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Developing a Coastal Oregon Water Supply Planning and Design of Water Supply, Treatment and Storage Facilities for the City of Gearhart

Milt Larsen, P.E.



Gearhart Project Location

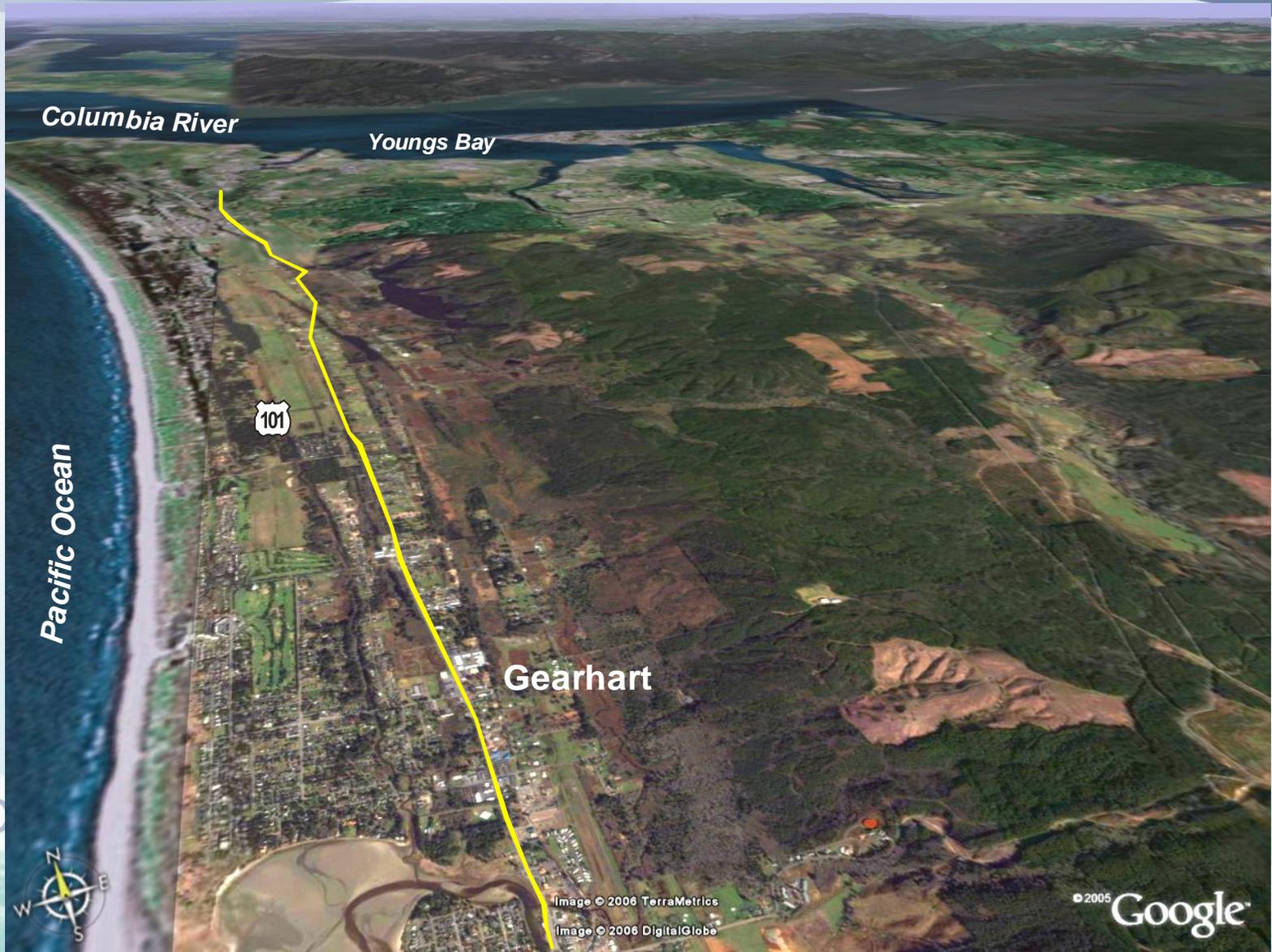


