



**Addendum No. 2
to
Request for Proposals
for
Master Maintenance Agreement**

Chemical Treatment
Washington State University
Pullman, WA

February 29, 2024

Washington State University
Facility Services, Capital

**RFP Addendum No. 2
2/29/2024**

**Master Maintenance Agreement
Chemical Treatment
Washington State University
Pullman, WA**

Proposal Deadline: March 5, 2024, 3:00 pm

1. This Addendum forms a part of the Contract Documents and modifies the original Request for Proposal dated 2/8/2024, and any prior addenda, as noted below.
2. This addendum consists of 17 total pages.

Item 1:

Proposer Questions and WSU Responses:

1. I could not find the previous "Chemical Treatment" bid results on the WSU contractor website going back to 2016. It looks like most bid results are shared on the website. Is it possible to get a copy of the last bid results?

WSU Response: We have been using a Group Purchasing Organization as our means for procuring chemicals for many years now, so there aren't bid results to share.

2. Does the University own any of the current chemical feed system components such as chemical run tanks, chemical feed pumps, etc.?

WSU Response: The existing vendor owns the tanks, but we own the feed pumps, analytical systems, piping, etc.

3. Can you provide yearly steam totals for both boiler plants (either in lbs of steam or gallons of RO permeate makeup)?

WSU Response: In 2023 WSU produced 918 million pounds of steam, and our average makeup rate was 15%.

4. Can you provide yearly cooling water system loading data?

WSU Response:

- a. Either in gallons of makeup, gallons of blowdown, and/or Cycles of Concentration for the main chiller plants or. The chiller plant cooling towers currently operate at 2.5 cycles of concentration.
 - b. Installed chiller load, average duty cycle, and or hrs/days of operation. WSU currently has 12,260 tons of installed chiller capacity and a 2MG 20,000 ton-hour thermal storage tank. In 2023 the plants produced 16,700,000 ton-hours with a peak production rate of 10,300 tons.
5. Would you have vendors simply list their products to use in the specified systems on the cost sheet, for formal purchasing, and then use and loading data for "cost estimates"?

WSU Response: Please see the amended cost form posted to our website with addendum 1 on February 23.

6. Are you planning on providing any technical information regarding your smaller remote chillers and boilers or is it your intention to cover these items under "Maintenance Orders" as the water treatment cost associated with these systems will be marginal in comparison (i.e. trying to keep the bid simplified to the main systems)?

WSU Response: I think we can handle these as separate maintenance orders.

7. We'd like to build some realistic process models for each of the chemical applications on campus.

WSU Response: Examples of desired information below:

- a. Total Steam/Total Make up. See above.
- b. Cooling tower circulating water rates. East Plant 3000-3200 GPM/chiller, West Plant 2600-2800 GPM/chiller, Clark Hall 2400-2600 GPM/chiller.
- c. Cooling tower DeltaT 10-12 degF
- d. Cooling tower operating hours (approx.)
- e. Reverse osmosis recovery rates Both the RO at the GWSP and at the East Chilled Water Plant run at around 66%.

8. Are you providing a raw water analysis?

WSU Response: Please see the water the attached water analyses that were completed at four locations; two at our supply wells and two within the Grimes Way Steam Plant. The analyses are over a decade old, but we are still using the same wells and I wouldn't expect the results to be significantly different today.

9. How is the nuclear reactor lab involved in the bid?

WSU Response: Dodgen has both a stand-alone steam boiler, and a cooling tower related to their research - the reactor is isolated from the cooling tower with a heat exchanger. Please reference the lists of stand-alone equipment below.

10. What is the total count of incumbent owned control panels (We have in our notes: 2 RO panels, 3 Boiler DA panels, and 7 chiller/cooling panels)? Please confirm.

WSU Response: Please see the list of chemical equipment below.

11. Was the chlorine dioxide shock treatment of the closed loop chiller system generated on site or brought to campus in liquid form?

WSU Response: The chlorine dioxide was generated onsite using equipment temporarily brought to campus for that effort.

12. The make-up and blowdown rate of the cooling towers.

WSU Response: Please see question 4 above.

13. The RO and raw water ratio at the East Chiller Plant?

WSU Response: We are currently feeding the condenser loop with a 75% RO, 25% raw water mix.

