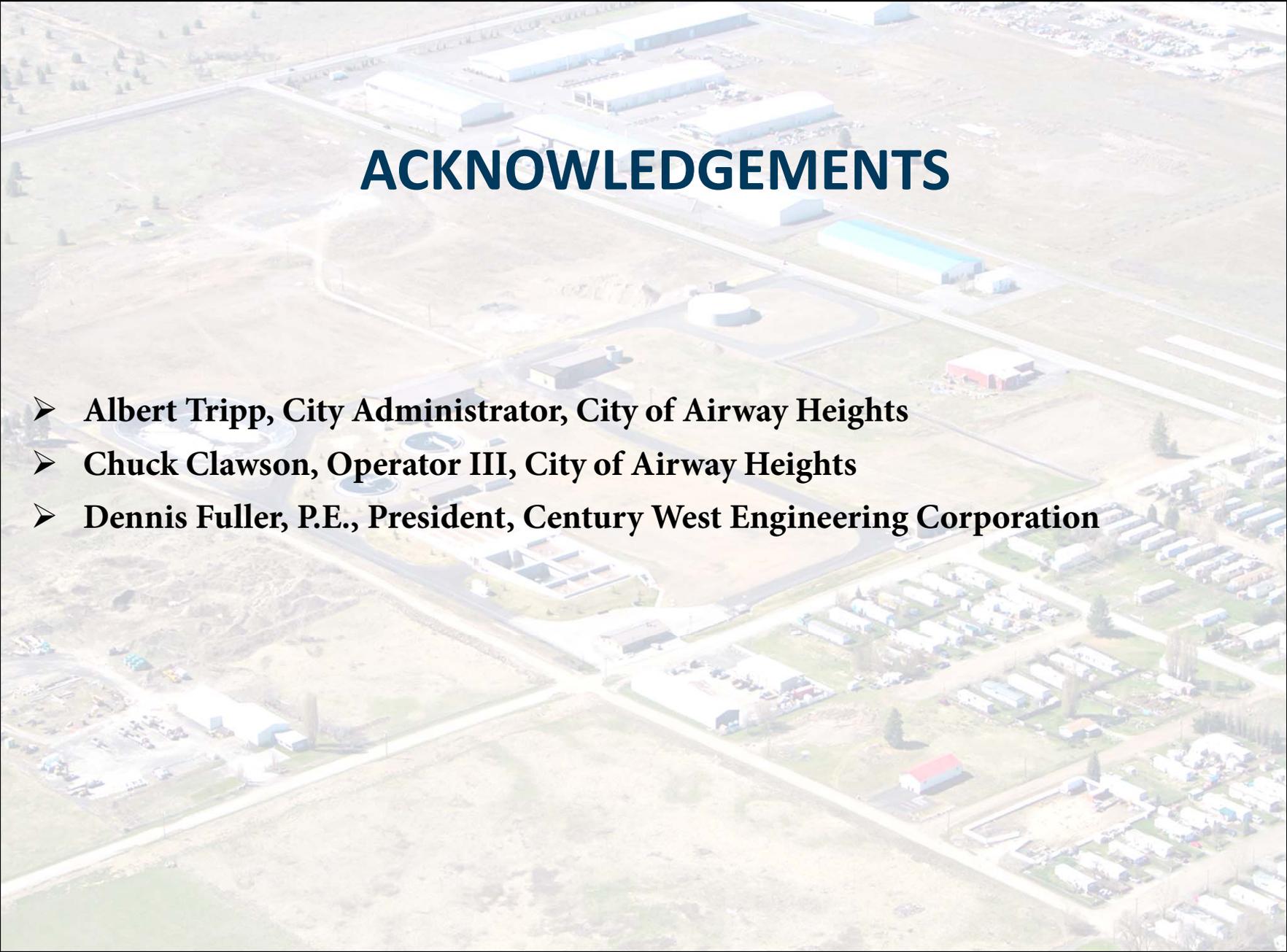


CITY OF AIRWAY HEIGHTS WATER RECLAMATION PROJECT

2014 Water Reuse Conference
Boise, Idaho



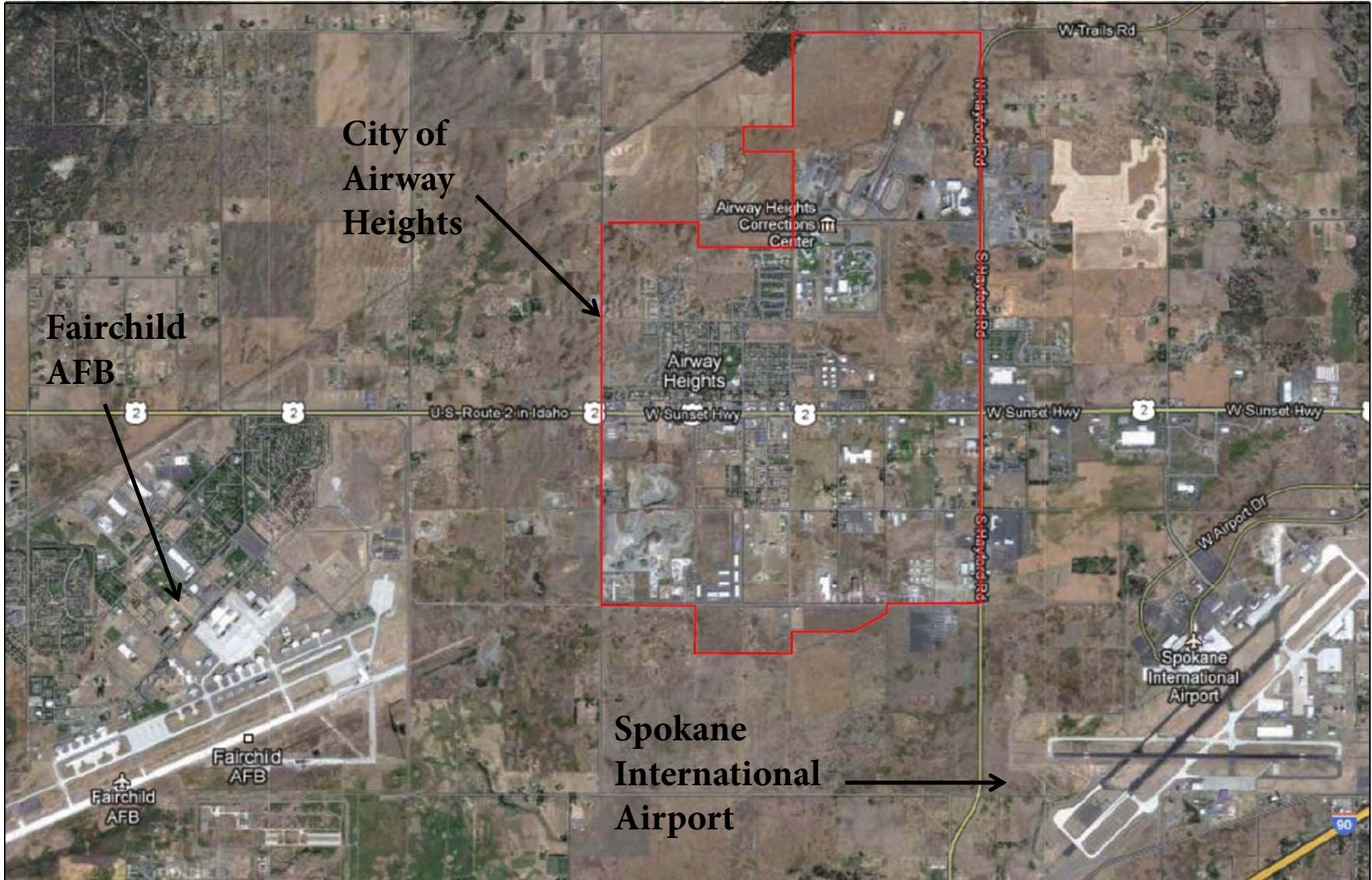
Allison Esvelt, PE, BCEE, Esvelt Environmental Engineering, LLC

