

# City of Spokane Pilot Reuse Water Project 2008 (Year 1)

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A stylized silhouette of a mountain range in shades of teal, located in the bottom right corner of the slide.

# Outline

- ◆ Objectives
- ◆ 5 sites used in the pilot study
- ◆ Compare suitability of Reuse to City water currently used for irrigation
- ◆ Soil Test
- ◆ Soil physical properties at 2 sites
- ◆ Turfgrass tissue analysis and visual observations

# Objectives

- ◆ To determine the long term (2 year – 2008-09) effects of irrigation with Reuse water compared to non-effluent city/pond water, on soil chemical and physical properties and turfgrass tissue and quality parameters at 2 City of Spokane Golf Courses: Downriver and The Creek at Qualchan
- ◆ Monitor Reuse water quality

# Downriver Sites

- #6 Tee
- #7 Rough



# Qualchan Sites

- #15 Green
- #16 Tee
- #16 Fairway

# Soil Profile Downriver Sites

- ◆ #6 Tee

- Sand cap over native soil

- ◆ #7 Rough

- Native soil (Gravelly sandy loam)

# Soil Profile Qualchan Sites

## ◆ #15 Green

- USGA sand-based green with drainage
- Very well suited for Reuse water use
- Reconstructed Fall 2008

## ◆ #16 Tee

- Sand cap over native soil
- Old established forward tee (Pond)
- Newly constructed back tee (Reuse)

## ◆ #16 Fairway

- Native soil (Sandy loam)

**Reuse water was applied through 2 sprinkler heads at each of the 5 sites**





**“CLASS A” RECLAIMED WATER  
FOR IRRIGATION ONLY**

**(The right water for the right use!)**



# Water Samples

- ◆ 2 times (July and October)
- ◆ Samples
  - Reuse water (Downriver and Qualchan)
  - City water (Downriver)
  - Irrigation Pond water (Qualchan)
- ◆ Analysis
  - Heavy metals
  - Irrigation water suitability

## Reuse water heavy metals all well below EPA limits

Beryllium

Silver

Chromium

Cadmium

Cobalt

Barium

Nickel

Lead

Copper

Mercury

Arsenic

Vanadium

Selenium

Manganese

Molybdenum

Zinc

# Irrigation Water Suitability

	Units	Reuse water	City water	Satisfactory range
pH		7.8	8.0	5.5 – 7.5
Sodium	meq/l	2.3	0.3	0 – 2.9
Chloride	ppm	52.7	4.4	0 – 140
Boron	ppm	0.2	0.05	0 – 0.5
EC <sub>(salinity)</sub>	mmhos/cm	0.7	0.3	0 – 0.75
SAR	meq/l	2.6	0.4	0 – 6.0

# Plant Nutrients in Water

Nutrient	Reuse water (ppm)	City water (ppm)
Nitrate	22.8	7.4
Phosphate	0.3	0.0
Potassium	9.6	2.6
Magnesium	24.7	15.2
Calcium	44.3	59.6
Sulfate	65.7	15.6

# Soil Samples

- ◆ 3 times during the growing season  
(May, July, and October)
- ◆ Analysis
  - Basic soil test
  - SAR

# Soil Test Results

- ◆ Few differences in soil nutrient levels between Reuse and City water
- ◆ EC (soil salinity) similar regardless of irrigation source and within satisfactory range
- ◆ Sodium and SAR soil levels increased at all 5 sites receiving reuse water. However, SAR levels all within satisfactory range

# Soil Physical Properties

- ◆ #6 Tee at Downriver
  - Poor sand selection: Sand profile too high in fine sand creates poor water infiltration conditions
  
- ◆ #16 Fairway Qualchan
  - Excessive thatch layer
  - Poor water infiltration

# Recommendations

- ◆ #6 Tee Downriver
  - Aerate
  - USGA specified topdress sand
- ◆ #16 fairway Qualchan
  - Dethatch to remove excess thatch
  - Aerate



**Turfgrass tissue analysis  
and visual observations**

# Turfgrass Results

- ◆ Slight differences in leaf tissue nutrient levels between Reuse and City water
- ◆ All 5 sites irrigated with Reuse water had no adverse visual effect on turfgrass

# First Year Conclusions

- ◆ 'Class A' Reuse water has low heavy metal levels
- ◆ Reuse water within satisfactory limits of Sodium, Chloride, Boron, EC (salinity), and SAR although much higher compared to City water
- ◆ **Reuse water provides a number of essential plant nutrients at levels above the City water currently used**

# First Year Conclusions

- ◆ Few differences in soil nutrient levels
- ◆ No difference in soil EC (soil salinity)
- ◆ Sodium levels in soil increased at all 5 sites irrigated with Reuse water
- ◆ Poor soil drainage issues should be identified and corrected
- ◆ No adverse effects on turfgrass tissue chemistry or visual turfgrass quality parameters
- ◆ Year 2 (2009) sampling will be a repeat of Year 1.



**Questions?**