Item 2:

List of Chemicals, Containers and Controllers by Location:

Grimes Way Steam Plant:

- 22310 Nexguard, 105 gal
- 1720 Oxy Scavenger, 105 gal
- 1820 Triact, 400 gal
- PC-510T RO Anti-Scale, 105 gal
- 7408 RO Chlorine Scavenger, 400 gal
- 8735 Alkaline Source, 800 gal
- Trasar controllers at each DA (3), and on the RO skid

College Avenue Steam Plant:

- 22310 Nexguard, 105 gal
- 1720 Oxy Scavenger, 105 gal
- 1820 Triact, 105 gal
- 8735 Alkaline Source, 105 gal
- No controllers

East Chiller Plant:

- ST-70 - 105gal SS
- 3DT128 - 400gal SS
- 7341 - 110gal POLY
- 7408 - 105gal SS
- 73550 - 30gal SS
- Trasar controller for each chiller (3), and one on the RO skid

West Chiller Plant:

- ST-70 - 400gal SS
- ST-70 - 105gal SS
- 3DT465 - 800gal SS
- 730550 - 30gal SS
- Trasar controller for each chiller (3)

Clark (two chillers):

- ST-70 - 105gal SS
- 3DT465 - 105gal SS
- 73550 - 30gal SS
- Trasar controller for each chiller

SCUE (one chiller, currently out of service):

- ST-70 - 30gal SS
- 3DT465 - 30gal SS
- Trasar controller for chiller

Ableson (stand-alone tower):

- ST-70 - 5gal JUG
- 3DT465 - 15gal JUG
- Conductivity controller

Bustad (stand-alone tower):

- ST-70 - 5gal JUG
- 3DT465 - 15gal JUG
- Conductivity controller

Dodgen (stand-alone tower):

ST-70 - 5gal JUG
3DT465 - 15gal JUG
Trasar controller

Greenhouse 114 (stand-alone tower):

ST-70 - 5gal JUG
3DT465 - 15gal JUG
Conductivity controller

Meats Lab (stand-alone tower):

ST-70 - 5gal JUG
3DT465 - 15gal JUG
Conductivity controller

Wheat Research (stand-alone tower):

ST-70 - 65gal POLY
3DT465 - 65gal POLY
Trasar controller

Item 3:

List of stand-alone boilers:

1. Wheat Research (4, hot water)
2. Steffen Center (steam)
3. Dodgen Research (steam)
4. Incinerator Facility (steam)
5. WSU Creamery (steam)
6. Feed Mill (steam)
7. WSU Dairy (steam)
8. Research Park (2 steam, 1 hot water)

Item 4:

Internal Utility Rates (2023):

Utility Electrical	\$0.08/kWh
Domestic Water	\$0.006/gallon
Steam	\$0.084/pound
Chilled Water	\$0.087/ton-hour

All other requirements of the Request for Proposal remain in force.

END OF ADDENDUM No. 2

Final - Report Number: 555768

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049599

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: MMF Inlet

Water

Cations - Metals	Test Method: CW14024	Total
Aluminum (Al)		<0.03 mg/L
Barium (Ba)		0.09 mg/L
Boron (B)		<0.02 mg/L
Cadmium (Cd)		<0.01 mg/L
Calcium (Ca)		26 mg/L
Calcium (CaCO ₃)		64 mg/L
Chromium (Cr)		<0.02 mg/L
Copper (Cu)		<0.03 mg/L
Iron (Fe)		0.25 mg/L
Lead (Pb)		<0.10 mg/L
Lithium (Li)		0.01 mg/L
Magnesium (Mg)		17 mg/L
Magnesium (CaCO ₃)		71 mg/L
Manganese (Mn)		0.06 mg/L
Molybdenum (Mo)		<0.04 mg/L
Nickel (Ni)		<0.01 mg/L
Phosphorus (P)		0.05 mg/L
Potassium (K)		4.5 mg/L
Silicon (Si)		34 mg/L
Silica (SiO ₂)		72 mg/L
Sodium (Na)		26 mg/L
Sodium (CaCO ₃)		56 mg/L
Strontium (Sr)		0.19 mg/L
Vanadium (V)		<0.01 mg/L
Zinc (Zn)		<0.01 mg/L
Total Hardness (CaCO ₃)		140 mg/L