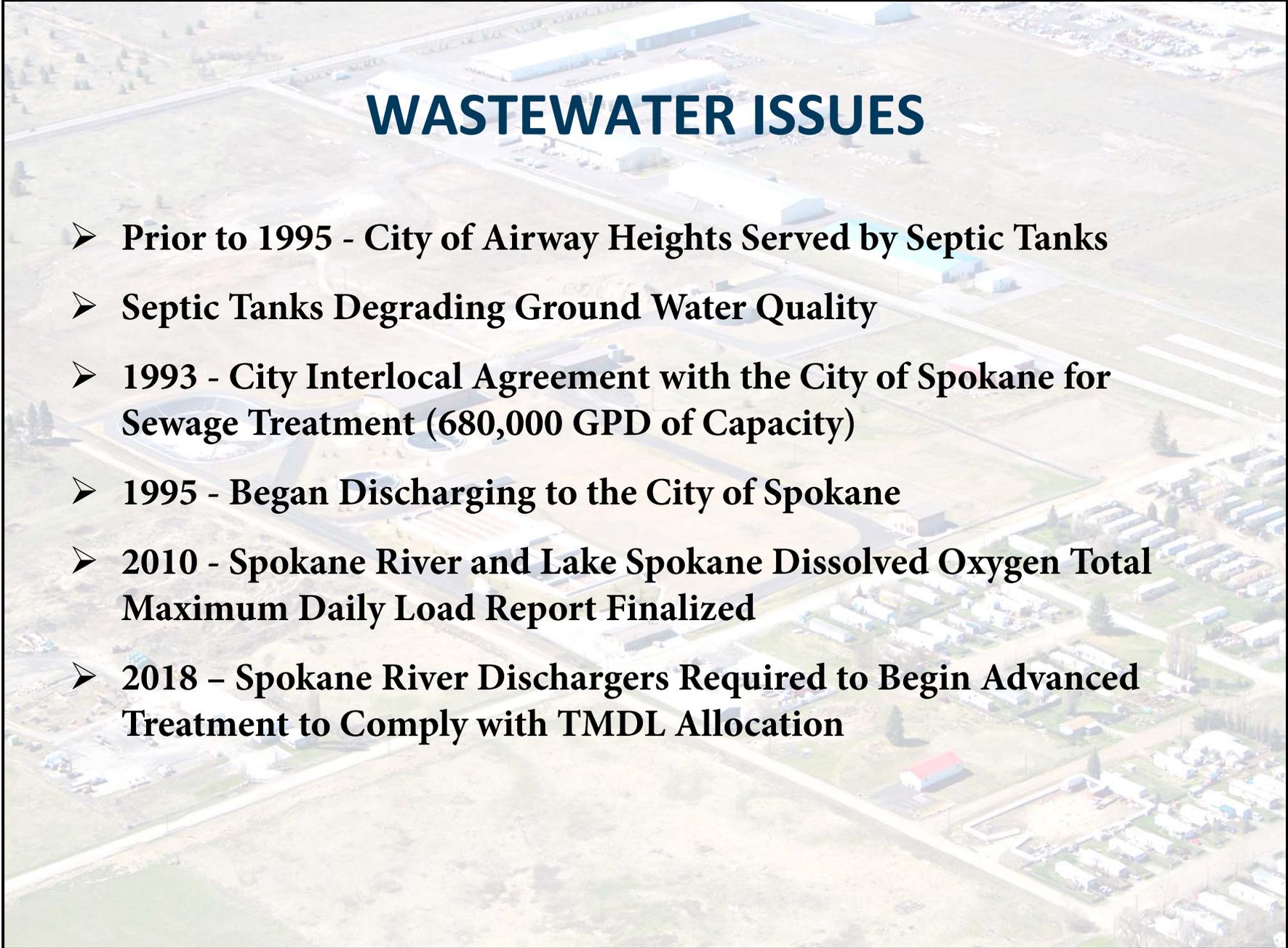


ACKNOWLEDGEMENTS

- **Albert Tripp, City Administrator, City of Airway Heights**
- **Chuck Clawson, Operator III, City of Airway Heights**
- **Dennis Fuller, P.E., President, Century West Engineering Corporation**

AREA LOCATION





WASTEWATER ISSUES

- **Prior to 1995 - City of Airway Heights Served by Septic Tanks**
- **Septic Tanks Degrading Ground Water Quality**
- **1993 - City Interlocal Agreement with the City of Spokane for Sewage Treatment (680,000 GPD of Capacity)**
- **1995 - Began Discharging to the City of Spokane**
- **2010 - Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load Report Finalized**
- **2018 - Spokane River Dischargers Required to Begin Advanced Treatment to Comply with TMDL Allocation**



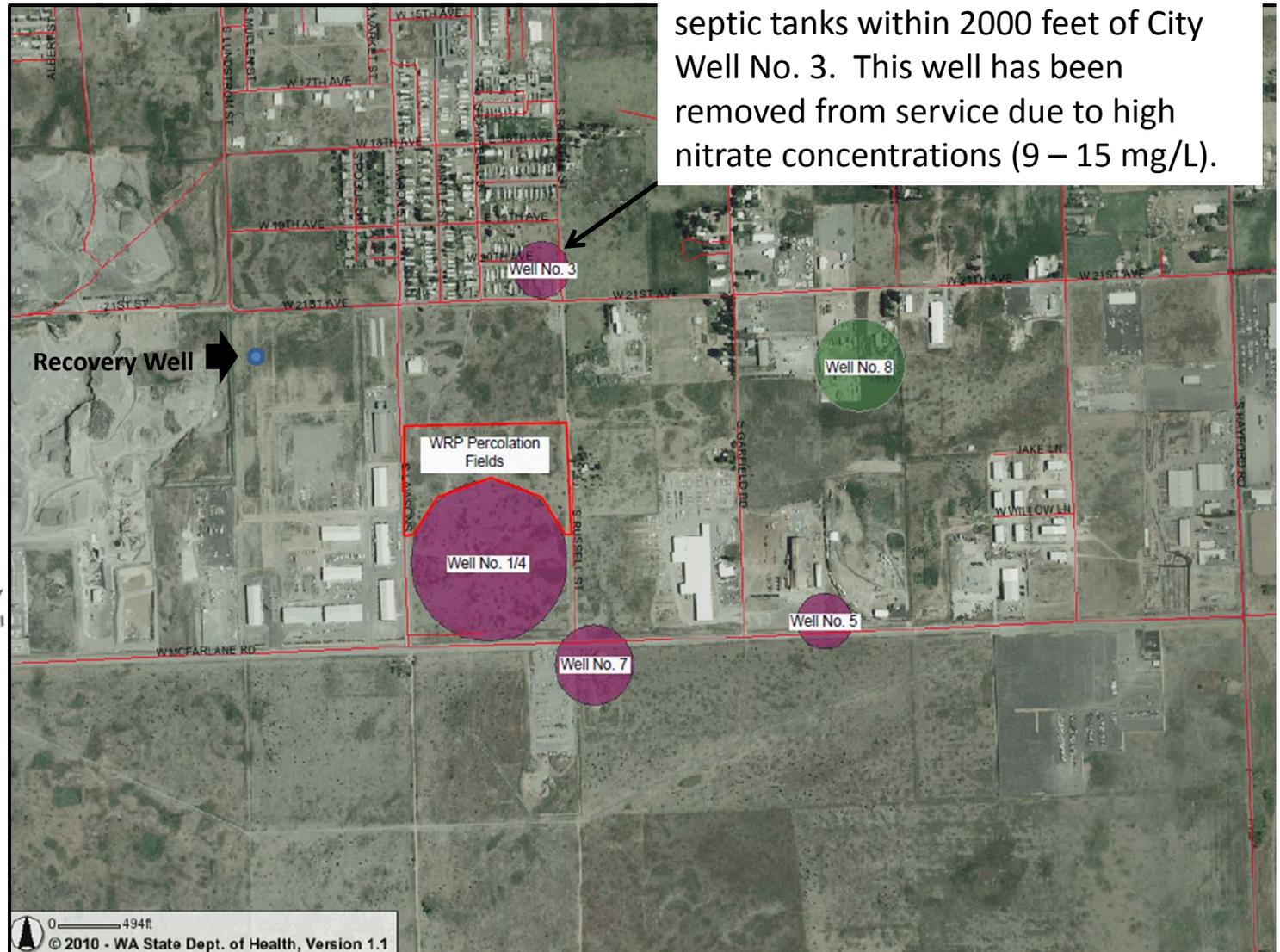
WATER SOURCE ISSUES

- **Septic Systems Contaminating Drinking Water Wells**
- **Declining Aquifer Levels**
- **Regional Source “Mining” of Aquifers**
- **Multiple Jurisdictions Withdrawing Water (Airway Heights, Medical Lake, Four Lakes, Clear Lake)**
- **Numerous Private Wells Impacted**
- **Increased Infrastructure Costs for City of Spokane Source Water**
- **Increasing Demand for Water From Regional Growth**
- **Water Leaving Basin through Wastewater Discharge to River**
- **DOE Order to Quit Pumping from Largest Producing Well by 2014**
- **No New Water Rights Being Issued**

GROUND WATER QUALITY DEGRADATION

There are approximately 100 - 200 septic tanks within 2000 feet of City Well No. 3. This well has been removed from service due to high nitrate concentrations (9 – 15 mg/L).

