	110.00	-1,824.94	5.18	5.82	10.52	Open
323		P-51	J-193	J-216	158.25	8.00	110.00	5.12	0.03	0.00	0.00	Open
324		P-52	J-193	M13-3H	110.34	8.00	110.00	0.00	0.00	0.00	0.00	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
325		P-57	J-180	J-223	228.41	8.00	110.00	46.08	0.29	0.02	0.08	Open
326		P-58	J-179	J-180	323.33	8.00	110.00	51.20	0.33	0.03	0.10	Open
327		P-59	J-179	M13-5H	6.00	8.00	110.00	0.00	0.00	0.00	0.00	Open
328		P-60	J-256	J-179	14.41	8.00	110.00	56.32	0.36	0.00	0.12	Open
329		P-61	J-180	M12-2H	7.82	8.00	110.00	0.00	0.00	0.00	0.00	Open
330		P-62	J-217	M12-5H	7.65	8.00	110.00	0.00	0.00	0.00	0.00	Open
331		P-63	J-223	J-248	240.64	8.00	110.00	5.12	0.03	0.00	0.00	Open
332		P-64	J-223	J-M12-6H	74.73	8.00	110.00	35.84	0.23	0.00	0.05	Open
333		P-64A	J-M12-6H	M12-6H	16.94	6.00	110.00	0.00	0.00	0.00	0.00	Open
334		P-64B	J-M12-6H	J-166	80.88	8.00	110.00	35.84	0.23	0.00	0.05	Open
335		P-65	J-166	J-167	246.95	8.00	110.00	20.48	0.13	0.00	0.02	Open
336		P-66	J-167	J-234	19.76	8.00	110.00	15.36	0.10	0.00	0.01	Open
337		P-67	J-167	M12-7H	11.19	8.00	110.00	0.00	0.00	0.00	0.00	Open
338		P-68	J-230	J-229	495.46	12.00	110.00	2,426.53	6.88	8.84	17.83	Open
339		P-69	J-138	J-182	296.96	8.00	110.00	5.12	0.03	0.00	0.00	Open
340		P-7	J-125	J-126	564.55	10.00	110.00	5.12	0.02	0.00	0.00	Open
341		P-70	J-137	J-138	14.05	12.00	110.00	-1,830.06	5.19	0.15	10.58	Open
342		P-71	J-137	M13-2H	54.24	8.00	110.00	0.00	0.00	0.00	0.00	Open
343		P-72	J-229	J-156	144.82	12.00	110.00	1,871.02	5.31	1.60	11.02	Open
344		P-73	J-156	N13-1H	16.39	8.00	110.00	0.00	0.00	0.00	0.00	Open
345		P-74	J52	J-156	373.92	12.00	110.00	-1,865.90	5.29	4.10	10.96	Open
346		P-75	J-169	J-169A	120.03	8.00	110.00	5.12	0.03	0.00	0.00	Open
347		P-76	J-169	M12-3H	17.25	8.00	110.00	0.00	0.00	0.00	0.00	Open
348		P-77	J-235	M12-8H	17.75	8.00	110.00	0.00	0.00	0.00	0.00	Open
349		P-78	J-208	J-230	233.19	12.00	110.00	2,431.66	6.90	4.18	17.91	Open
350		P-79	J-224	J-208	89.11	8.00	110.00	-296.90	1.90	0.23	2.63	Open
351		P-8	J-112	J-113	234.36	10.00	110.00	-404.74	1.65	0.37	1.57	Open
352		P-80	J-208	N12-1H	29.86	8.00	110.00	0.00	0.00	0.00	0.00	Open
353		P-81	J-134	J-139	284.76	8.00	110.00	1,225.47	7.82	10.33	36.27	Open
354		P-82	J-139	J-219	479.01	8.00	110.00	763.50	4.87	7.23	15.10	Open
355		P-83	J-219	J-165	142.35	8.00	110.00	758.38	4.84	2.12	14.91	Open
356		P-84	J-219	M12-1H	20.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
357		P-85	J-159	M11-6H	21.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
358		P-86	J-171	J-159	363.43	8.00	110.00	30.72	0.20	0.01	0.04	Open
359		P-86A	J-159	J-365	31.79	8.00	110.00	25.60	0.16	0.00	0.02	Open
360		P-87	J-171	J-139	276.80	8.00	110.00	-456.85	2.92	1.61	5.83	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
361		P-88	J-139	M11-1H	24.42	8.00	110.00	0.00	0.00	0.00	0.00	Open
362		P-89	J-253	J-209	440.00	8.00	110.00	-5.12	0.03	0.00	0.00	Open
363		P-9	J-113	J-104	183.55	10.00	110.00	-420.10	1.72	0.31	1.69	Open
364		P-90	J-133	J-134	116.30	8.00	110.00	255.94	1.63	0.23	2.00	Open
365		P-93	J-209	J-247	44.60	8.00	110.00	-286.66	1.83	0.11	2.46	Open
366		P-94	J-247	N11-1H	20.10	8.00	110.00	0.00	0.00	0.00	0.00	Open
367		P-95	J-221	J-162	263.63	8.00	110.00	410.76	2.62	1.26	4.79	Open
368		P-96	J-163	J-162	264.20	8.00	110.00	-405.64	2.59	1.24	4.68	Open
369		P-97	J-162	N11-3H	29.33	8.00	110.00	0.00	0.00	0.00	0.00	Open
370		P-98	J-172	J-163	39.90	8.00	110.00	-400.52	2.56	0.18	4.57	Open
371		P-99	J-163	N11-2H	12.78	8.00	110.00	0.00	0.00	0.00	0.00	Open
372		P-EL-OBS	EL-OBS-HILL-TANK	J-358	84.21	8.00	110.00	-1,149.63	7.34	2.71	32.22	Open
373		P-J106	J-252	J-106	417.04	8.00	110.00	191.74	1.22	0.49	1.17	Open
374		P-J286	J-363	J-286	10.63	6.00	110.00	81.80	0.93	0.01	0.96	Open
375		P-J335	J-335	J-286	287.42	6.00	110.00	-76.68	0.87	0.25	0.87	Open
376		P-J377	J-375	J-377	60.85	6.00	110.00	5.12	0.06	0.00	0.00	Open