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Sample Number

NW049599

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: MMF Inlet

Anions	Test Method	Filtered	Total
Soluble Fluoride (F)	CW11060		0.46 mg/L
Chloride (Cl)	CW15000	3.8 mg/L	
Nitrite (NO ₂)	CW15000	<0.20 mg/L	
Bromide (Br)	CW15000	<0.20 mg/L	
Nitrate (NO ₃)	CW15000	0.25 mg/L	
Sulfate (SO ₄)	CW15000	3.0 mg/L	
Chloride (CaCO ₃)	CW15000	5.3 mg/L	
Nitrate (CaCO ₃)	CW15000	<0.28 mg/L	
Sulfate (CaCO ₃)	CW15000	3.2 mg/L	

Alkalinity	Test Method: CW11059	Total
Total Alkalinity (CaCO ₃)		170 mg/L
Phenolphthalein Alkalinity (CaCO ₃)		<10 mg/L
Bicarbonate (CaCO ₃)		160 mg/L
Carbonate (CaCO ₃)		10 mg/L

Phosphate	Test Method: CW13063	Filtered
Ortho Phosphate (PO ₄)		0.1 mg/L

Demand	Test Method: CW20000	Total
Non-Purgeable Organic Carbon (C) - Total		<2 mg/L

Other Analytes	Test Method	Filtered	Total
True Color	CW13057	2 Pt-Co	
Conductivity at 25°C	CW11063		320 µS/cm
pH @ 25°C	CW11059		8.5 pH
Silica (SiO ₂) - Colloidal			9 mg/L
Silica (SiO ₂) - Molybdate Reactive	CW13063	63 mg/L	
Total Dissolved Solids @ 180°C	CW12001		190 mg/L



Final - Report Number: 555768

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

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Representative: John Marone

Sample Number

NW049599

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: MMF Inlet

Final - Report Number: 557801

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049602

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

28-Feb-2012

Date Authorized

28-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: RO Inlet

Water

Cations - Metals	Test Method: CW14024	Total
Aluminum (Al)		<0.03 mg/L
Barium (Ba)		<0.01 mg/L
Boron (B)		0.04 mg/L
Cadmium (Cd)		<0.01 mg/L
Calcium (Ca)		<0.05 mg/L
Calcium (CaCO ₃)		<0.13 mg/L
Chromium (Cr)		<0.02 mg/L
Copper (Cu)		<0.03 mg/L
Iron (Fe)		0.10 mg/L
Lead (Pb)		<0.10 mg/L
Lithium (Li)		0.01 mg/L
Magnesium (Mg)		<0.15 mg/L
Magnesium (CaCO ₃)		<0.62 mg/L
Manganese (Mn)		0.01 mg/L
Molybdenum (Mo)		<0.04 mg/L
Nickel (Ni)		<0.01 mg/L
Phosphorus (P)		59 mg/L
Potassium (K)		0.48 mg/L
Silicon (Si)		32 mg/L
Silica (SiO ₂)		68 mg/L
Sodium (Na)		160 mg/L
Sodium (CaCO ₃)		350 mg/L
Strontium (Sr)		<0.01 mg/L
Vanadium (V)		<0.01 mg/L
Zinc (Zn)		<0.01 mg/L
Total Hardness (CaCO ₃)		0 - 0.75 mg/L



Final - Report Number: 557801

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049602

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

28-Feb-2012

Date Authorized

28-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: RO Inlet

Anions	Test Method	Filtered	Total
Soluble Fluoride (F)	CW11060		0.46 mg/L
Chloride (Cl)	CW15000	7.2 mg/L	
Nitrite (NO ₂)	CW15000	<0.20 mg/L	
Bromide (Br)	CW15000	<0.20 mg/L	
Nitrate (NO ₃)	CW15000	<0.20 mg/L	
Sulfate (SO ₄)	CW15000	3.7 mg/L	
Chloride (CaCO ₃)	CW15000	10 mg/L	
Nitrate (CaCO ₃)	CW15000	<0.28 mg/L	
Sulfate (CaCO ₃)	CW15000	3.9 mg/L	