Wellhead Protection Areas

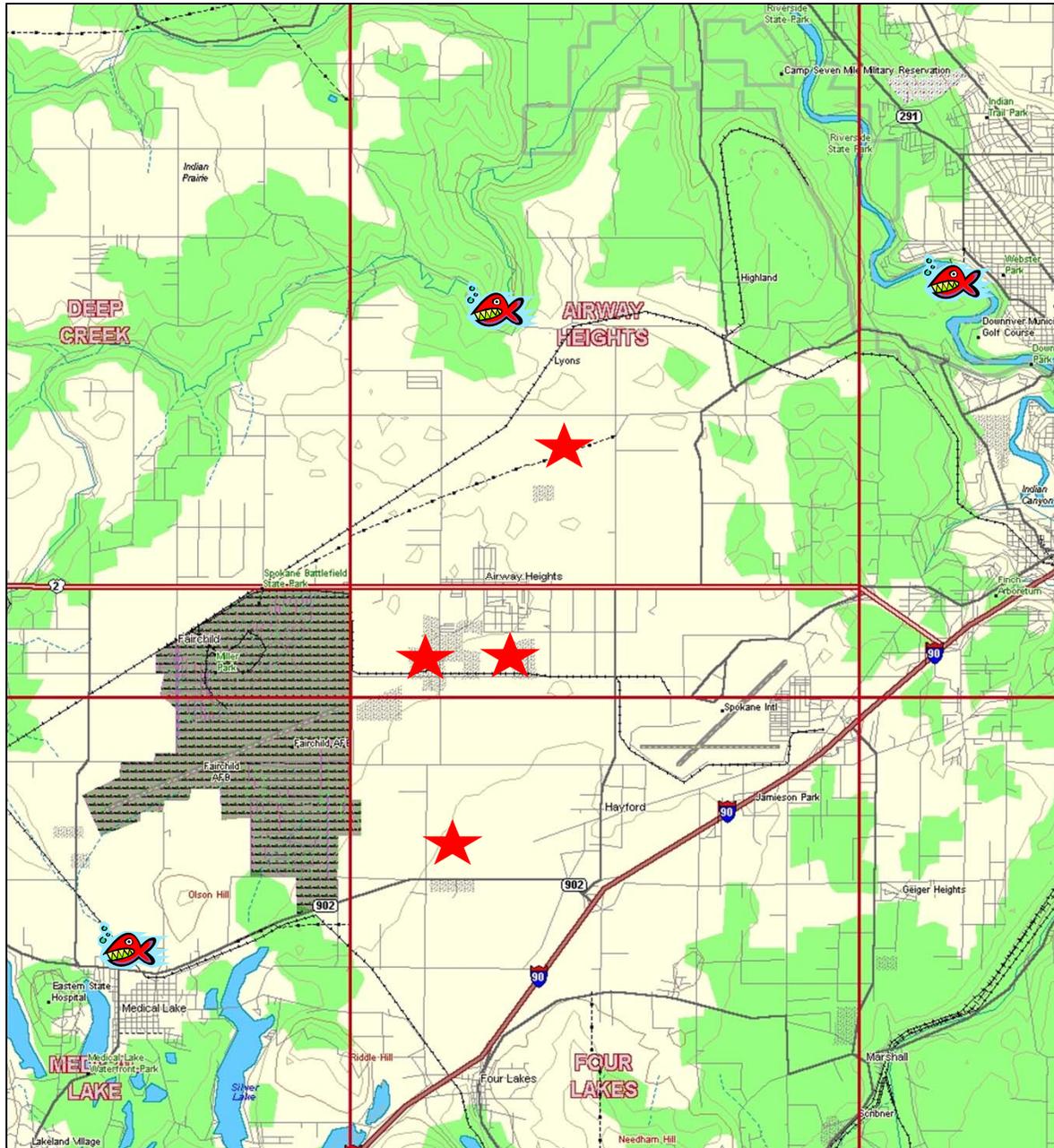




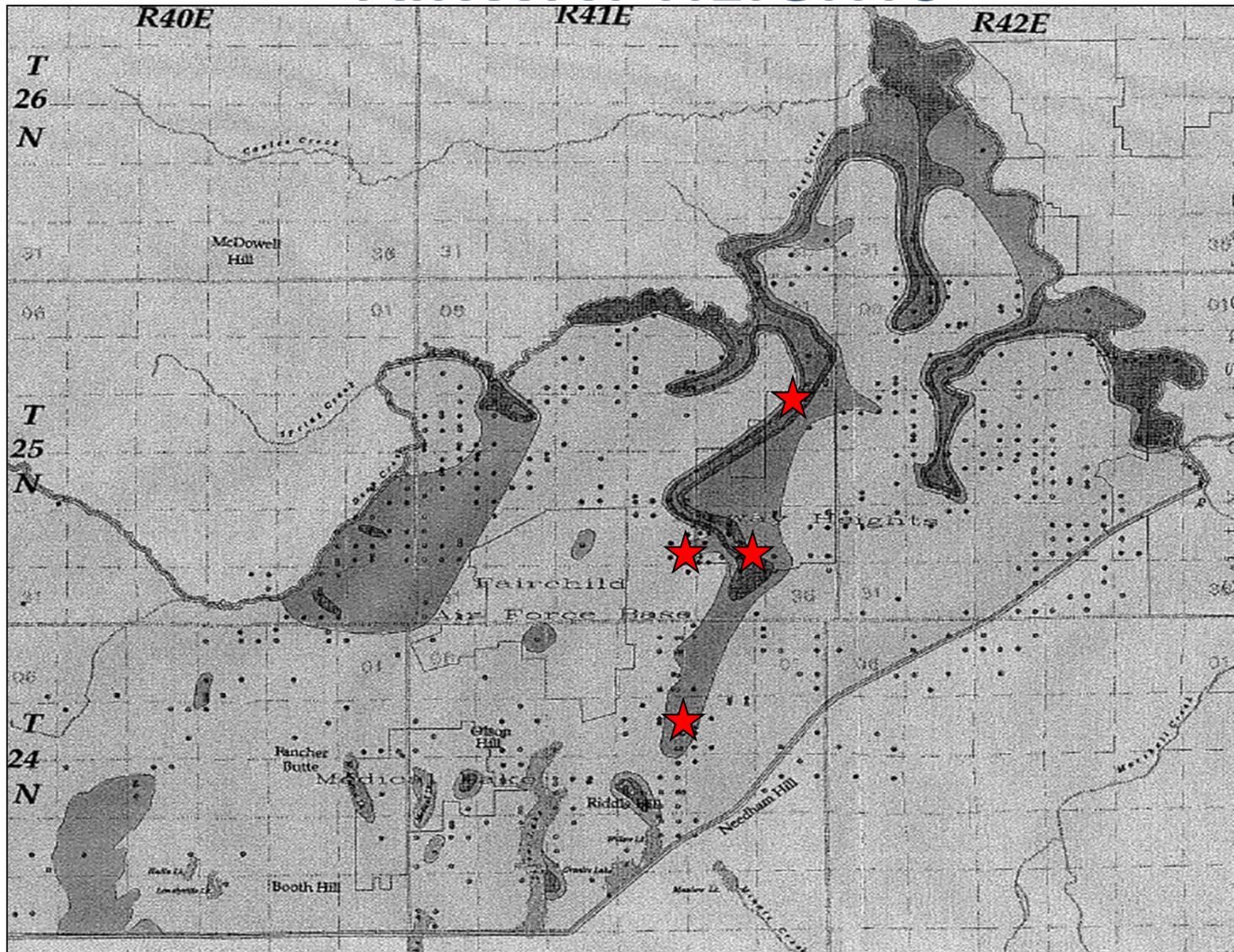
WASTEWATER TREATMENT ALTERNATIVES

- **Continued Discharge to the City of Spokane Treatment System**
 - Increasing Cost due to Spokane River TMDL
 - No Reclaimed Water Source
- **Transmission to an Expanded City of Medical Lake Wastewater Treatment and Reuse Facility and Return Reclaimed Water**
 - Higher Cost Due to Transmission and Treatment System Expansion
 - Reclaimed Water Source
- **Construction of a New Wastewater Treatment Plant with Discharge to Deep Creek (a tributary to Spokane River)**
 - Higher Cost due to Spokane River TMDL
 - No Reclaimed Water Source
- **Construction of a New Water Reclamation Plant with Ground Water Recharge**
 - High Cost
 - Reclaimed Water Source