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Presentation Overview

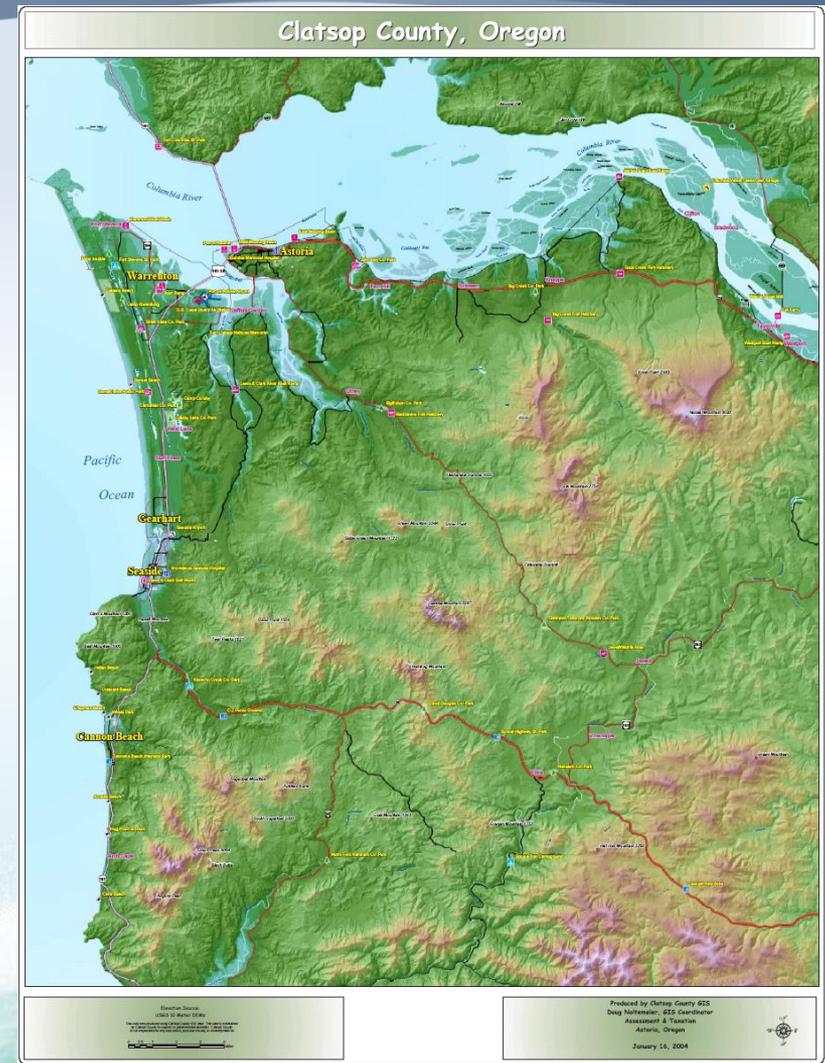
- **Project Background**
- **Pilot Test**
- **Supply, Storage, & Water Treatment Facilities**



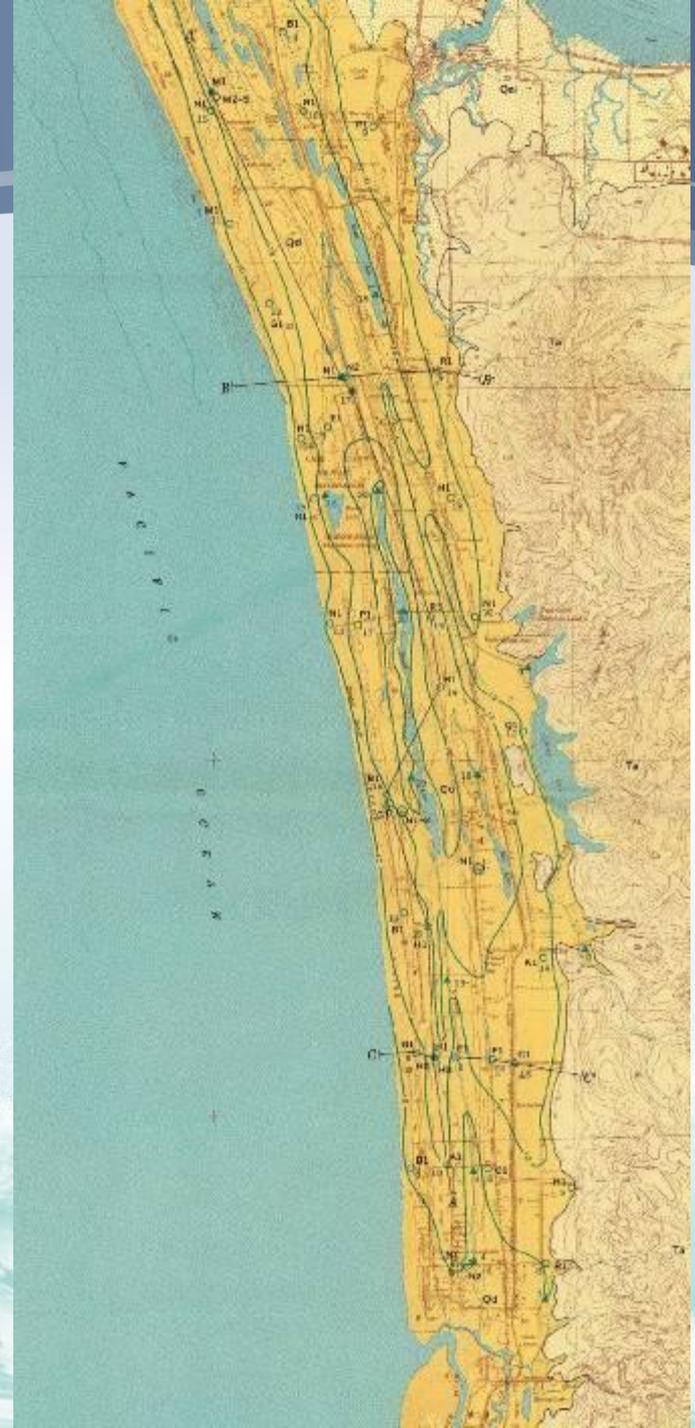
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Gearhart, Oregon