Alkalinity	Test Method: CW11059	Total
Total Alkalinity (CaCO ₃)		260 mg/L
Phenolphthalein Alkalinity (CaCO ₃)		<10 mg/L
Bicarbonate (CaCO ₃)		240 mg/L
Carbonate (CaCO ₃)		18 mg/L

Phosphate	Test Method: CW13063	Filtered
Ortho Phosphate (PO ₄)		3.2 mg/L

Demand	Test Method: CW20000	Total
Non-Purgeable Organic Carbon (C) - Total		21 mg/L

Other Analytes	Test Method	Filtered	Total
True Color	CW13057	2 Pt-Co	
Conductivity at 25°C	CW11063		620 µS/cm
pH @ 25°C	CW11059		8.6 pH
Silica (SiO ₂) - Colloidal			9 mg/L
Silica (SiO ₂) - Molybdate Reactive	CW13063	59 mg/L	
Total Dissolved Solids @ 180°C	CW12001		420 mg/L



Final - Report Number: 557801

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100 DAIRY RD

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Representative: John Marone

Sample Number

NW049602

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

28-Feb-2012

Date Authorized

28-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: RO Inlet



An ISO 9001:2008 Certified Laboratory
Certificate No. 88758-2010-AQ-USA-ANAB Rev. 1

Authorized by Timothy Murphy
Laboratory Technician IV

Final - Report Number: 555769

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049600

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: Well #7

Water

Cations - Metals	Test Method: CW14024	Total
Aluminum (Al)		<0.03 mg/L
Barium (Ba)		0.08 mg/L
Boron (B)		<0.02 mg/L
Cadmium (Cd)		<0.01 mg/L
Calcium (Ca)		27 mg/L
Calcium (CaCO ₃)		68 mg/L
Chromium (Cr)		<0.02 mg/L
Copper (Cu)		<0.03 mg/L
Iron (Fe)		0.41 mg/L
Lead (Pb)		<0.10 mg/L
Lithium (Li)		0.01 mg/L
Magnesium (Mg)		17 mg/L
Magnesium (CaCO ₃)		71 mg/L
Manganese (Mn)		0.06 mg/L
Molybdenum (Mo)		<0.04 mg/L
Nickel (Ni)		<0.01 mg/L
Phosphorus (P)		0.05 mg/L
Potassium (K)		4.5 mg/L
Silicon (Si)		32 mg/L
Silica (SiO ₂)		69 mg/L
Sodium (Na)		25 mg/L
Sodium (CaCO ₃)		54 mg/L
Strontium (Sr)		0.20 mg/L
Vanadium (V)		<0.01 mg/L
Zinc (Zn)		<0.01 mg/L
Total Hardness (CaCO ₃)		140 mg/L



Final - Report Number: 555769

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049600

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: Well #7

Anions	Test Method	Filtered	Total
Soluble Fluoride (F)	CW11060		0.41 mg/L
Chloride (Cl)	CW15000	2.2 mg/L	
Nitrite (NO ₂)	CW15000	<0.20 mg/L	
Bromide (Br)	CW15000	<0.20 mg/L	
Nitrate (NO ₃)	CW15000	<0.20 mg/L	
Sulfate (SO ₄)	CW15000	14 mg/L	
Chloride (CaCO ₃)	CW15000	3.1 mg/L	
Nitrate (CaCO ₃)	CW15000	<0.28 mg/L	
Sulfate (CaCO ₃)	CW15000	15 mg/L	

Alkalinity	Test Method: CW11059	Total
Total Alkalinity (CaCO ₃)		170 mg/L
Phenolphthalein Alkalinity (CaCO ₃)		<10 mg/L
Bicarbonate (CaCO ₃)		160 mg/L
Carbonate (CaCO ₃)		10 mg/L

Phosphate	Test Method: CW13063	Filtered
Ortho Phosphate (PO ₄)		<0.1 mg/L

Demand	Test Method: CW20000	Total
Non-Purgeable Organic Carbon (C) - Total		<2 mg/L

Other Analytes	Test Method	Filtered	Total
True Color	CW13057	6 Pt-Co	
Conductivity at 25°C	CW11063		340 µS/cm
pH @ 25°C	CW11059		8.4 pH
Silica (SiO ₂) - Colloidal			8 mg/L
Silica (SiO ₂) - Molybdate Reactive	CW13063	61 mg/L	
Total Dissolved Solids @ 180°C	CW12001		280 mg/L