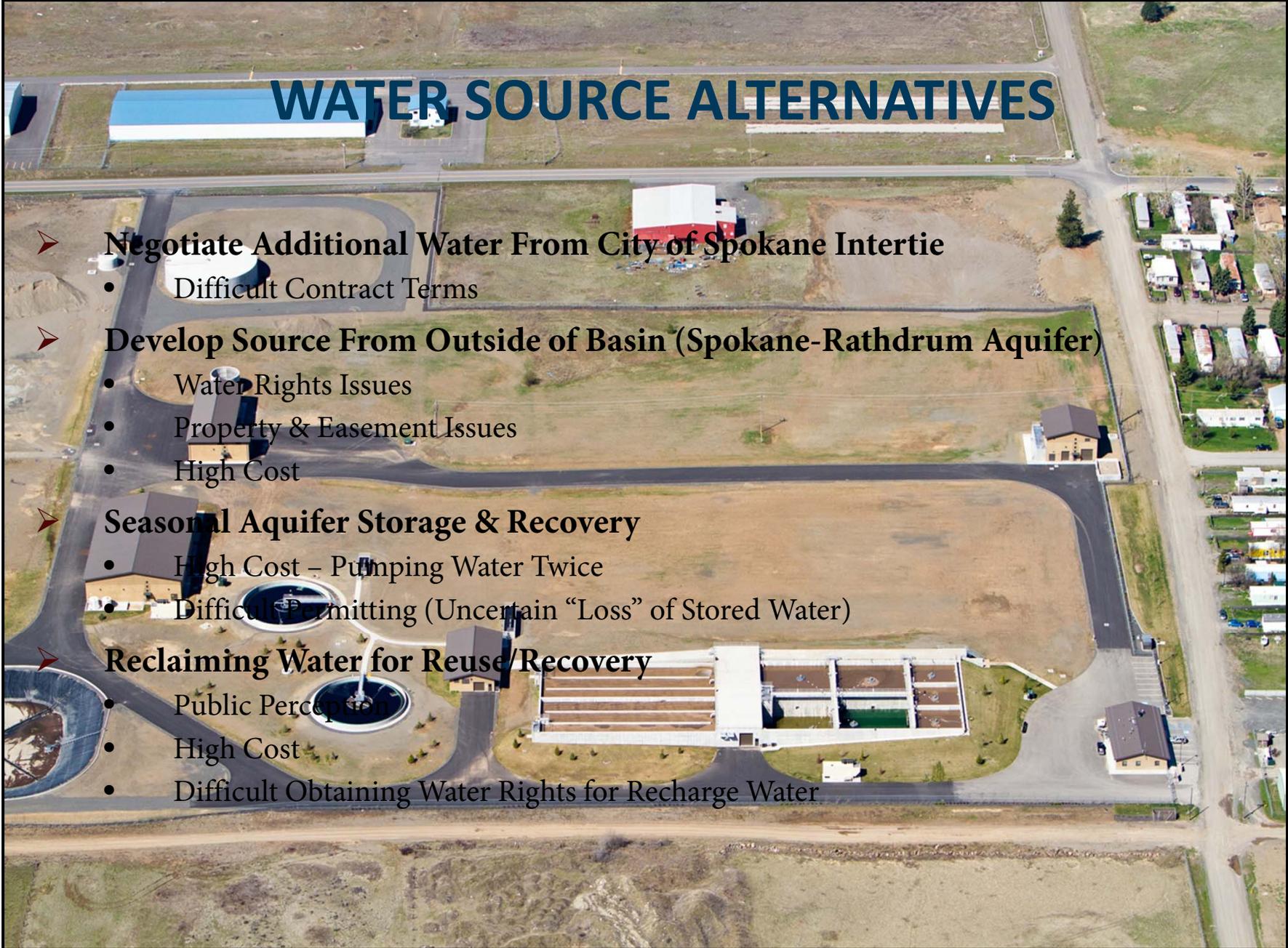
LOCATION OF ALTERNATIVES



PALEOCHANNELS IN THE VICINITY OF AIRWAY HEIGHTS



Source: Deobald and Buchanan, *Hydrogeology of the West Plains Area of Spokane County, Washington*, May 1995.



WATER SOURCE ALTERNATIVES

- **Negotiate Additional Water From City of Spokane Intertie**
 - Difficult Contract Terms
- **Develop Source From Outside of Basin (Spokane-Rathdrum Aquifer)**
 - Water Rights Issues
 - Property & Easement Issues
 - High Cost
- **Seasonal Aquifer Storage & Recovery**
 - High Cost – Pumping Water Twice
 - Difficult Permitting (Uncertain “Loss” of Stored Water)
- **Reclaiming Water for Reuse/Recovery**
 - Public Perception
 - High Cost
 - Difficult Obtaining Water Rights for Recharge Water



ALTERNATIVE SELECTION

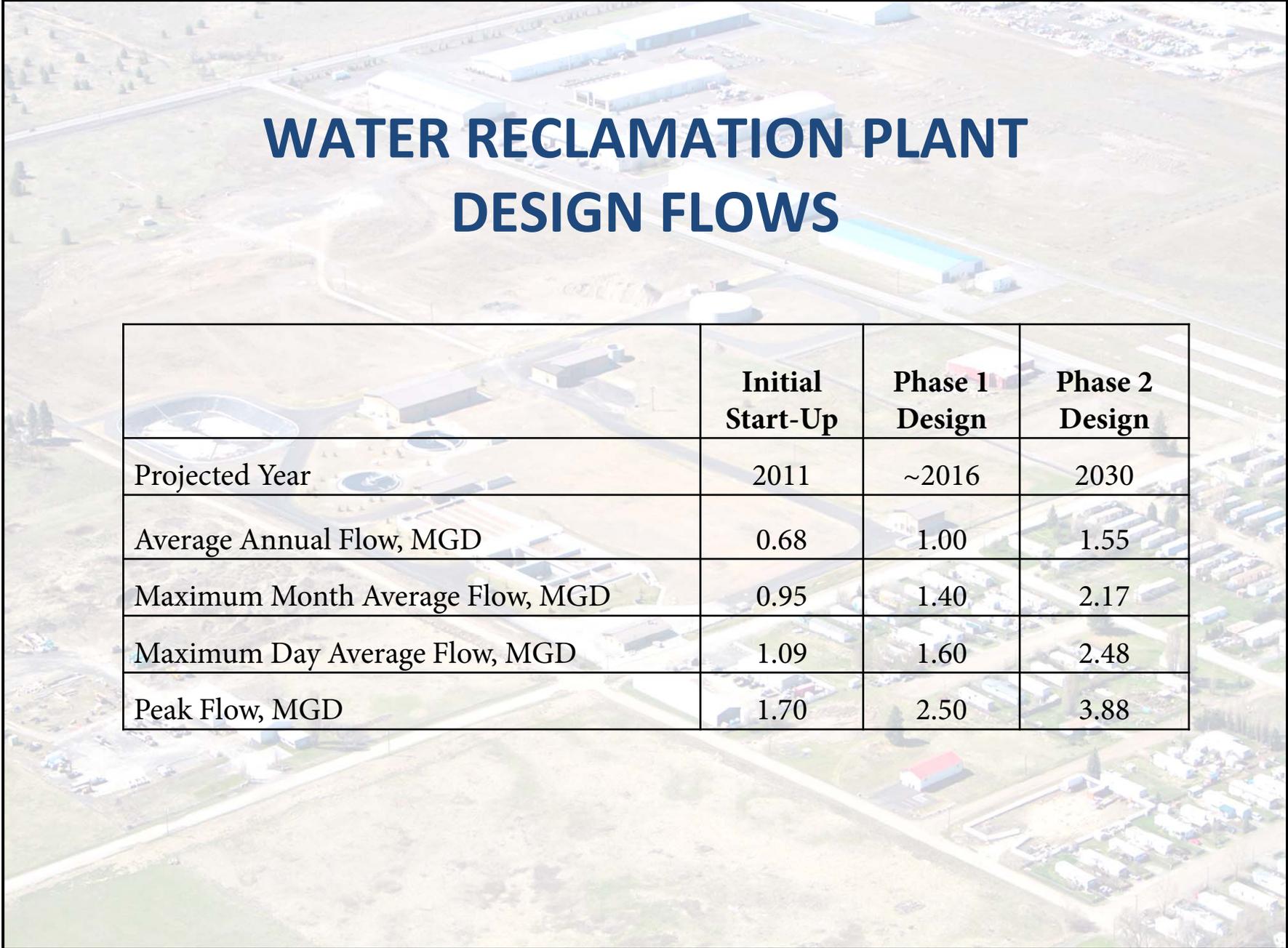
Reclaiming Water for Reuse & Recovery

- Resolved Issues for Both Sewer & Water
- Provided City with Utility Independence
- Provides Opportunity to Eliminate Septic Systems
- Keeps Water in the West Plains
- Provides for Future Growth
- Removed Discharge from Spokane River (EPA 303D Listed Impaired Water)
- Helps Improve Water Quality in Spokane River
- Improves Local Ground Water Quality
- Class "A" Reclaimed Water plus Recharged Water for New Water Source
- Full Systems Redundancy for Protecting Public Health

NEW WATER RECLAMATION PLANT

- **Lift Station and Force Main to Plant**
- **Headworks with Fine Screening, Grit Removal, Odor Control**
- **Short-Term Storage Lagoon**
- **Extended Aeration Activated Sludge System**
- **Biological Nutrient Removal**
- **Secondary Clarifiers**
- **Pressure Membrane Filtration**
- **Ultraviolet Disinfection**
- **Reclaimed Water Storage Reservoir (1 MG)**
- **Reclaimed Water Pump Station**
- **Reuse Distribution Backbone**
- **Subsurface Percolation for Aquifer Recharge**
- **Biosolids Dewatering for Off-Site Composting**





WATER RECLAMATION PLANT DESIGN FLOWS

	Initial Start-Up	Phase 1 Design	Phase 2 Design
Projected Year	2011	~2016	2030
Average Annual Flow, MGD	0.68	1.00	1.55
Maximum Month Average Flow, MGD	0.95	1.40	2.17
Maximum Day Average Flow, MGD	1.09	1.60	2.48
Peak Flow, MGD	1.70	2.50	3.88

WATER RECLAMATION PLANT LAYOUT



MEMBRANE FILTRATION SYSTEM

- Pressurized in Modules
- Siemens Water Technologies Memcor CP120 L20V Modules
- Each module has 7,400 hollow fiber membranes
- Nominal pore size of 0.04 μm



PERCOLATION BASINS

- Four (4) basins at ~2.5 acres each for 10 acres total
- Fed by dosing tank to maintain pressure for distribution