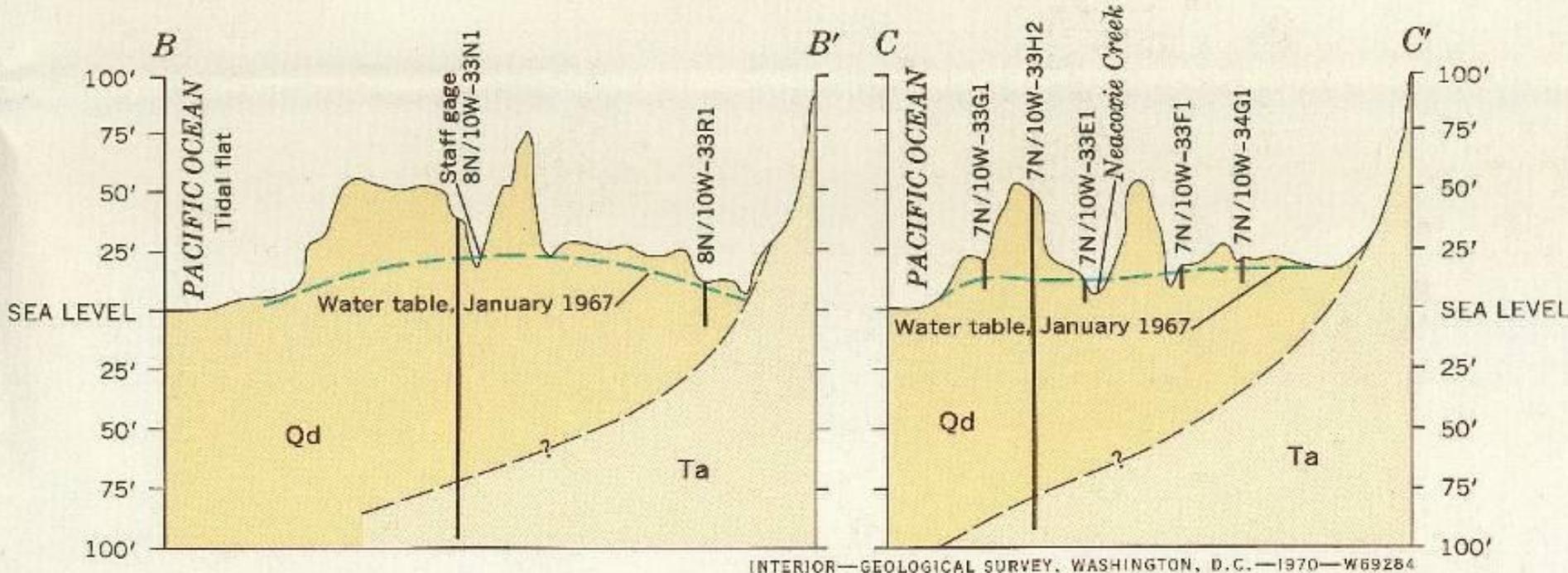
- 1400 connections
- Seasonal influx of tourists
- Depended on another utility for drinking water supply for over 60 years
- USGS began researching Clatsop Plains Aquifer in late 1970s



Large Sand-Dune Deposits extend from Warrenton South to Seaside, Offering Groundwater Supply Potential



Deep Sand Deposits Exist Above Confining Sandstone, Capture Water and Create Horizontal Flow