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WASHINGTON STATE UNIV - SHIPPING & REC

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Sample Number

NW049600

Date Sampled

27-Jan-2012 13:00

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2-Feb-2012

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15-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: Well #7



An ISO 9001:2008 Certified Laboratory
Certificate No. 88758-2010-AQ-USA-ANAB Rev. 1

Authorized by Rebecca G. Abdelnour
Senior Chemist

Final - Report Number: 555770

WASHINGTON STATE UNIV - SHIPPING & REC

100 DAIRY RD

PULLMAN WA 99164 USA

Sold To: 0002172714 **Ship To:** 0002172714

Representative: John Marone

Sample Number

NW049601

Date Sampled

27-Jan-2012 13:00

Date Received

2-Feb-2012

Date Completed

24-Feb-2012

Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: Well #8

Water

Cations - Metals	Test Method: CW14024	Total
Aluminum (Al)		<0.03 mg/L
Barium (Ba)		0.09 mg/L
Boron (B)		<0.02 mg/L
Cadmium (Cd)		<0.01 mg/L
Calcium (Ca)		25 mg/L
Calcium (CaCO ₃)		63 mg/L
Chromium (Cr)		<0.02 mg/L
Copper (Cu)		0.03 mg/L
Iron (Fe)		0.44 mg/L
Lead (Pb)		<0.10 mg/L
Lithium (Li)		0.01 mg/L
Magnesium (Mg)		17 mg/L
Magnesium (CaCO ₃)		69 mg/L
Manganese (Mn)		0.06 mg/L
Molybdenum (Mo)		<0.04 mg/L
Nickel (Ni)		<0.01 mg/L
Phosphorus (P)		0.05 mg/L
Potassium (K)		4.4 mg/L
Silicon (Si)		32 mg/L
Silica (SiO ₂)		69 mg/L
Sodium (Na)		25 mg/L
Sodium (CaCO ₃)		55 mg/L
Strontium (Sr)		0.19 mg/L
Vanadium (V)		<0.01 mg/L
Zinc (Zn)		0.05 mg/L
Total Hardness (CaCO ₃)		130 mg/L



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WASHINGTON STATE UNIV - SHIPPING & REC

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Sample Number

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Date Authorized

24-Feb-2012

Water

This sample was analyzed as received, the results being as follows:

Sampling point: Well #8

Anions	Test Method	Filtered	Total
Soluble Fluoride (F)	CW11060		0.45 mg/L
Chloride (Cl)	CW15000	2.3 mg/L	
Nitrite (NO ₂)	CW15000	<0.20 mg/L	
Bromide (Br)	CW15000	<0.20 mg/L	
Nitrate (NO ₃)	CW15000	<0.20 mg/L	
Sulfate (SO ₄)	CW15000	2.9 mg/L	
Chloride (CaCO ₃)	CW15000	3.2 mg/L	
Nitrate (CaCO ₃)	CW15000	<0.28 mg/L	
Sulfate (CaCO ₃)	CW15000	3.0 mg/L	

Alkalinity	Test Method: CW11059	Total
Total Alkalinity (CaCO ₃)		170 mg/L
Phenolphthalein Alkalinity (CaCO ₃)		<10 mg/L
Bicarbonate (CaCO ₃)		160 mg/L
Carbonate (CaCO ₃)		12 mg/L

Phosphate	Test Method: CW13063	Filtered
Ortho Phosphate (PO ₄)		<0.1 mg/L

Demand	Test Method: CW20000	Total
Non-Purgeable Organic Carbon (C) - Total		<2 mg/L

Other Analytes	Test Method	Filtered	Total
True Color	CW13057	6 Pt-Co	
Conductivity at 25°C	CW11063		320 µS/cm
pH @ 25°C	CW11059		8.5 pH
Silica (SiO ₂) - Colloidal			12 mg/L
Silica (SiO ₂) - Molybdate Reactive	CW13063	57 mg/L	
Total Dissolved Solids @ 180°C	CW12001		250 mg/L



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Authorized by Rebecca G. Abdelnour
Senior Chemist