377		P-K13-1H	J-384	K13-1H	25.16	6.00	110.00	0.00	0.00	0.00	0.00	Open
378		P-L11-4H	J-373	L11-4H	22.88	6.00	110.00	0.00	0.00	0.00	0.00	Open
379		P-L11-6H	J-376	L11-6H	20.96	6.00	110.00	0.00	0.00	0.00	0.00	Open
380		P-L13-10H	J-381	L13-10H	34.63	6.00	110.00	0.00	0.00	0.00	0.00	Open
381		P-L14-2H	J-299	L14-2H	292.26	6.00	110.00	0.00	0.00	0.00	0.00	Open
382		P-L7-2H	J-265A	L7-2H	29.74	6.00	110.00	0.00	0.00	0.00	0.00	Open
383		P-M13-4H	J-169A	M13-4H	199.83	6.00	110.00	0.00	0.00	0.00	0.00	Open
384		P-N14-3H	J-295A	N14-3H	17.48	6.00	110.00	0.00	0.00	0.00	0.00	Open
385		P-O8-1H	J-396	O8-1H	26.28	6.00	110.00	0.00	0.00	0.00	0.00	Open
386		P-O9-1H	J-397	O9-1H	8.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
387		P-OBS1-2	OBS-HILL-TANK-1-2	TRANSF	112.58	12.00	110.00	0.00	0.00	0.00	0.00	Open
388		P-PUMP5	PUMP5	J-125	27.38	8.00	110.00	0.00	0.00	0.00	0.00	Open
389		P-PUMP8	PUMP8	J-385	47.28	8.00	110.00	3,713.44	23.70	13.36	282.64	Open
390		P-RES5	RES-5	PUMP5	28.55	8.00	110.00	0.00	0.00	0.00	0.00	Open
391		P-RES6	RES-6	PUMP6	48.40	8.00	110.00	0.00	0.00	0.00	0.00	Open
392		P-RES8	RES-8	PUMP8	73.80	8.00	110.00	-5,426.22	34.63	42.11	570.56	Open
393		P-TANK8B	J-208	J-385	277.35	12.00	110.00	-2,733.67	7.75	6.17	22.24	Open
394		P-TRANSF	TRANSF	J-358	36.05	12.00	110.00	0.00	0.00	0.00	0.00	Open
395		P126	J-242	J-376	11.13	8.00	110.00	509.47	3.25	0.08	7.15	Open
396		P126B	J-365	L11-5H	324.75	8.00	110.00	15.36	0.10	0.00	0.01	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
397		P128	J-344	J-393	9.32	12.00	110.00	-188.87	0.54	0.00	0.16	Open
398		P130	J10	J14	116.51	10.00	110.00	370.47	1.51	0.16	1.33	Open
399		P132	J14	M8-2H	217.35	8.00	110.00	106.96	0.68	0.09	0.40	Open
400		P134	M8-2H	M8-3H	242.94	8.00	110.00	106.96	0.68	0.10	0.40	Open
401		P136	M8-3H	J16	275.97	8.00	110.00	106.96	0.68	0.11	0.40	Open
402		P138	J16	J12	16.19	10.00	110.00	360.23	1.47	0.02	1.27	Open
403		P140	J16	M8-4H	42.30	10.00	110.00	-258.39	1.06	0.03	0.68	Open
404		P142	M8-4H	M8-5H	267.68	10.00	110.00	-258.39	1.06	0.18	0.68	Open
405		P144	M8-5H	J14	116.30	10.00	110.00	-258.39	1.06	0.08	0.68	Open
406		P146	J12	J-102	126.72	10.00	110.00	355.11	1.45	0.16	1.24	Open
407		P148	J20	J22	6.79	12.00	110.00	-37.78	0.11	0.00	0.00	Open
408		P150	J22	J-161	73.04	8.00	110.00	-42.90	0.27	0.01	0.07	Open
409		P152	J-194	J24	40.99	8.00	110.00	-5.12	0.03	0.00	0.00	Open
410		P154	J26	J24	12.75	8.00	110.00	10.24	0.07	0.00	0.02	Open
411		P156	J32	J40	349.41	12.00	110.00	12.54	0.04	0.00	0.00	Open
412		P158	J30	J28	652.66	12.00	110.00	18.55	0.05	0.00	0.00	Open
413		P160	J-313	J32	17.72	6.00	110.00	22.78	0.26	0.00	0.10	Open
414		P162	J30	J-207	49.17	12.00	110.00	-16.83	0.05	0.00	0.00	Open
415		P164	J30	J36	31.14	12.00	110.00	-4.54	0.01	0.00	0.00	Open
416		P166	J36	J-207	18.03	8.00	110.00	-9.66	0.06	0.00	0.01	Open
417		P168	J28	J34	44.56	12.00	110.00	5.12	0.01	0.00	0.00	Open
418		P170	J20	J18	292.00	12.00	110.00	5.12	0.01	0.00	0.00	Open
419		P172	J38	K7-10H	22.46	6.00	110.00	0.00	0.00	0.00	0.00	Open
420		P174	J40	K7-11H	21.68	6.00	110.00	0.00	0.00	0.00	0.00	Open
421		P176	J44	L13-11H	13.21	16.00	110.00	0.00	0.00	0.00	0.00	Open
422		P178	J44	J-236	15.32	8.00	110.00	-1,159.88	7.40	0.50	32.75	Open
423		P180	J42	J-190	51.62	8.00	110.00	-1,170.12	7.47	1.72	33.29	Open
424		P182	J42	L13-12H	148.52	8.00	110.00	0.00	0.00	0.00	0.00	Open
425		P184	J48	J46	1,260.92	6.00	110.00	74.30	0.84	1.03	0.82	Open
426		P186	J46	J-366	444.59	10.00	110.00	427.50	1.75	0.77	1.74	Open
427		P188	O12-1H	J48	84.17	6.00	110.00	0.00	0.00	0.00	0.00	Open
428		P190	J40	J38	318.75	12.00	110.00	7.42	0.02	0.00	0.00	Open
429		P192	J38	J30	286.67	12.00	110.00	2.30	0.01	0.00	0.00	Open
430		P194	J50	J-281	85.58	6.00	110.00	-34.92	0.40	0.02	0.20	Open
431		P196	J50	K14-6H	485.44	6.00	110.00	0.00	0.00	0.00	0.00	Open
432		P198	J52	J54	266.38	8.00	110.00	20.49	0.13	0.00	0.02	Open