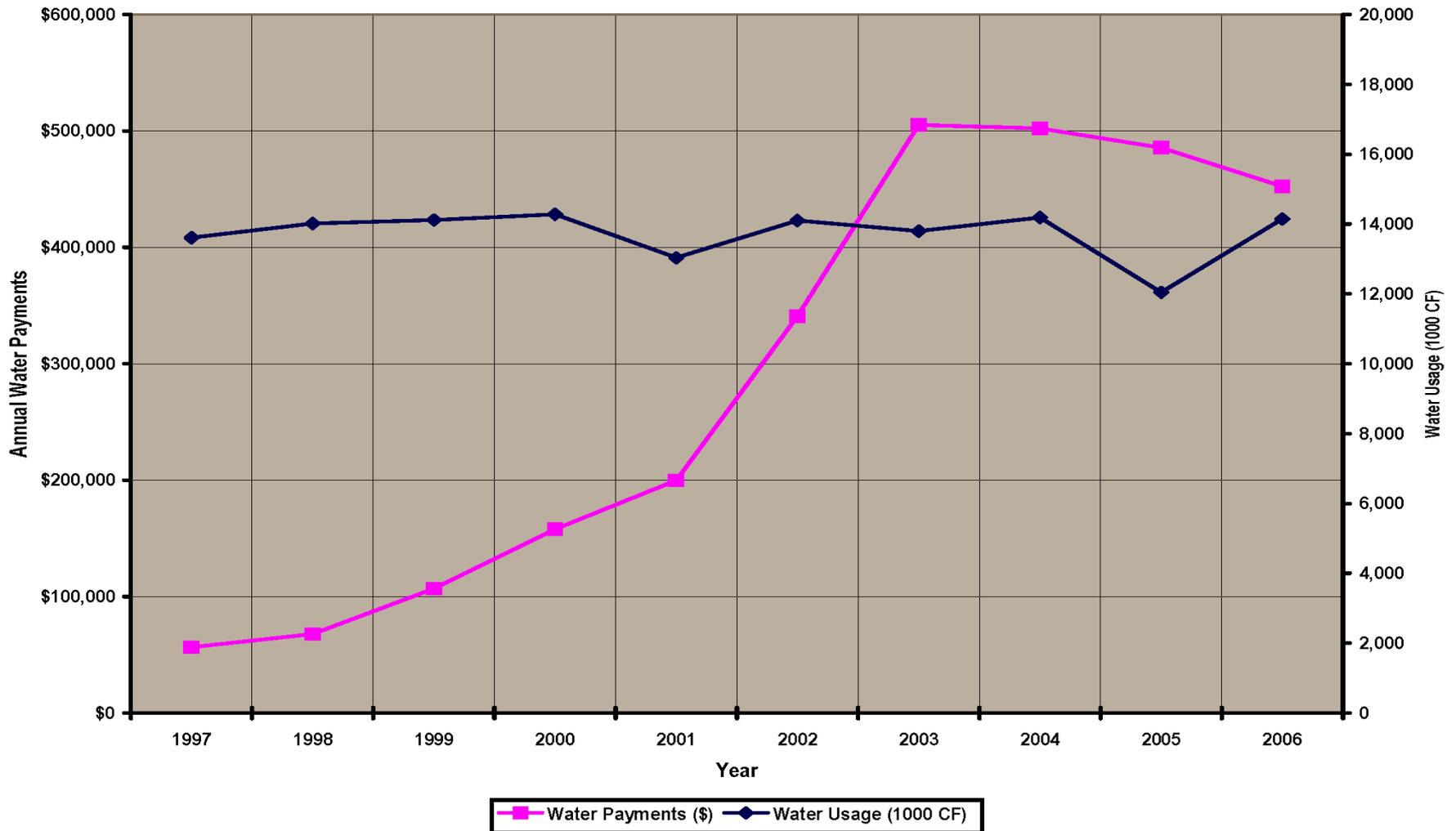
Water Rate Shock to Residents

- Wholesale water rates quadrupled in 4 years
- Average 80 complaints per week over water bills
- Current wholesale charge \$6,800/MG
- Issues
 - Rapid increase in water rates
 - Lack of control over future water rates
 - Desire to control their own water supply
 - Reduce draw on local surface water



History – Water Rates

City of Gearhart - Water Usage and Payments 1997-2006

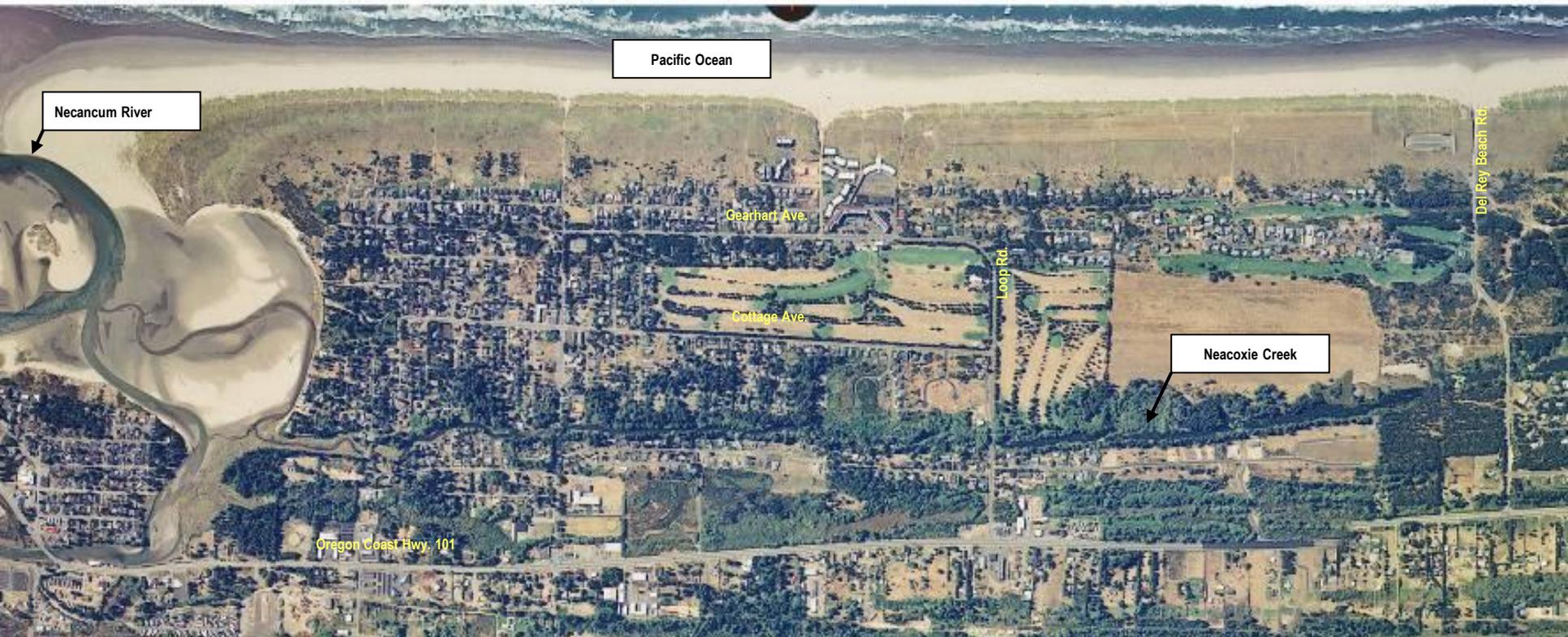


Initial Effort

- 2003 - began work to develop an independent water supply
- 2004 - 77% favorable vote for issuing \$7 million general obligation bonds
- Fund water rights acquisition, source development, water treatment, water storage and transmission pipeline



Water Quality and Availability Varies with Location Between Warrenton and Seaside



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Gearhart Groundwater Chemistry

<u>Element</u>	<u>Value</u>	<u>MCL/STD.</u>
Arsenic	19 -30 µg/l	10 µg/l
Iron	19 µg/l	300 µg/l
Manganese	9-21 µg/l	50 µg/l
Ammonia-N	0.32 – 0.56 mg/l	
Nitrate-N	ND	10 mg/l
Sodium	31-50 mg/l	
Chloride	17-48 mg/l	
Sulfate	9-15 mg/l	250 mg/l
pH	7.8	
Hardness	84-95 mg/l	61-120 mg/l (moderately hard)