Aerial Taken 2-21-10

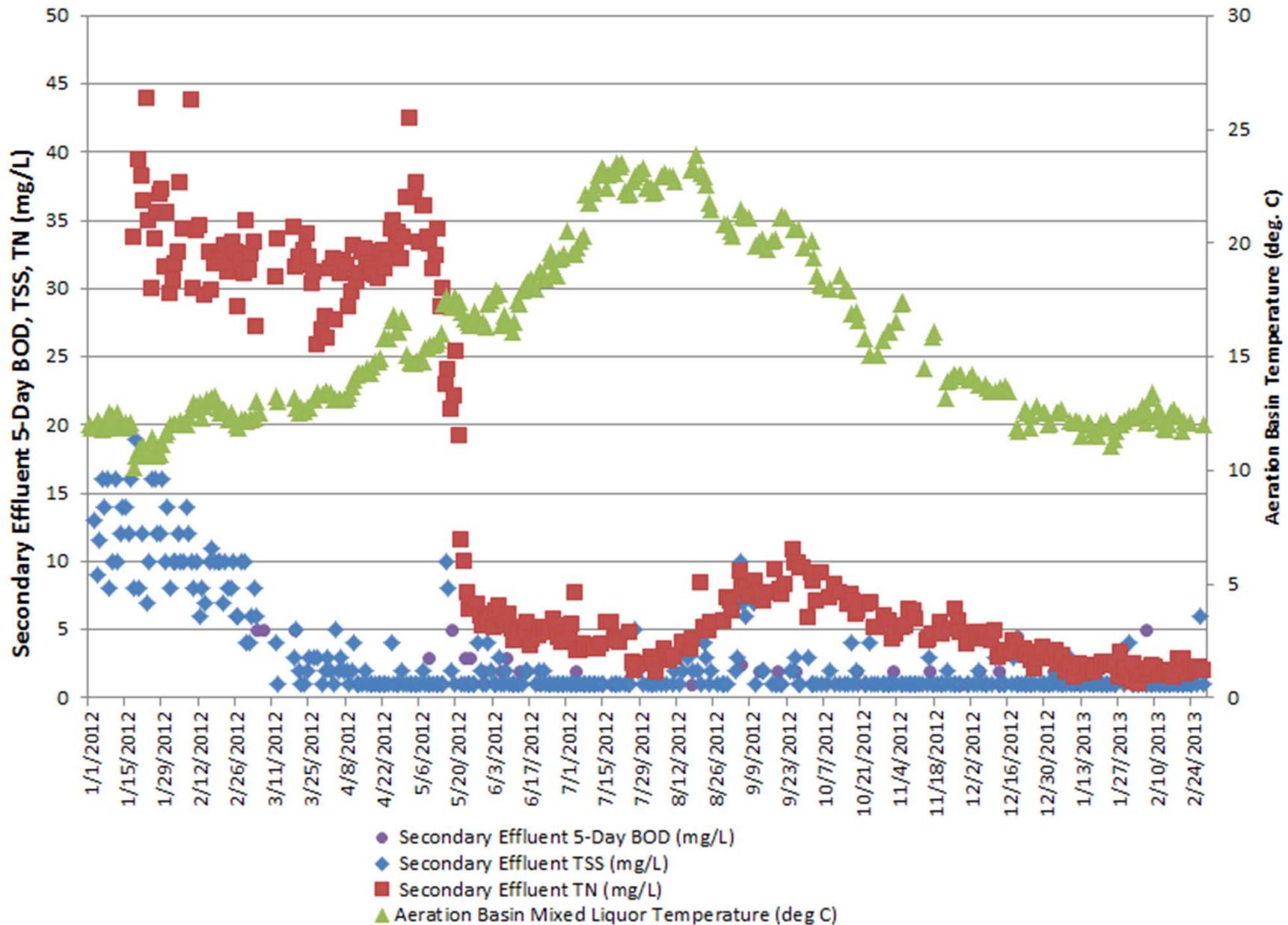


Photo Taken 1-21-10

EFFLUENT WATER QUALITY PERMIT LIMITS

Table R1. Water Quality Limits					
Point of Compliance	Parameter (units) ^a	Average Monthly ^b	Average Weekly ^b	Sample Maximum	
Secondary Clarifier Effluent	BOD ₅ (mg/L)	20	30	***	
	TSS (mg/L)	20	30	***	
	Dissolved Oxygen (mg/L)	Sample Minimum: 0.2			
Filter Effluent Prior to Disinfection	Turbidity (NTU)	0.2	***	0.5	
After Disinfection	Total Nitrogen, as N (mg/L)	10	***	15	
	Total Coliform ^c (MPN per 100 mL)	***	7-Day Median: 2.2 ^d	23	
	pH (standard units)	Minimum		Maximum	
		6.0		9.0	
Table R1. Water Quality Limits					
Point of Compliance	Parameter (units) ^a	Average Monthly ^b	Average Weekly ^b	Sample Maximum	
Reclaimed Water Distribution ^e	Chlorine Residual (mg/L)	Minimum			
		0.5			

Secondary Effluent Water Quality



MONITORING WELLS



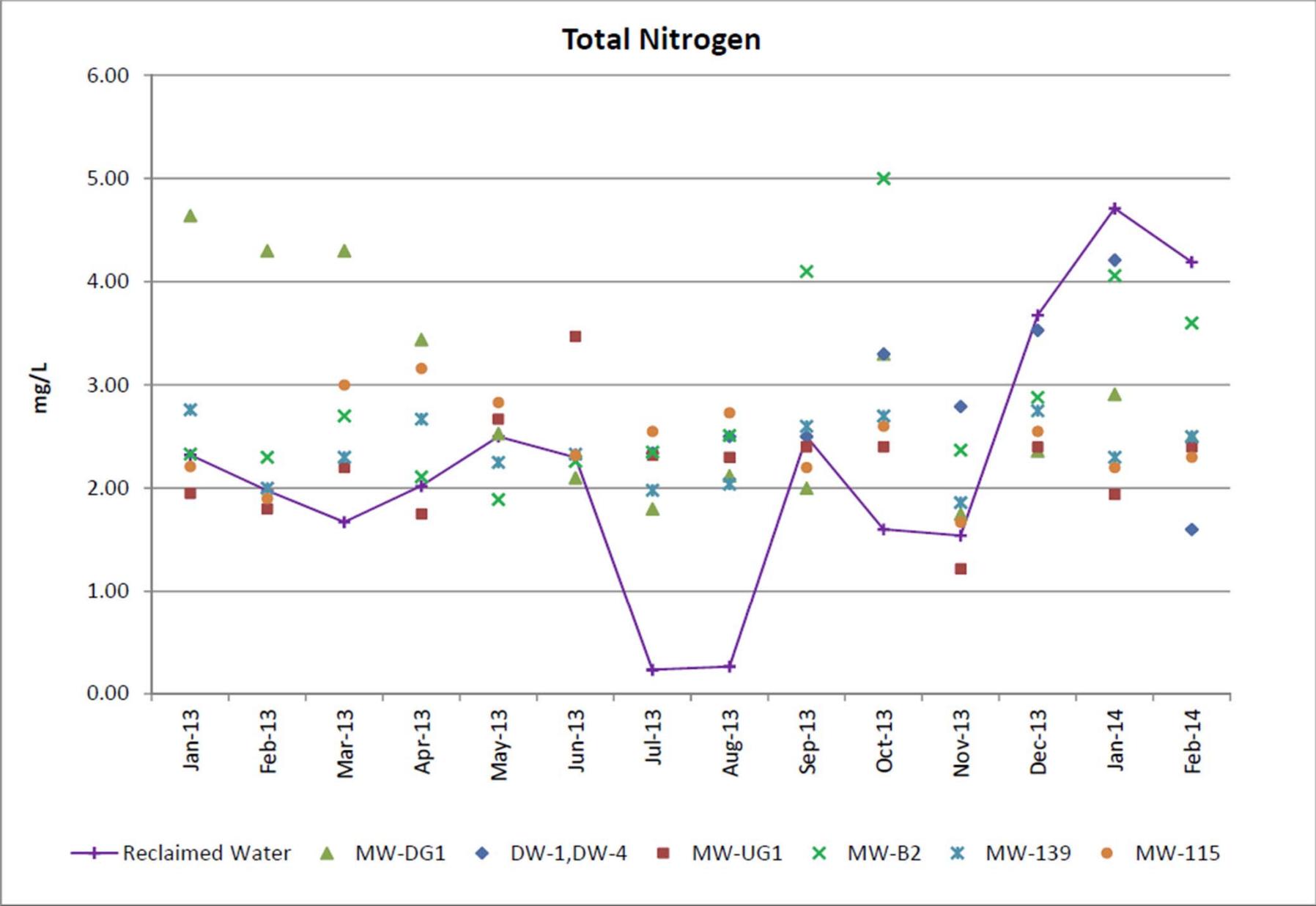
MONTHLY SAMPLING

- Depth
- pH
- Chemical Oxygen Demand
- Conductivity
- Total Kjeldahl Nitrogen
- Nitrite-Nitrogen
- Nitrate-Nitrogen
- Total Nitrogen
- Total Dissolved Solids
- Total Coliform
- Chloride