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		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
433		P200	J54	J58	128.71	8.00	110.00	6.43	0.04	0.00	0.00	Open
434		P202	J58	M14-2H	13.20	6.00	110.00	0.00	0.00	0.00	0.00	Open
435		P204	J58	J60	396.43	8.00	110.00	1.30	0.01	0.00	0.00	Open
436		P206	J60	J56	280.60	8.00	110.00	-3.82	0.02	0.00	0.00	Open
437		P208	J56	J54	23.03	8.00	110.00	-8.94	0.06	0.00	0.00	Open
438		P210	J56	M14-1H	39.14	6.00	110.00	0.00	0.00	0.00	0.00	Open
439		P212	J60	M14-3H	4.13	6.00	110.00	0.00	0.00	0.00	0.00	Open
440		P214	J-138	J52	34.67	12.00	110.00	-1,840.30	5.22	0.37	10.68	Open
441		P216	L14-3H	J68	30.12	6.00	110.00	0.00	0.00	0.00	0.00	Open
442		P218	J68	J66	131.35	8.00	110.00	0.00	0.00	0.00	0.00	Open
443		P220	J66	J64	592.01	8.00	110.00	0.00	0.00	0.00	0.00	Open
444		P222	J64	J44	294.57	8.00	110.00	-1,154.75	7.37	9.57	32.49	Open
445		P224	J-344	J-106	395.17	12.00	110.00	335.37	0.95	0.18	0.46	Open
446		P226	J-106	J-104	393.05	12.00	110.00	522.00	1.48	0.41	1.04	Open
447		P228	J70	J-200	50.08	8.00	110.00	35.84	0.23	0.00	0.05	Open
448		P230	J72	J70	21.65	8.00	110.00	6.91	0.04	0.00	0.00	Open
449		P232	J74	J-241	28.57	12.00	110.00	-9.29	0.03	0.00	0.00	Open
450		P234	J-201	J-204	2.96	6.00	110.00	5.12	0.06	0.00	0.00	Open
451		P236	J84	J88	84.39	12.00	110.00	12.04	0.03	0.00	0.00	Open
452		P238	J82	J70	45.95	12.00	110.00	28.93	0.08	0.00	0.01	Open
453		P240	J82	J80	156.42	12.00	110.00	-21.49	0.06	0.00	0.00	Open
454		P242	J74	J80	48.39	12.00	110.00	-1.30	0.00	0.00	0.00	Open
455		P244	J80	J78	60.00	12.00	110.00	-22.79	0.06	0.00	0.00	Open
456		P246	J78	J84	490.51	12.00	110.00	12.04	0.03	0.00	0.00	Open
457		P248	J72	J-318	236.32	6.00	110.00	-1.44	0.02	0.00	0.00	Open
458		P250	J88	J86	49.28	12.00	110.00	7.44	0.02	0.00	0.00	Open
459		P252	J86	J82	141.57	12.00	110.00	7.44	0.02	0.00	0.00	Open
460		P254	J88	J-318	25.35	6.00	110.00	4.60	0.05	0.00	0.01	Open
461		P256	J78	J76	5.94	12.00	110.00	-34.84	0.10	0.00	0.00	Open
462		P258	J-170	J76	8.58	8.00	110.00	53.08	0.34	0.00	0.11	Open
463		P262	J92	J90	54.75	6.00	110.00	0.00	0.00	0.00	0.00	Open
464		P264	J92	J12-6H	94.98	6.00	110.00	0.00	0.00	0.00	0.00	Open
465		P266	J90	J-276	7.38	6.00	110.00	10.24	0.12	0.00	0.03	Open
466		P268	J92	J12-8H	192.29	6.00	110.00	0.00	0.00	0.00	0.00	Open
467		P275	J-286	N14-1H	8.24	6.00	110.00	0.00	0.00	0.00	0.00	Open
468		P304A	J-378	J-347	26.13	6.00	110.00	5.12	0.06	0.00	0.00	Open