Gearhart Dune Area and Test Well Looking West



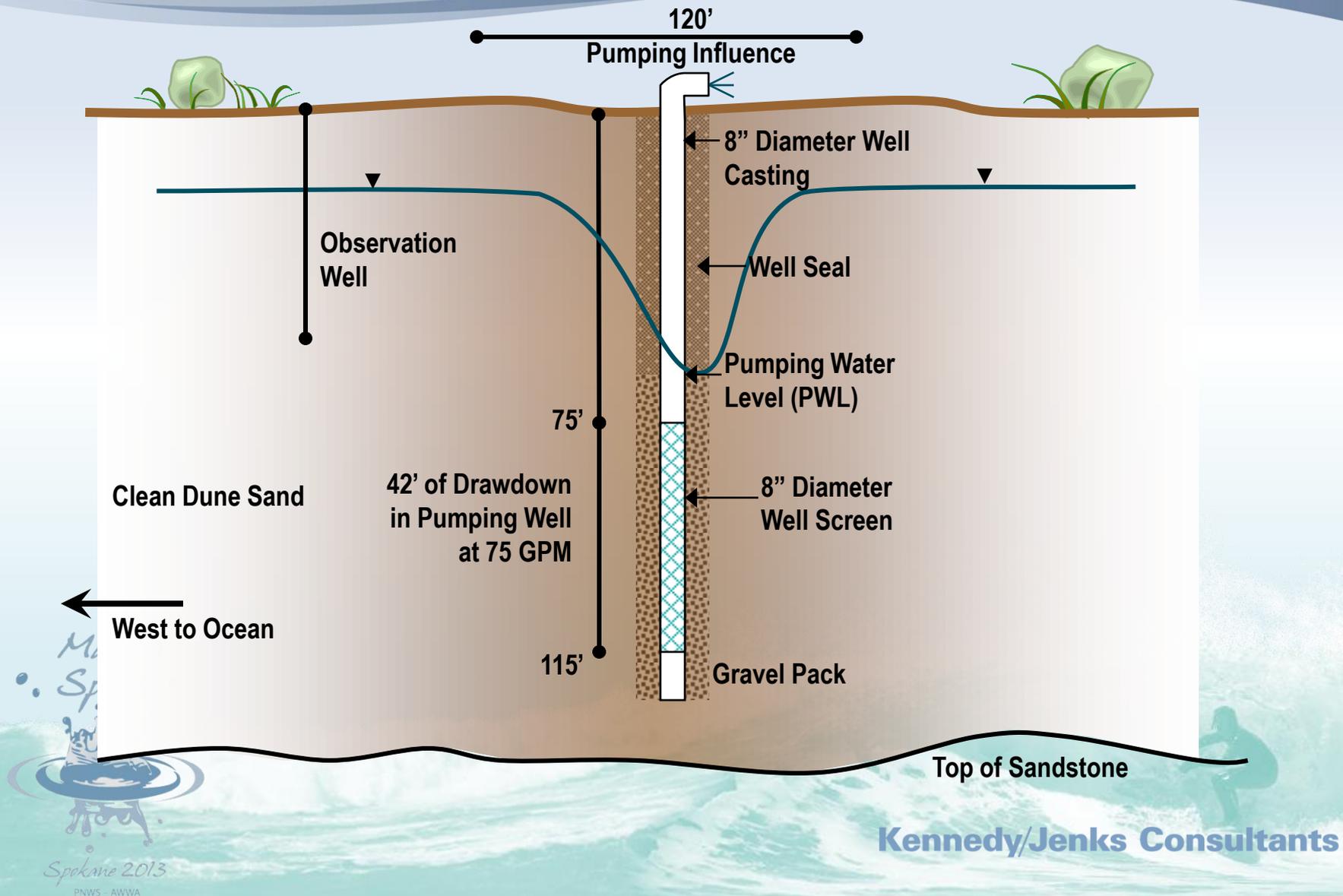
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Gearhart Dune Area-looking East



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Fine Grained Clatsop Plains Aquifer Sands Impact Well Design and the Resulting Drawdown