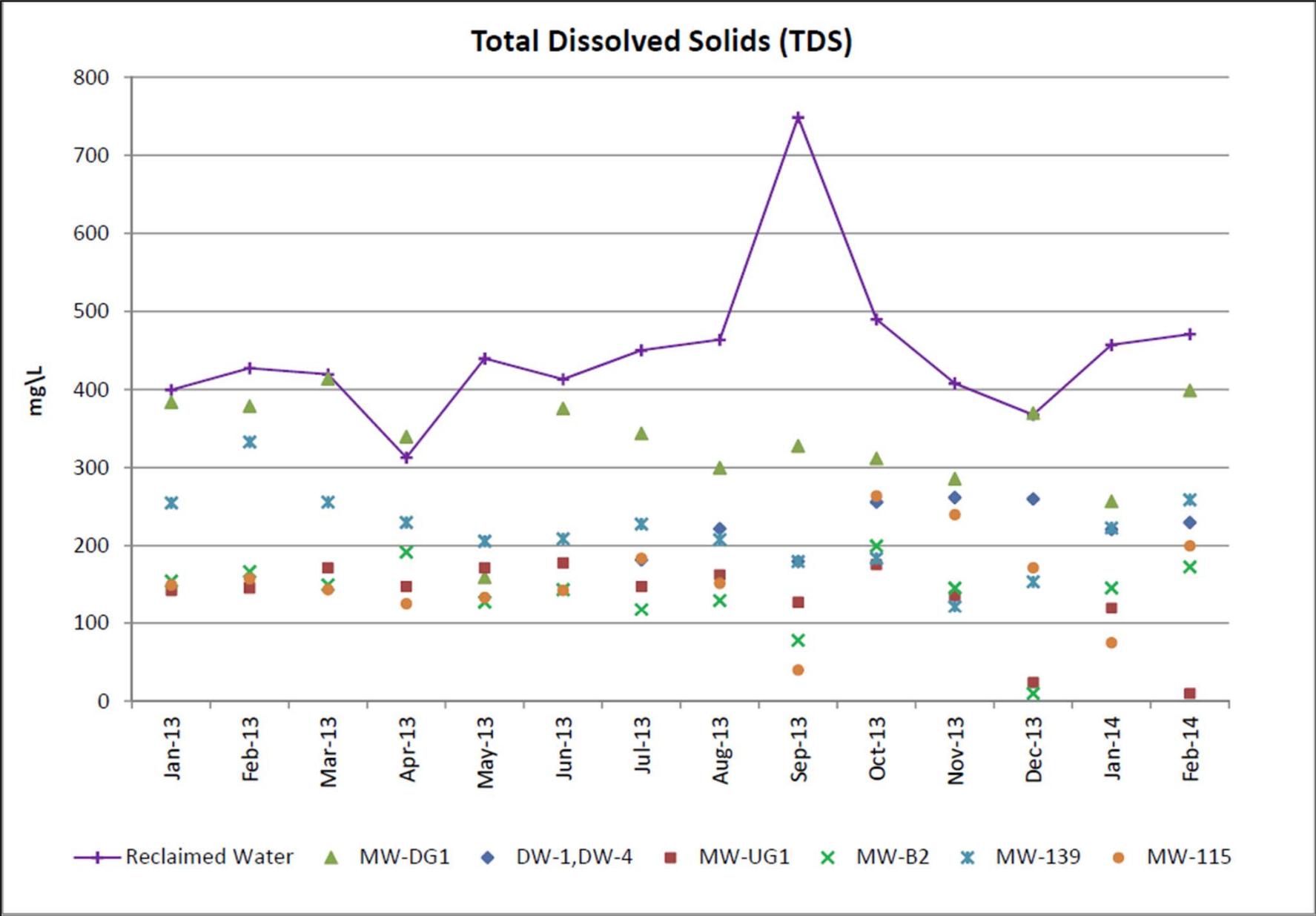
QUARTERLY SAMPLING

- Arsenic
- Heptachlor
- Bis(2-Ethylhexyl) Phthalate
- Dichlorobromomethane

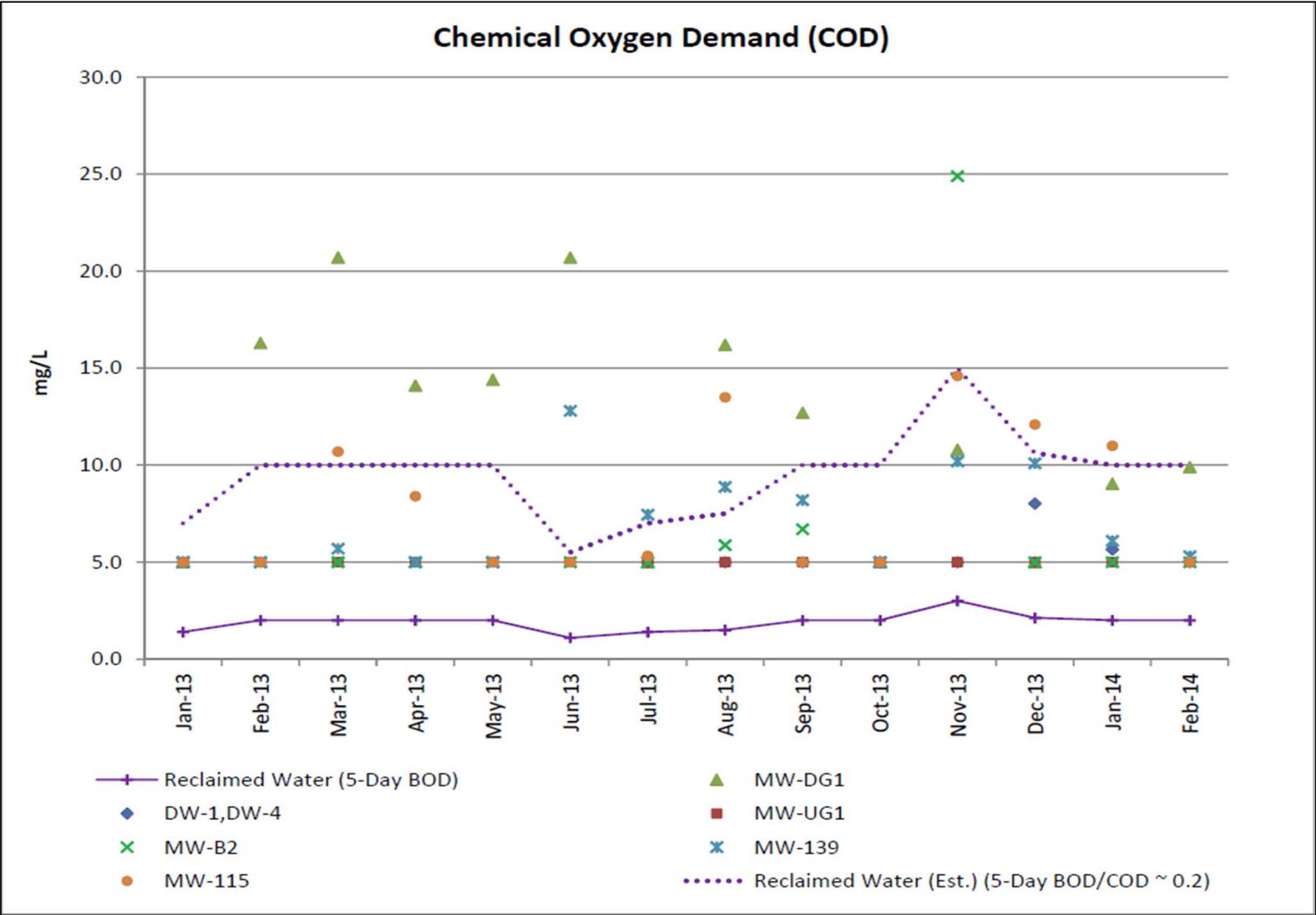
GROUND WATER QUALITY



GROUND WATER QUALITY



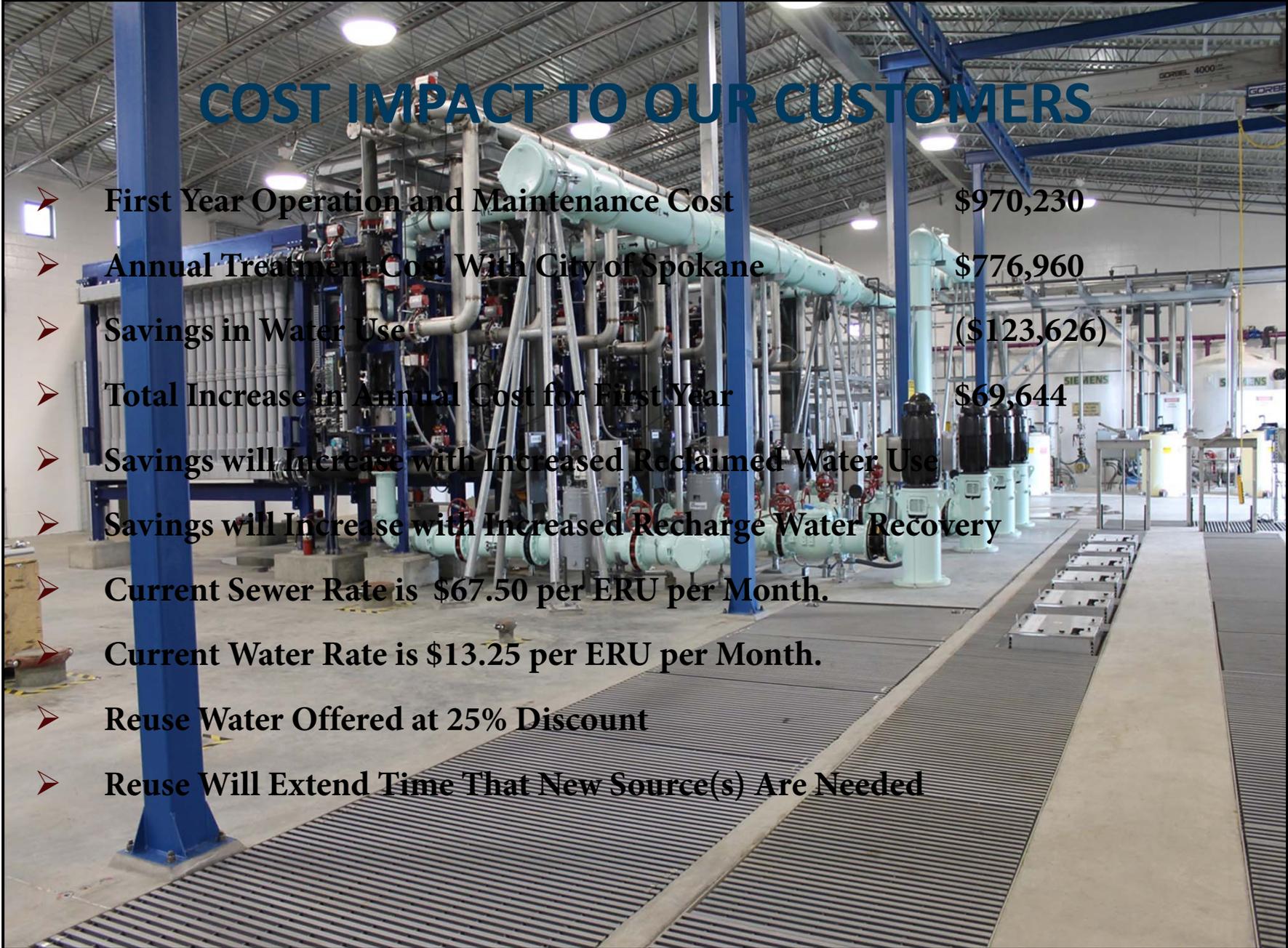
GROUND WATER QUALITY



COSTS AND FUNDING

Capital Costs in Millions:

- **Design - \$2.07 million total**
 - \$1.0 M - PWTF
 - \$1.074 M - SRF Loan
- **Construction - \$40.86 million total**
 - \$7.0 M - Public Works Trust Fund (PWTF)
 - \$2.92 M - Centennial Clean Water Fund Grant
 - \$0.17 M - State Revolving Fund (SRF) Loan
 - \$3.35 M - Rural Development
 - \$22.97 M - ARRA Forgivable Principle and Loans
 - \$1.0 M - Legislative Appropriation
 - \$1.87 M - City Capital Fund
 - \$1.58 M - Tribal
- **\$28.47 M - (66% of total cost) in Non-Loan Funding**
- **\$14.46 M - (34% of total cost) In Borrowed Money**



COST IMPACT TO OUR CUSTOMERS

- **First Year Operation and Maintenance Cost** **\$970,230**
- **Annual Treatment Cost With City of Spokane** **\$776,960**
- **Savings in Water Use** **(\$123,626)**
- **Total Increase in Annual Cost for First Year** **\$69,644**
- **Savings will Increase with Increased Reclaimed Water Use**
- **Savings will Increase with Increased Recharge Water Recovery**
- **Current Sewer Rate is \$67.50 per ERU per Month.**
- **Current Water Rate is \$13.25 per ERU per Month.**
- **Reuse Water Offered at 25% Discount**
- **Reuse Will Extend Time That New Source(s) Are Needed**

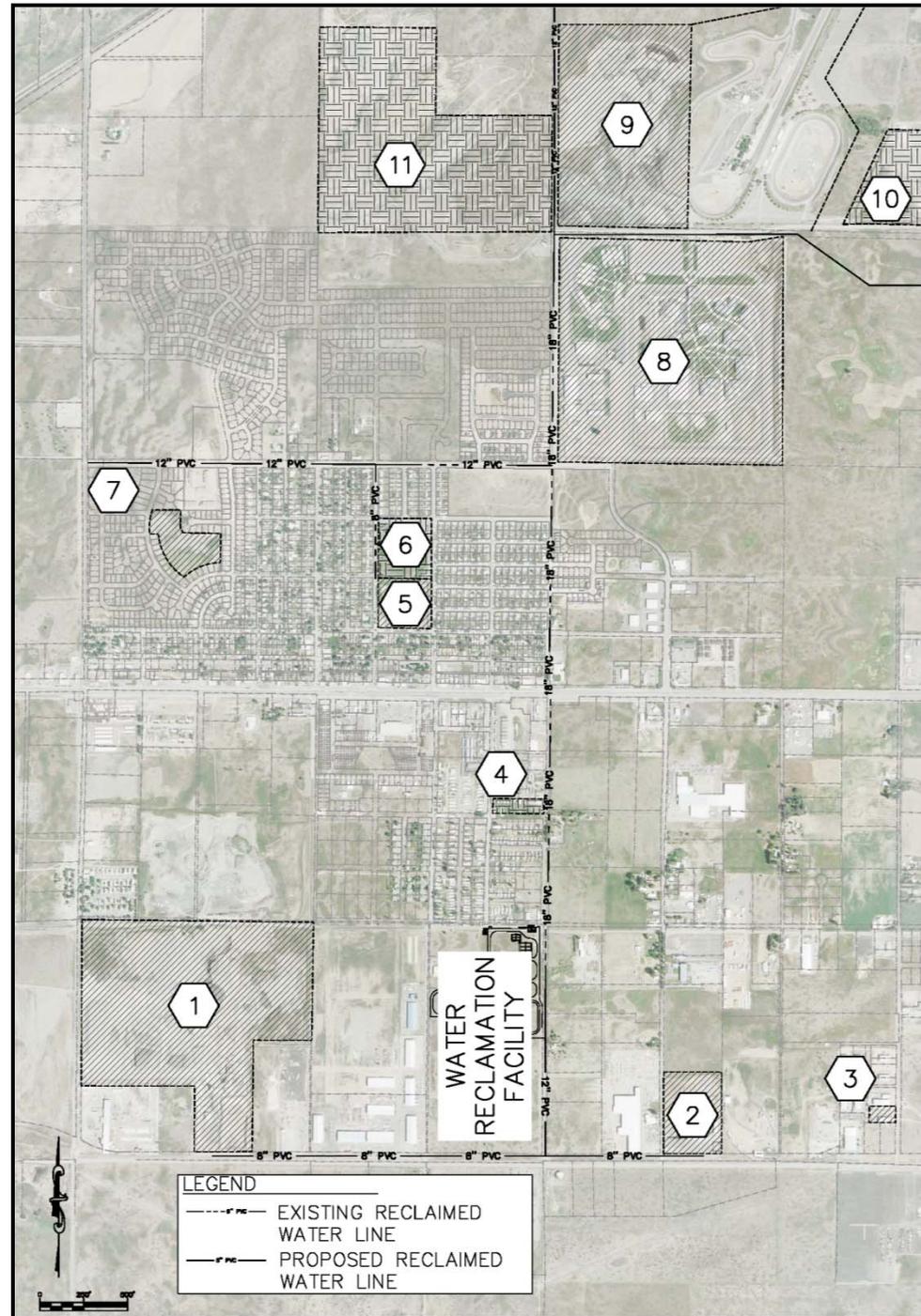
REUSE AND POTENTIAL REUSE CUSTOMER MAP

Current Reuse Customers

- 4 Shorty Combs Park
- 6 Sunset Park
- 10 Kalispel Tribal Development
- 11 Spokane County Off-Road Vehicle Park