High Zone 4 hr 2020 MDD FF with Transmission & Improvements Pipe Report

		ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status
469		PIPE6A	PUMP6	J-114	50.56	8.00	110.00	0.00	0.00	0.00	0.00	Open
470		RESPIPE	FAIRWAYTANK	J-103	183.97	8.00	110.00	-1,119.84	7.15	5.65	30.69	Open

APPENDIX J:

- Item 1 – Typical Invoice for September 2013

HOUSING & FOOD SERVICE

Utility Billing for September 2013 Usage

NO.	BUILDING NAME	GROSS SQUARE FT	ELECTRICITY $0.0705 PER KWH USAGE	ELECTRICITY COST	STEAM $8.4716 PER 1000 LBS USAGE	STEAM COST	WATER & SEWER $0.0269 /SqFt $0.0042 /Gal COST	WATER & SEWER GALLONS	CHILLED WATER $0.0593 PER Ton COST	ADMIN CHARGE 8.7% COST	UTILITY TOTAL COST
0006	Community-Duncan Dunn	71,991	36,611	$2,581.08	44,149	$374.01	$686.15	164,500	$0.00	$316.79	$3,958.03
0079A	Gannon Hall	52,760	24,680	$1,739.94	149,940	$1,270.23	$1,419.24	210,355	$0.00	$385.36	$4,814.77
0079B	Goldsworthy Hall	56,146	22,760	$1,604.58	100,793	$853.88	$1,510.33		$0.00	$345.28	$4,314.07
0805	Graduate Student Dorm	84,961	38,160	$2,690.28	159,936	$1,354.91	$2,285.45		$0.00	$550.77	$6,881.41
0019	McCroskey Hall	33,323	13,954	$983.76	43,316	$366.96	$896.39		$0.00	$195.50	$2,442.61
0087	Orton Hall	108,707	47,035	$3,315.97	230,741	$1,954.74	$2,924.22		$0.00	$712.96	$8,907.89
0081B	Perham Hall^	59,185	12,993	$916.01	190,757	$1,616.02	$1,592.08		$0.00	$358.80	$4,482.91
0065B	Regents - Barnard	41,722	16,320	$1,150.56	81,634	$691.57	$1,122.32		$0.00	$257.91	$3,222.36
0065C	Regents - McGregor	42,700	21,840	$1,539.72	147,441	$1,249.06	$1,148.63		$0.00	$342.55	$4,279.96
0083	Rogers Hall	107,684	54,000	$3,807.00	308,210	$2,611.03	$1,707.57	409,380	$0.00	$706.93	$8,832.53
72+73	Scott & Coman Halls	71,302	6,400	$451.20	99,127	$839.76	$1,013.12	242,890	$0.00	$200.46	$2,504.54
0093E	Stephenson East	73,317	35,520	$2,504.16	118,286	$1,002.07	$1,972.23		$0.00	$476.63	$5,955.09
0093N	Stephenson North	73,317	33,440	$2,357.52	106,624	$903.27	$1,972.23		$0.00	$455.27	$5,688.29
0093S	Stephenson South	67,774	26,400	$1,861.20	126,616	$1,072.64	$1,823.12		$0.00	$413.86	$5,170.82
0034	Stevens Hall *	25,681	8,880	$626.04	40,817	$345.78	$690.82		$0.00	$144.65	$1,807.29
0035	Stimson Hall	53,540	24,000	$1,692.00	64,974	$550.43	$1,440.23		$0.00	$320.39	$4,003.05
0081A	Streit Hall	59,747	26,880	$1,895.04	84,966	$719.80	$1,607.19		$0.00	$367.32	$4,589.35
0039	Waller Hall	40,382	12,720	$896.76	154,938	$1,312.57	$1,086.28		$0.00	$286.72	$3,582.33
0014	Honors Hall (Old White Hall)	46,617	23,054	$1,625.31	106,179	$899.51	$446.61	107,071	$0.00	$258.51	$3,229.94
0030	Wilmer - Davis Hall	65,700	28,320	$1,996.56	129,948	$1,100.87	$1,767.33		$0.00	$423.23	R
0042	Olympia Avenue Student Housing	78,562	68,566	$4,833.90		$0.00	$662.79	158,900	N/A	$478.21	$5,974.90
0018	Northside Residence Hall ^	104,661	94,195	$6,640.75	19,659	$166.54	$877.42	210,355	$3,975.23	$1,014.41	$12,674.35
	RESIDENCE HALL TOTALS	1,419,779	676,728	$47,709.32	2,509,051	$21,255.65	$30,651.75	1,503,451	$3,975.23	$9,012.50	**$112,604.46**
0065A	Regents Dining Hall (Northside)	45,173	66,000	$4,653.00	218,246	$1,848.89	$498.10		$352.89	$639.70	$7,992.58
0080	Rotunda (Southside)	38,958	101,400	$7,148.70	184,926	$1,566.62	$1,069.06	256,300	$0.00	$851.24	$10,635.62
0093C	Stephenson Dining Hall (CPU)	54,555	51,300	$3,616.65	259,896	$2,201.73	$1,467.53		$388.47	$667.67	$8,342.05
	Stephenson ESPC Rebate x $864.01)			$0.00		$0.00				$0.00	$0.00
0030A	Wilmer-Davis Dining Hall (Hillside)	17,678	53,600	$3,778.80	64,141	$543.38	$475.54		$190.83	$434.00	$5,422.55
	DINING HALL TOTALS	156,364	272,300	$19,197.15	727,209	$6,160.62	$3,510.23	256,300	$932.20	2,593	**$32,392.80**
0660	Kamiak Apartments	75,895	0	$0.00	0	$0.00	$2,041.58		$0.00	$177.62	$2,219.20
0650	Terrace Apartments	60,966	0	$0.00	0	$0.00	$1,639.99		$0.00	$142.68	$1,782.67
0665	Steptoe Village	156,658	0	$0.00	0	$0.00	$4,214.10		$0.00	$366.63	$4,580.73
0676	Chief Joseph Village	95,882	0	$0.00	0	$0.00	$2,579.23		$0.00	$224.39	$2,803.62
0675	Valley Crest Village	47,034	19,270	$1,358.54	0	$0.00	$1,265.21		$0.00	$228.27	$2,852.02
0677	Nez Pierce Village	91,624	0	$0.00	0	$0.00	$2,464.69		$0.00	$214.43	$2,679.12
0678	Columbia Village	48,721	0	$0.00	0	$0.00	$1,310.59		$0.00	$114.02	$1,424.61
0679	Chinook Village	148,147	0	$0.00	0	$0.00	$3,985.15		$0.00	$346.71	$4,331.86
0680	Yakama Village	115,983	0	$0.00	0	$0.00	$3,119.94		$0.00	$271.43	$3,391.37
	APARTMENT TOTALS	840,910	19,270	$1,358.54	0	$0.00	$22,620.48		$0.00	$2,086.17	**$26,065.19**
0089	Food Service Building	73,206	93,792	$6,612.34	109,123	$924.45	$39.25	9,410	$0.00	$659.12	$8,235.16
0081C	Streit-Perham Admin. Off.	34,707	26,560	$1,872.48	35,819	$303.44	$933.62		$0.00	$270.53	$3,380.07
	Meter reading credit (6 * $22.08 = $132.48)										($132.48)
	GRAND TOTALS	2,524,966	1,088,650	$76,749.83	3,381,202	$28,644.16	$57,755.33	1,769,161	$4,907.43	$14,620.93	**$182,545.20**

* Steam estimated ^ Electricity estimated # Electric meter removed for construction ## Billing adjustment included $182,545.20

+++ Usage adjustment from meter over read previous month.