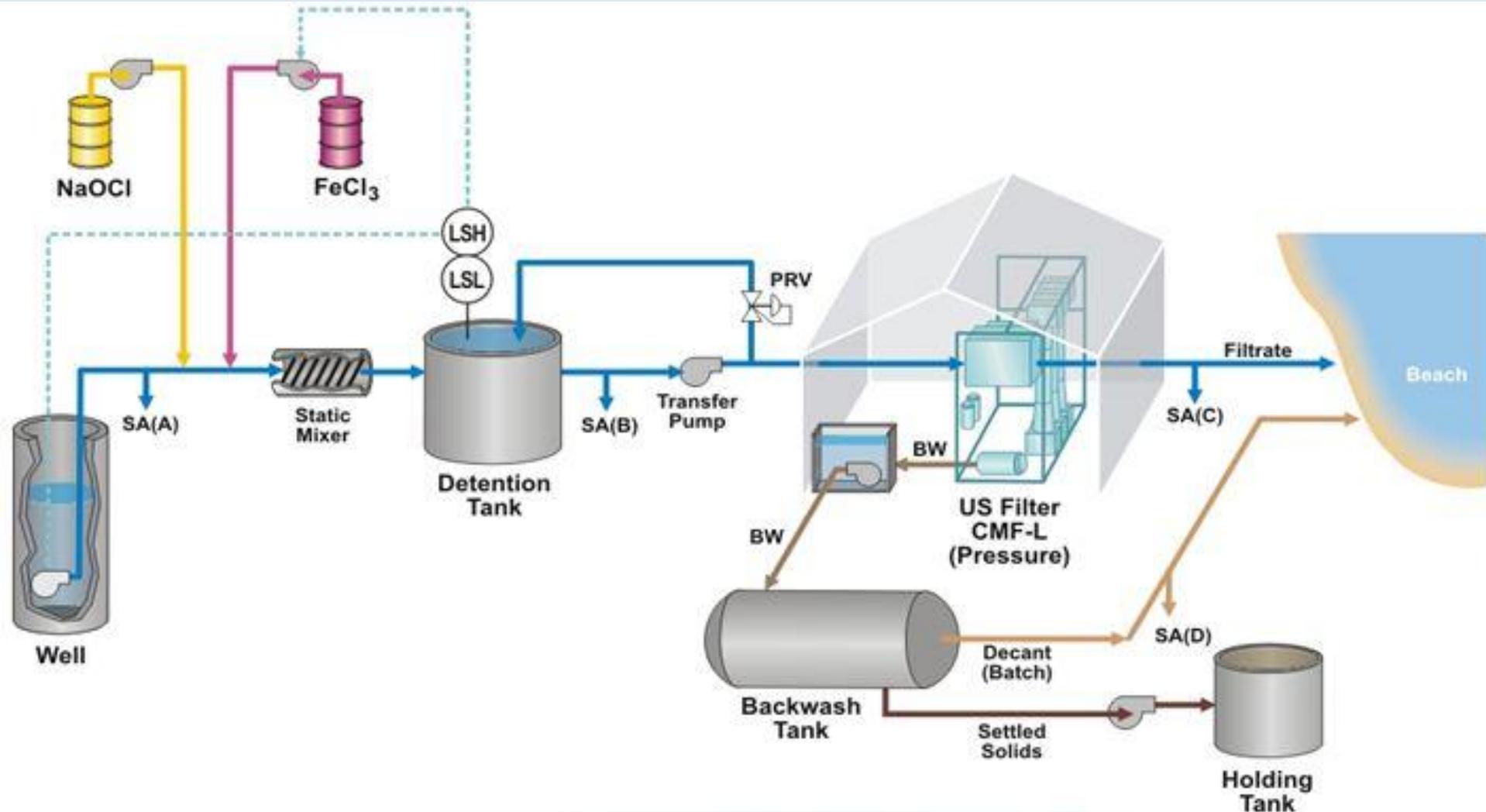


Groundwater Supply

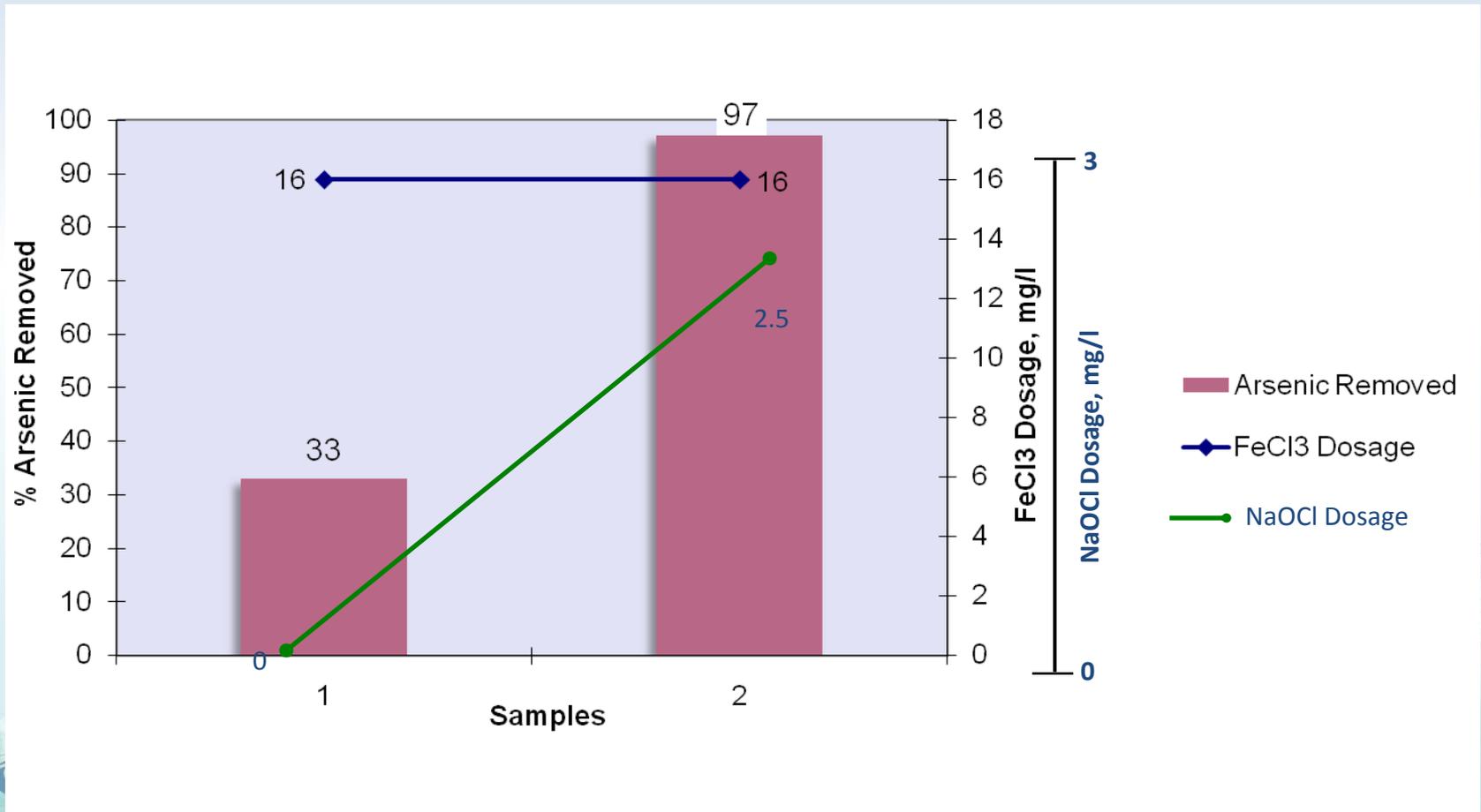
- **Anticipated**
 - 14 – 75 gpm wells
- **Actual**
 - 8 wells
 - 60 to 210 gpm