Note: Valley Crest Village Electrical Usage is a predetermined amount, not a metered amount

**Note: Honors Hall (Old White Hall) will be billed at a rate of 78.2% of the total building usage. Total square footage is listed as 59,613 on the Facility Roster.

Note: Northside Residence Hall had electrical meters (2 - the feeder 13 meter has yet to be installed) installed on the 23rd of September. The total kWh metered from these meters when multiplied out to

WASHINGTON STATE UNIVERSITY — Facilities Operations

TO: Student Book Corporation @ WSU CUB — **WSU Utility Account No:** UT10045

FROM: Terry A. Ryan - Director, Energy Systems Operations

DATE: October 10, 2013

SUBJECT: Utility Billing for September 2013 Usage

BASIS: WSU Lease Agreement No. 16443

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
Current Aggregated Meter Read (BTU)		Previous Aggregated Meter Read (BTU)		
4,556,532,000		4,546,624,000		
Consumption (Therms)	x	Unit Cost		
99.08		$0.75929		$75.23
		Total Heating Charge	=	**$83.23**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

Current Aggregated Meter Read (BTU)		Previous Aggregated Meter Read (BTU)		
4,549,032,800		4,293,706,100		
Consumption (Tons)	x	Unit Cost		
21,277.23		$0.0593		
*** - Includes $497.17 credit for error on August billing.**		**Total Cooling Charge ***	=	**$767.57**

III. Electricity (Avista Schedule 21)

Consumption (kWh)	x	Unit Energy Cost		
44,970		$0.07043		$3,167.22
Current Month Peak Demand (kW)*	x	Demand Charge		
104		$7.3125		$760.50
		Total Electricity Charge	=	**$3,927.72**

IV. Water (City of Pullman) (Included in Lease - Not Metered)

Current Meter Read (Gallons)		Previous Meter Read (Gallons)		
0		0		
Consumption (100 CuFt)*	x	Water Rate		
0.00		$2.49		$0.00
Water Meter Size	x	Meter Fee		
				$0.00
* First 500 cu.ft. free		**Total Water Charge**	=	**$0.00**

V. Sewer (City of Pullman) (Included in Lease - Not Metered)

Water Consumption (100 CuFt)	x	Sewer Rate		
0		$0.00		$0.00
Water Meter Size		Flat Fee Based on Meter Size		
0				$0.00
		Total Sewer Charge	=	**$0.00**

VI.Admin Charge

I.+II.+III. SubTotal	x	Admin Charge		
$4,778.52		8.7%		
		Total Administrative Fee	=	**$415.73**
		Total Utility Billing	=	**$5,194.25**

McCluskey Services Building, PO Box 641150, Pullman, WA 99164-1150
Phone: (509) 335-9000 Fax: (509) 335-9304
For questions on billed energy usage or rates, please contact:
Kate Vines (509-335-9013) or Terry Ryan (509-335-9352)

WASHINGTON STATE UNIVERSITY

Facilities Operations

TO: **U.S. Bank @ WSU CUB** **WSU Utility Account No:** **UT10046**

FROM: **Terry A. Ryan - Director, Energy Systems Operations**

DATE: **October 10, 2013**

SUBJECT: **Utility Billing for September 2013 Usage**

BASIS: **WSU Lease Agreement No. 17134**

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
		Heating BTU Usage		
		20,211		
Consumption (Therms)	x	Unit Cost		
0.20		$0.72953		$0.15
		Total Heating Charge	=	**$8.15**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

		Cooling BTU Usage		
		3,935,000		
Consumption (Tons)	x	Unit Cost		
327.92		$0.0593		
		Total Cooling Charge	=	**$19.45**

III. Electricity (Avista Schedule 11)

		Base Meter Charge		$22.35
Consumption (kWh)	x	Unit Energy Cost		
1,246		$0.11254		$140.22
Current Month Peak Demand (kW)*	x	Demand Charge		
4.0		$0.0000		$0.00
*First 20 kW demand is free		**Total Electricity Charge**	=	**$162.57**

IV. Water (City of Pullman) (Included in Lease - Not Metered)

Current Meter Read (Gallons)		Previous Meter Read (Gallons)		
0		0		
Consumption (100 CuFt)*	x	Water Rate		
0.00		$2.49		$0.00
Water Meter Size	x	Meter Fee		
				$0.00
* First 500 cu.ft. free		**Total Water Charge**	=	**$0.00**

V. Sewer (City of Pullman) (Included in Lease - Not Metered)

Water Consumption (100 CuFt)	x	Sewer Rate		
0		$0.00		$0.00
Water Meter Size		Flat Fee Based on Meter Size		
0				$0.00
		Total Sewer Charge	=	**$0.00**

VI.Admin Charge

I.+II.+III. SubTotal	x	Admin Charge		
$190.17		8.7%		
		Total Administrative Fee	=	**$16.54**
		Total Utility Billing	=	**$206.71**

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WASHINGTON STATE UNIVERSITY

Facilities Operations

TO: **WSECU @ WSU CUB** **WSU Utility Account No:** **UT10047**

FROM: **Terry A. Ryan - Director, Energy Systems Operations**

DATE: **October 10, 2013**

SUBJECT: **Utility Billing for September 2013 Usage**

BASIS: **WSU Lease Agreement No. 6616**

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
		Heating BTU Usage		
		82,631		
Consumption (Therms)	x	Unit Cost		
0.83		$0.73014		$0.61
		Total Heating Charge	=	**$8.61**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

***		Cooling BTU Usage		
		19,695,200		
Consumption (Tons)	x	Unit Cost		
1,641.27		$0.0593		
		Total Cooling Charge	=	**$97.33**

III. Electricity (Avista Schedule 11)

		Base Meter Charge		$22.35
Consumption (kWh)	x	Unit Energy Cost		
2,586		$0.11254		$291.03
Current Month Peak Demand (kW)*	x	Demand Charge		
4.0		$0.0000		$0.00
*First 20 kW demand is free		**Total Electricity Charge**	=	**$313.38**

IV. Water (City of Pullman) (Included in Lease - Shown for Information Only)

Current Meter Read (Gallons)		Previous Meter Read (Gallons)		
6,100		5,970		
Consumption (100 CuFt)*	x	Water Rate		
0.17		$2.49		$0.00
Water Meter Size	x	Meter Fee		
3/4"		$55.40		$55.40
* First 500 cu.ft. free		**Total Water Charge**	=	**$0.00**

V. Sewer (City of Pullman) (Included in Lease - Shown for Information Only)

Water Consumption (100 CuFt)	x	Sewer Rate		
0.17		$1.87		$0.33
Water Meter Size		Flat Fee Based on Meter Size		
3/4"		$8.20		$8.20
		Total Sewer Charge	=	**$0.00**

Billing Correction for May 2013 Chilled Water Overcharge **$0.00**

VI.Admin Charge

I.+II.+III. SubTotal	x	Admin Charge		
$419.32		8.7%		
				$36.48
		Total Utility Billing	=	**$455.80**

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WASHINGTON STATE UNIVERSITY

Facilities Operations

TO: **PANDA EXPRESS @ WSU CUB** **WSU Utility Account No:** **UT10044**

FROM: **Terry A. Ryan - Director, Energy Systems Operations**

DATE: **October 10, 2013**

SUBJECT: **Utility Billing for September 2013 Usage**

BASIS: **WSU Lease Agreement No. 17259**

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
		Heating BTU Usage		
		20,164,806		
Consumption (Therms)	x	Unit Cost		
201.65		$0.79519		$160.35
		Total Heating Charge	=	**$168.35**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

		Cooling BTU Usage		
		34,556,606		
Consumption (Tons)	x	Unit Cost		
2,879.72		$0.0593		
		Total Cooling Charge	=	**$170.77**

III. Electricity (Avista Schedule 11)

		Base Meter Charge		$22.35
Consumption (kWh)	x	Unit Energy Cost		
8,886		$0.09530		$846.84
Current Month Peak Demand (kW)*	x	Demand Charge		
19.9		$0.0000		$0.00
*First 20 kW demand is free		**Total Electricity Charge**	=	**$869.19**

IV. Water (City of Pullman)

Hot Water Usage (gallons)		Cold Water Usage (gallons)		
38,540		56,880		
Consumption (100 CuFt)*	x	Water Rate		
127.57		$2.49		$292.75
Water Meter Size	x	Meter Fee		
Two 1-1/4" Meters (Hot and Cold)		$94.85		$94.85
* First 2 x 500 = 1,000 cu.ft. free		**Total Water Charge**	=	**$387.60**

V. Sewer (City of Pullman)

Water Consumption (100 CuFt)	x	Sewer Rate		
127.57		$2.66		$339.34
Water Meter Size		Flat Fee Based on Meter Size		
Two 1-1/4" Meters (Hot and Cold)		$52.90		$52.90
		Total Sewer Charge	=	**$392.24**

VI.Admin Charge

I.+II.+III. +IV + V SubTotal	x	Admin Charge		
$1,988.15		6.4%		
		Total Administrative Fee	=	**$127.24**
		Total Utility Billing	=	**$2,115.39**

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WASHINGTON STATE UNIVERSITY — Facilities Operations

TO: PIZZA PIPELINE @ WSU CUB
Acme Partners, LLC

WSU Utility Account No: UT17196

FROM: Terry A. Ryan - Director, Energy Systems Operations

DATE: October 10, 2013

SUBJECT: Utility Billing for September 2013 Usage — Initial Billing August 17 - September 30th 2013

BASIS: WSU Lease Agreement No. 17196

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
		Heating BTU Usage: 2,823,813		
Consumption (Therms): 28.24	x	Unit Cost: $0.72982		$20.61
		Total Heating Charge	=	**$28.61**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

		Cooling BTU Usage: 18,693,507		
Consumption (Tons): 1,557.79	x	Unit Cost: $0.0593		
		Total Cooling Charge	=	**$92.38**

III. Electricity (Avista Schedule 11)

		Base Meter Charge		$22.35
Consumption (kWh)*: 1,986	x	Unit Energy Cost: $0.11254		$223.55
Current Month Peak Demand (kW)*: 8.6	x	Demand Charge: $0.0000		$0.00
*First 20 kW demand is free		**Total Electricity Charge**	=	**$245.90**

IV. Water (City of Pullman)

Hot Water Usage (cubic feet): 623		Cold Water Usage (cubic feet): 614		
Consumption (100 CuFt)*: 12.37	x	Water Rate: $2.49		$5.90
Water Meter Size: Two 1-1/4" Meters (Hot and Cold)	x	Meter Fee: $94.85		$94.85
* First 2 x 500 = 1,000 cu.ft. free		**Total Water Charge**	=	**$100.75**

V. Sewer (City of Pullman)

Water Consumption (100 CuFt): 12.37	x	Sewer Rate: $2.66		$32.90
Water Meter Size: Two 1-1/4" Meters (Hot and Cold)		Flat Fee Based on Meter Size: $52.90		$52.90
		Total Sewer Charge	=	**$85.80**

VI. Admin Charge

I.+II.+III. +IV + V SubTotal: $553.44	x	Admin Charge: 6.4%		
Note - Electric meter anomaly repaired.		**Total Administrative Fee**	=	**$35.42**
		Total Utility Billing	=	**$588.86**