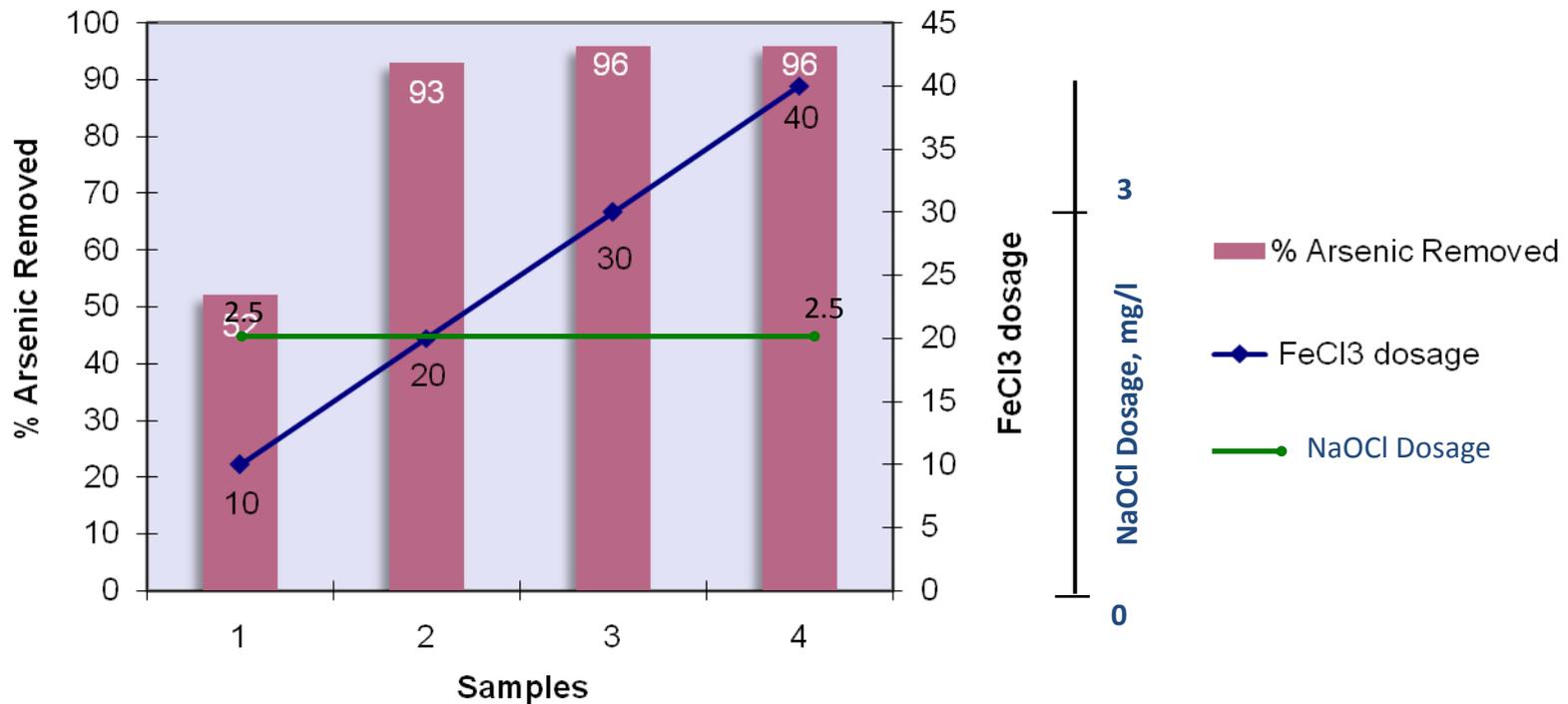
Coagulation Assisted Membrane Filtration Pilot Schematic