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WASHINGTON STATE UNIVERSITY

Facilities Operations

TO: **SUBWAY @ WSU CUB** **WSU Utility Account No:** **UT10050**

FROM: **Terry A. Ryan - Director, Energy Systems Operations**

DATE: **October 10, 2013**

SUBJECT: **Utility Billing for September 2013 Usage**

BASIS: **WSU Lease Agreement No. 17798**

I. Heating (Therms @ Avista Schedule 101 Natural Gas Rate)

		Base Meter Charge		$8.00
		Heating BTU Usage		
		489,741		
Consumption (Therms)	x	Unit Cost		
4.90		$0.72976		$3.58
		Total Heating Charge	=	**$11.58**

II. Cooling (Chilled Water Tons @ WSU Recharge Rate)

		Cooling BTU Usage		
		19,375,347		
Consumption (Tons)	x	Unit Cost		
1,614.61		$0.0593		
		Total Cooling Charge	=	**$95.75**

III. Electricity (Avista Schedule 11)

		Base Meter Charge		$22.35
Consumption (kWh)	x	Unit Energy Cost		
6,194		$0.10052		$622.67
Current Month Peak Demand (kW)*	x	Demand Charge		
12.6		$0.0000		$0.00
*First 20 kW demand is free		**Total Electricity Charge**	=	**$645.02**

IV. Water (City of Pullman)

Hot Water Usage (cubic feet)		Cold Water Usage (cubic feet)		
698		1,005		
Consumption (100 CuFt)*	x	Water Rate		
17.03		$2.49		$17.50
Water Meter Size	x	Meter Fee		
Two 3/4" Meters (Hot and Cold)		$46.00		$46.00
* First 2 x 500 = 1,000 cu.ft. free		**Total Water Charge**	=	**$63.50**

V. Sewer (City of Pullman)

Water Consumption (100 CuFt)	x	Sewer Rate		
17.03		$2.66		$45.30
Water Meter Size		Flat Fee Based on Meter Size		
Two 3/4" Meters (Hot and Cold)		$18.50		$18.50
		Total Sewer Charge	=	**$63.80**

VI.Admin Charge

I.+II.+III. +IV + V SubTotal	x	Admin Charge		
$879.65		6.4%		
		Total Administrative Fee	=	**$56.30**
		Total Utility Billing	=	**$935.95**

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Phone: (509) 335-9000 Fax: (509) 335-9304
For questions on billed energy usage or rates, please contact:
Kate Vines (509-335-9013) or Terry Ryan (509-335-9352)

WASHINGTON STATE UNIVERSITY

Facilities Operations

WSU Utility Account No: UT-10051

TO: **WSU GOLF - PALOUSE RIDGE GOLF COURSE**

FROM: **Terry A. Ryan - Director, Energy Systems Operations**

DATE: **October 10, 2013**

SUBJECT: **Utility Billing for September 2013 Usage**

BASIS: **WSU Lease Agreement No. 16450**

Location (Service Type)	Current Meter Reading (Gallons *)	Previous Meter Reading (Gallons *)	Consumption
Irrigation Pond (Irrigation):	324,583,640	320,333,680	4,249,960
Clubhouse (Commercial):	4,095,523	4,015,317	80,206
N. Comfort Station (Commercial) 13:	94,790	89,560	5,230
S. Comfort Station (Commercial) 6:	80,460	78,550	1,910
Cart Barn/etc. (Commercial) :	1,478	1,356	12,200
		Total Monthly Use (Gallons):	**4,349,506**
		Last Months Fiscal Year Total Use (Gallons):	**30,685,310**
		Current Fiscal Year Total Use (gallons):	**35,034,816**
		Fiscal Year "Free" Water Use (Gallons):	48,000,000
		Fiscal Year Billable Water Use (Gallons):	0
		Fiscal Year Billable Water Use (100 Cu. Ft.):	0.00
		Monthly Billable Water Use (100 Cu. Ft.):	**0.00**
Commercial Portion (100 Cu. Ft.):	0.00	Irrigation Portion(100 Cu. Ft.):	0.00
Commercial Rate per 100 Cu. Ft. :	$3.16	Irrigation Rate per 100 Cu. Ft. :	$3.51
Commercial Base Charge:	$0.00	Irrigation Base Water Charge:	$0.00
		Total Base Charge:	$0.00
		Water Meter Charges:	$0.00
		8.7% WSU Administration Charge:	$0.00
		Total Water Charge:	**$0.00**

Itemized Water Meter Locations and Fees

Location	*Water Service Type*	*Size*	*Monthly Meter Fee*
Irrigation Pond	*Irrigation*	*4"*	*$237.25*
Clubhouse	*Commercial*	*2"*	*$87.20*
North Comfort Station	*Commercial*	*1"*	*$36.25*
South Comfort Station	*Commercial*	*1"*	*$36.25*
Cart Barn/Ball Washer/Entry Irr.	*Commercial*	*11/2"*	*$58.60*
	Total Monthly Meter Charge:		*$455.55*

McCluskey Services Building, PO Box 641150, Pullman, WA 99164-1150

(509) 335-9000

For questions on energy usage or rates, please contact:

Kate Vines (509-335-9013) or Terry Ryan (509-335-9352)

Note: Conversion Factors: 1.0 Cu Ft = 7.48 Gallons; 100 Cu Ft = 748 Gallons

Note: Per Amendment 2 of the Lease, the Palouse Ridge Golf Course will be assessed water charges for each service point in accordance with the City of Pullman rates when the annual fiscal year usage exceeds 48 million gallons.

Note: City of Pullman water rates can be viewed at the web address below:

http://www.pullman-wa.gov/DrawOnePage.aspx?PageID=1040

APPENDIX K:

- Item 1 – SEPA Checklist and Determination of Nonsignificance (DNS)

WASHINGTON STATE UNIVERSITY

Facilities Services

November 30, 2015

Washington State Department of Ecology
SEPA Unit
P.O. Box 47703
Olympia, WA 98504-7703

RE: *2015 Water System Plan Update, Washington State University, Draft Report*

The 2015 Draft Report for the Washington State University Water System Plan Update was prepared by Taylor Engineering, Inc. The three volume study includes:

Chapter 1: Water System Description
Chapter 2: Basic Planning Data and Water Demand Forecasting
Chapter 3: System Analysis
Chapter 4: Conservation Program
Chapter 5: Water Rights and Future Supply Options
Chapter 6: Water Quality Review, Regulatory Compliance and Source Water Protection
Chapter 7: Operation and Maintenance Program
Chapter 8: Distribution Facilities Design and Construction Standards
Chapter 9: Capital Improvement Program
Chapter 10: Financial Program
Appendices: A-K

The WSU 2015 Water System Plan Update proposes to replace the 2008 Domestic Water System Plan Update. The report is available for review upon request.