Chlorine Impact on Arsenic Removal



Impact of Iron Dose on Arsenic Removal

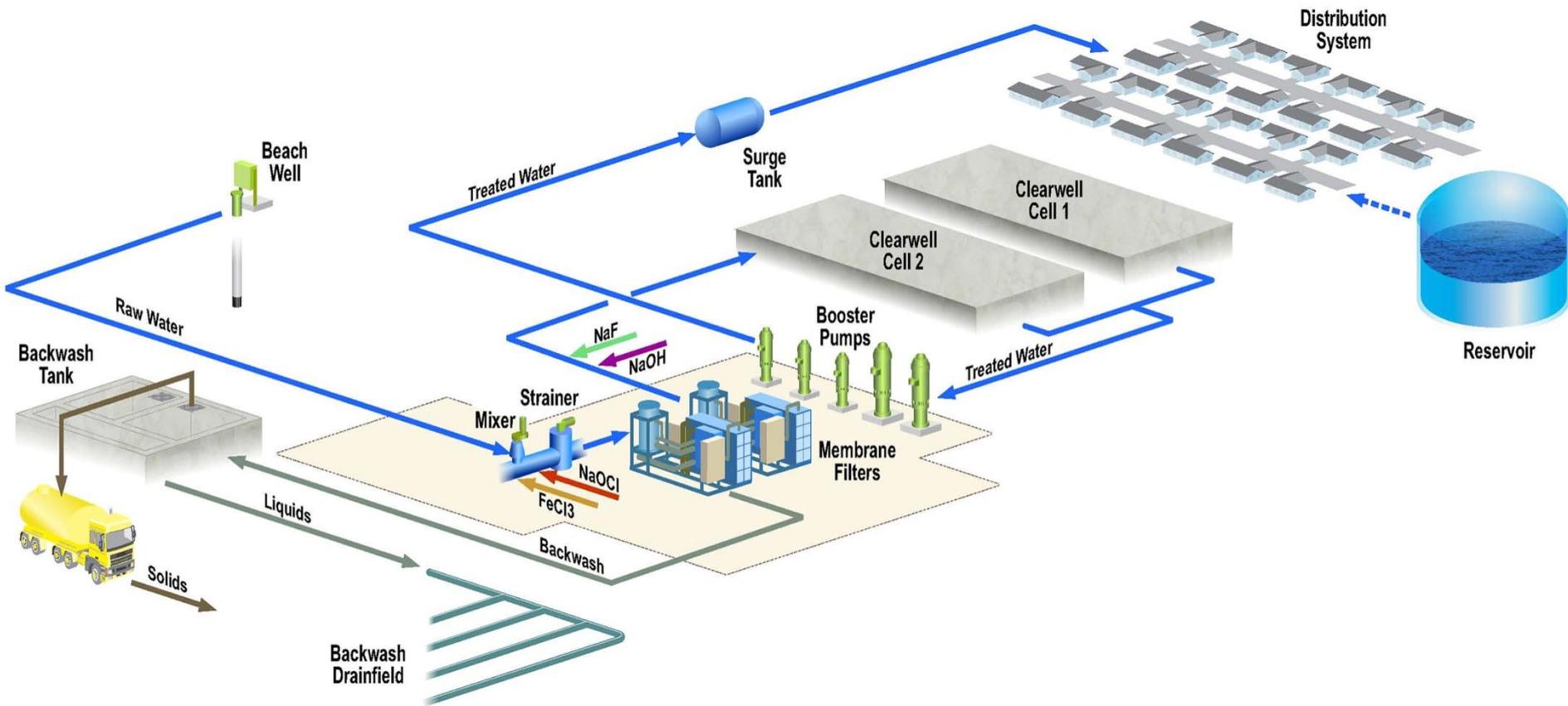


Selected Treatment Process

- 250 μm Strainer
- Onsite hypochlorite generation
- FeCl_3
- 5 min contact time
- Submerged UF membranes
 - 600 gpm initial
 - 900 gpm ultimate
- Sodium fluoride

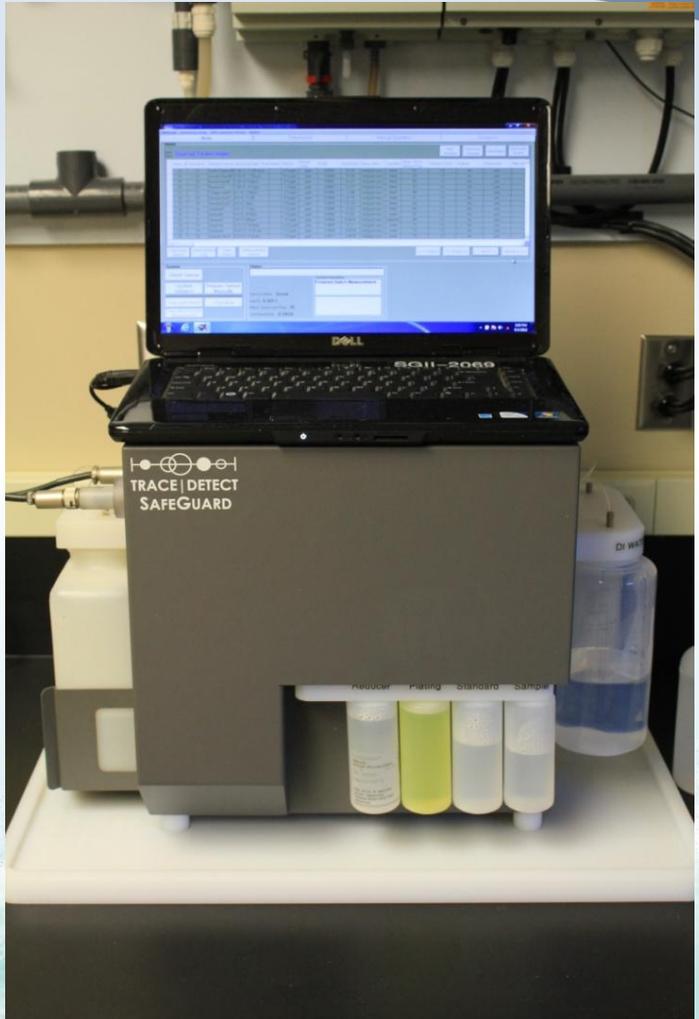


System Schematic



Treatment Performance

- **Chlorine Dose**
 - Initially 10-12 mg/l
 - Varies by well
 - Lowered over time 5 mg/l
 - 0.8-1.2 mg/l treated water
- **FeCl₃**
 - 15-18 mg/l
- **As**
 - ND to 4 µg/l
 - Trace Detect Analyzer



■ **pH**
● 7.5



1 MG Reservoir



Clearwell



Clearwell under the Tennis Courts



Goal to Blend into the Neighborhood



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Open House Celebration



Acknowledgements

- **City of Gearhart**
 - Chad Sweet
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 - Dennis McNally
- **Kennedy/Jenks**
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 - Andrew de Boer
- **Shannon & Wilson**
- **HLB/Otak**