Per WAC 197-11-965; WAC 197-11-340 (2)(a)(i), *the SEPA Environmental Checklist, WSU/Pullman – Washington State University Domestic Water System Plan Update, dated November 1, 2007* has been reviewed by WSU planning and engineering staff who have found the impacts to be similar and applicable to the 2015 updated plan. The supplemental information includes: updated information through demand forecasting, updated system analysis, an updated conservation program, and an updated capital improvement program for WSU.

Included for review are:

a. Notice of Adoption of the 2007 SEPA Checklist for the *2008 Domestic Water System Plan Update.*
b. The Determination of Non-significance (DNS) for the *2015 Water System Plan Update, Washington State University, Draft Report.*

In August 2015 a public meeting was held and updated information was presented. Persons wishing to comment on the 2015 document are welcome to do so in writing until December 18, 2015.

Thank you,

Barbara Ryder

Barbara Ryder, Sr. Campus Planner
WSU Facilities Services

110 Commons Building, PO Box 643611, Pullman, WA 99164-3611
509-335-5571 • Fax: 509-335-6875 • www.cpd.wsu.edu

WASHINGTON STATE UNIVERSITY

Facilities Services
Capital Projects

December 1, 2015

Washington State Department of Ecology
SEPA Unit
P.O. Box 47703
Olympia, WA 98504-7703

RE: Adoption of the WSU SEPA Checklist for the 2008 Domestic Water System Plan Update

1. **References:**
   a. WAC 197-11-965; WAC 197-11-340 (2)(a)(i)

   b. Environmental Checklist, WSU/Pullman – Washington State University Domestic Water System Plan Update, dated November 1, 2007.

   c. Determination of Nonsignificance (DNS), dated November 13, 2007.

2. **Description of current proposal:** The Washington State University 2015 Water System Plan Update for the Pullman Campus is proposed to replace the 2008 Domestic Water System Plan Update. The 2008 Plan described physical elements of the systems as well as maintenance and operation aspects and considerd anticipated needs through the year 2014. The 2015 plan considers needs for the next 20 years until 2035. It proposes additions and improvements to the system to accommodate future growth including water main additions and replacements.

3. **Proponent:** Washington State University, Facilities Services

4. **Location:** WSU Pullman Campus

5. **Title of documents being adopted:**
   a. Environmental Checklist, WSU/Pullman – Washington State University Domestic Water System Plan Update, dated November 1, 2007.
   b. Determination of Nonsignificance (DNS), dated November 13, 2007.

6. **Agency that prepared document being adopted:** Washington State University, Facilities Operations

7. **Date adopted document was prepared**: November 1, 2007 and November 13, 2007

8. **Description of document being adopted**: The SEPA Environmental Checklist and DNS.

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9. **If the document being adopted has been challenged (WAC 197-11-630), please describe**:

   The *2015 Water System Plan Update* for the WSU Pullman Campus has not been challenged. It was reviewed in a public meeting in August.

   The 2008 Domestic Water System Plan Update was challenged as part of a related lawsuit *Scott Cornelius, Palouse Water Conservation Network, and Sierra Club Palouse Group vs Washington Department of Ecology, Washington State University, and Washington Pollution Control Hearings Board*. This was recently ruled by the Washington State Supreme Courts in favor of Washington Department of Ecology, Washington State University, and Washington Pollution Control Hearings Board. The challenge was denied and the supportive documents upheld.

10. **Document is available to be read at**: Facilities Services, Washington State University, Pullman, WA

We have identified and adopted this document as being appropriate for this proposal after independent review. The document meets our environmental review needs for the current proposal and will accompany the proposal. Any persons wishing to comment on this proposal, may contact:

Name of Adopting Agency:	Washington State University, Facilities Services
Contact person:	Barbara Ryder, Sr. Campus Planner, (509)335-2192
Responsible Official:	Olivia Yang, Associate VP (509)335-5571

Comments are due in writing no later than 4:00 PM on December 18, 2015.

Thank you,

Olivia Yang, Associate VP, WSU Facilities Services

Cc:
WSU Facilities Services, Pullman SEPA File
WSU Environmental Health and Safety

Determination of Non-significance (DNS)

Description of Proposal: The 2015 Water System Plan Update for *Washington State University proposes to replace the 2008 Domestic Water System Plan Update for the Pullman Campus. The plan considers anticipated needs for the next 20 years with supplemental information on updated demand forecasting, updated system analysis, an updated conservation program, and an updated capital improvement program for WSU.*

Proponent: *Department of Facilities Services*
P.O. Box 643611
Washington State University
Pullman, Washington

Location: *The project is located on the WSU Pullman Campus, Pullman, WA.*
The site is located at 2425 Grimes Way, Pullman, WA

Lead Agency: *Washington State University*

The Lead Agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required, as provided for in RCW 43.21C.030(2)(c). This decision was made following the review of a completed Environmental Checklist and other information on file with the lead agency. This information is available to the public on request.

___ There is no comment period for this DNS.
√ This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for at least 14 days from the date listed below. Comments must be submitted in written form and be received by the Responsible Official designated below by 4:00 PM, December 18, 2015.

Responsible Official: *Olivia Yang*

Position/Title: *Associate VP for WSU Facilities Services*

Address: *Washington State University*
Post Office Box 643611
Pullman, WA 99164-3611

Telephone: *(509) 335-5571*
Fax: *(509) 335-6875*

Date: *December 1, 2014*

Signature: _____
/s/Olivia Yang, Associate VP Facilities Services