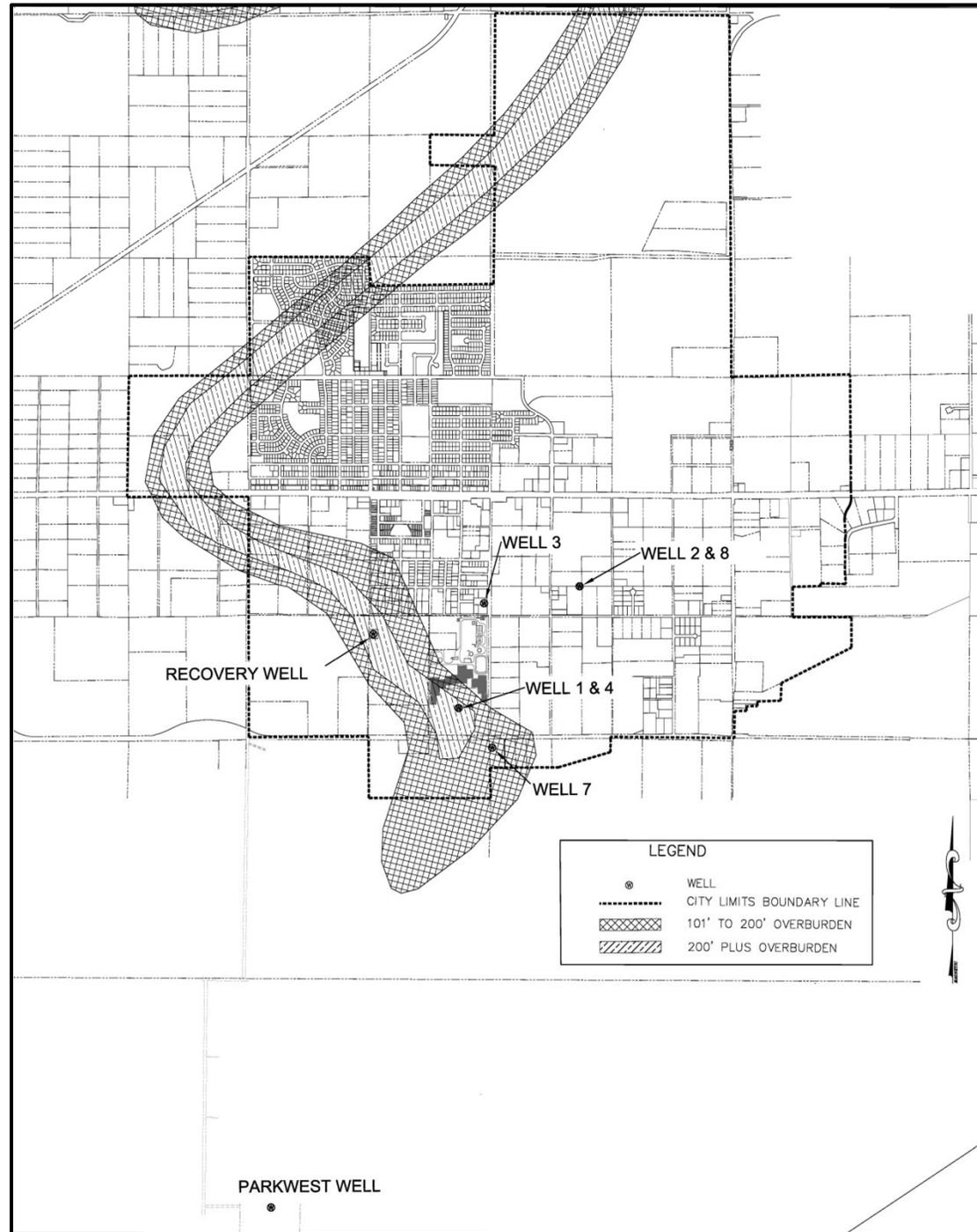
Future Reuse Customers

- 1 Spokane Rock Products
- 2 Spokane Galvanizing Co.
- 3 BMT Metal Fab.
- 5 Sunset School
- 7 Aspen Grove Park
- 8 Department of Corrections
- 9 Inland Asphalt

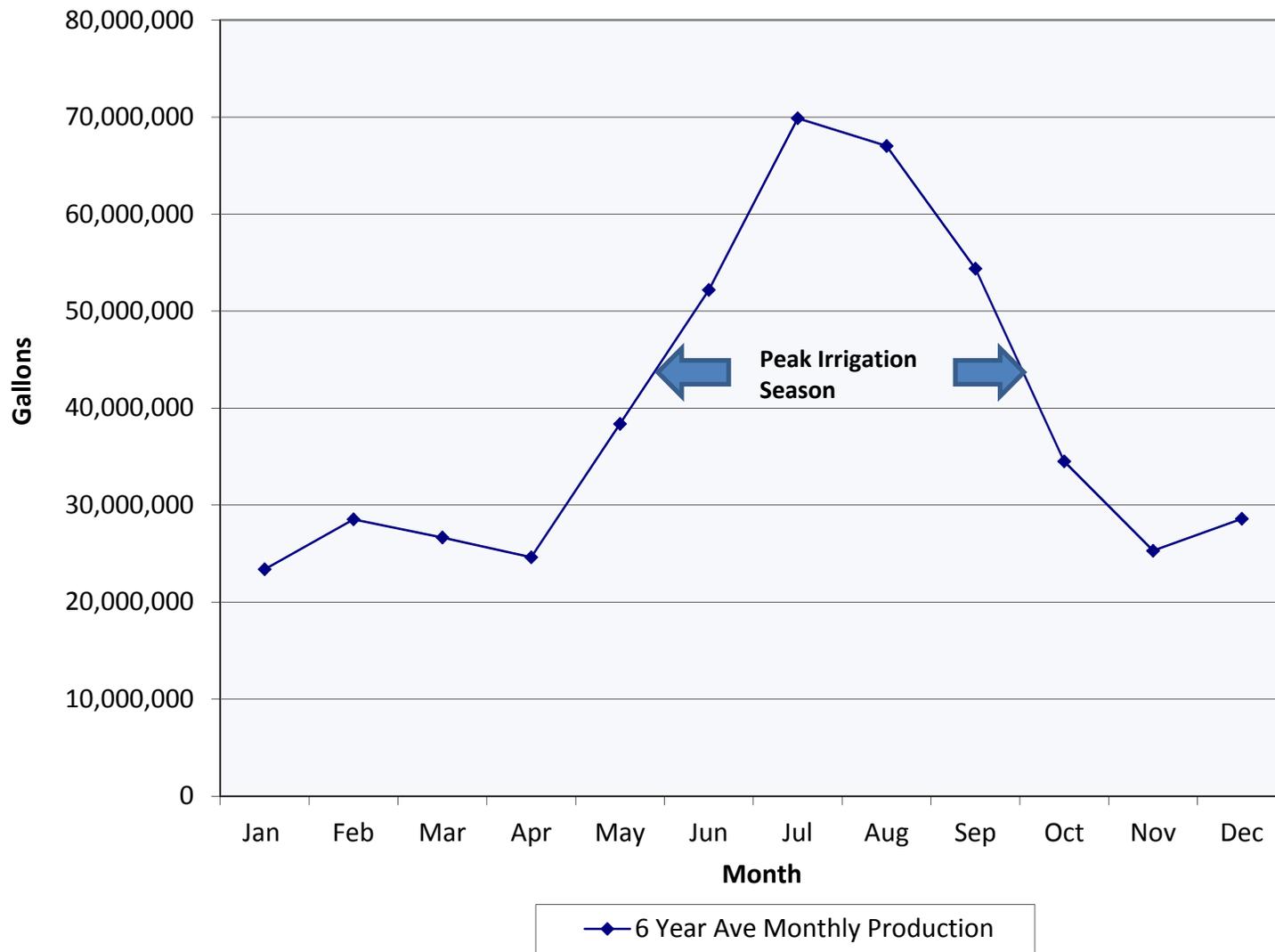


CITY OF AIRWAY HEIGHTS

Paleochannel & Well Map 2014

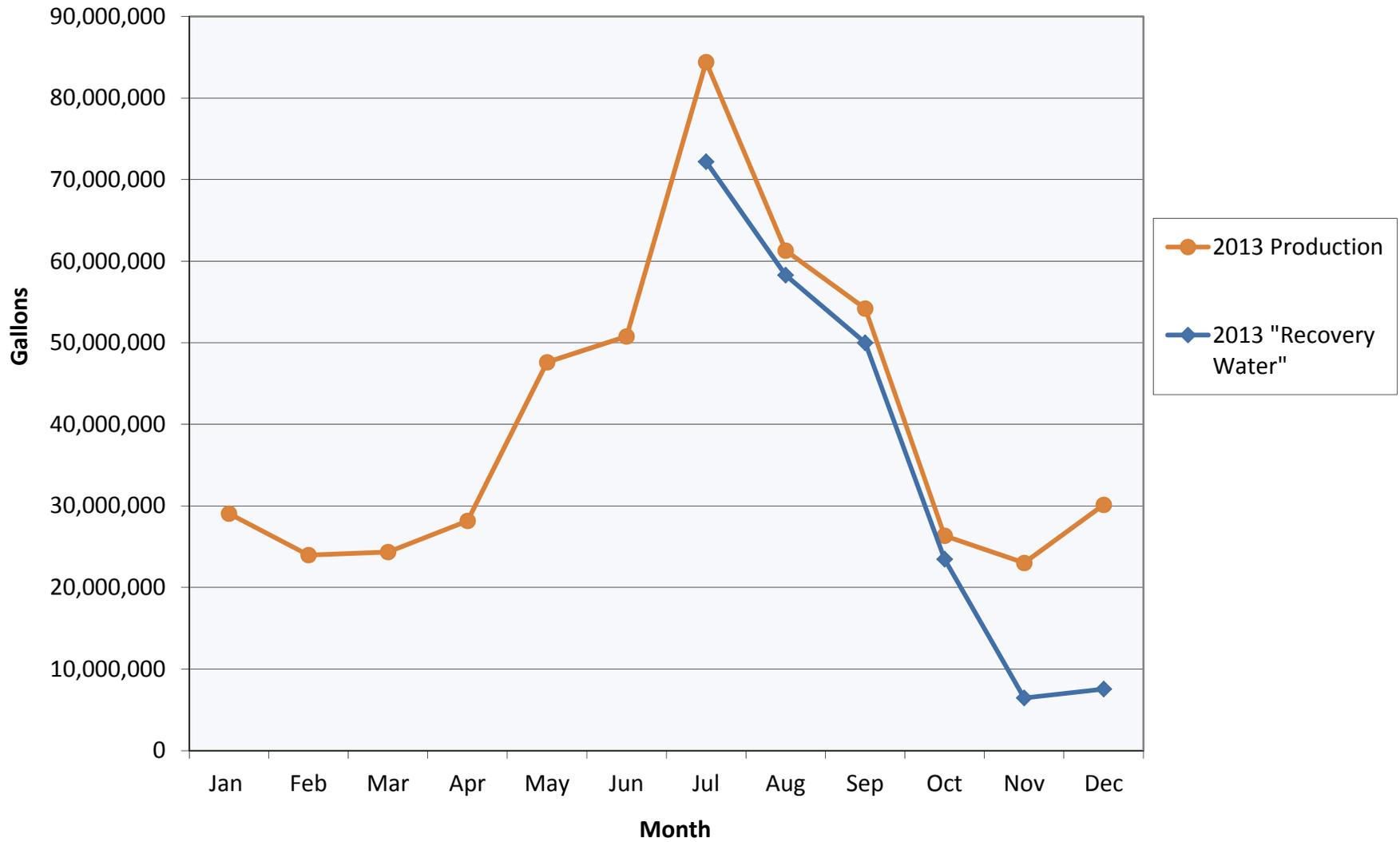


CITY OF AIRWAY HEIGHTS - Monthly Water Production 2008 thru 2013

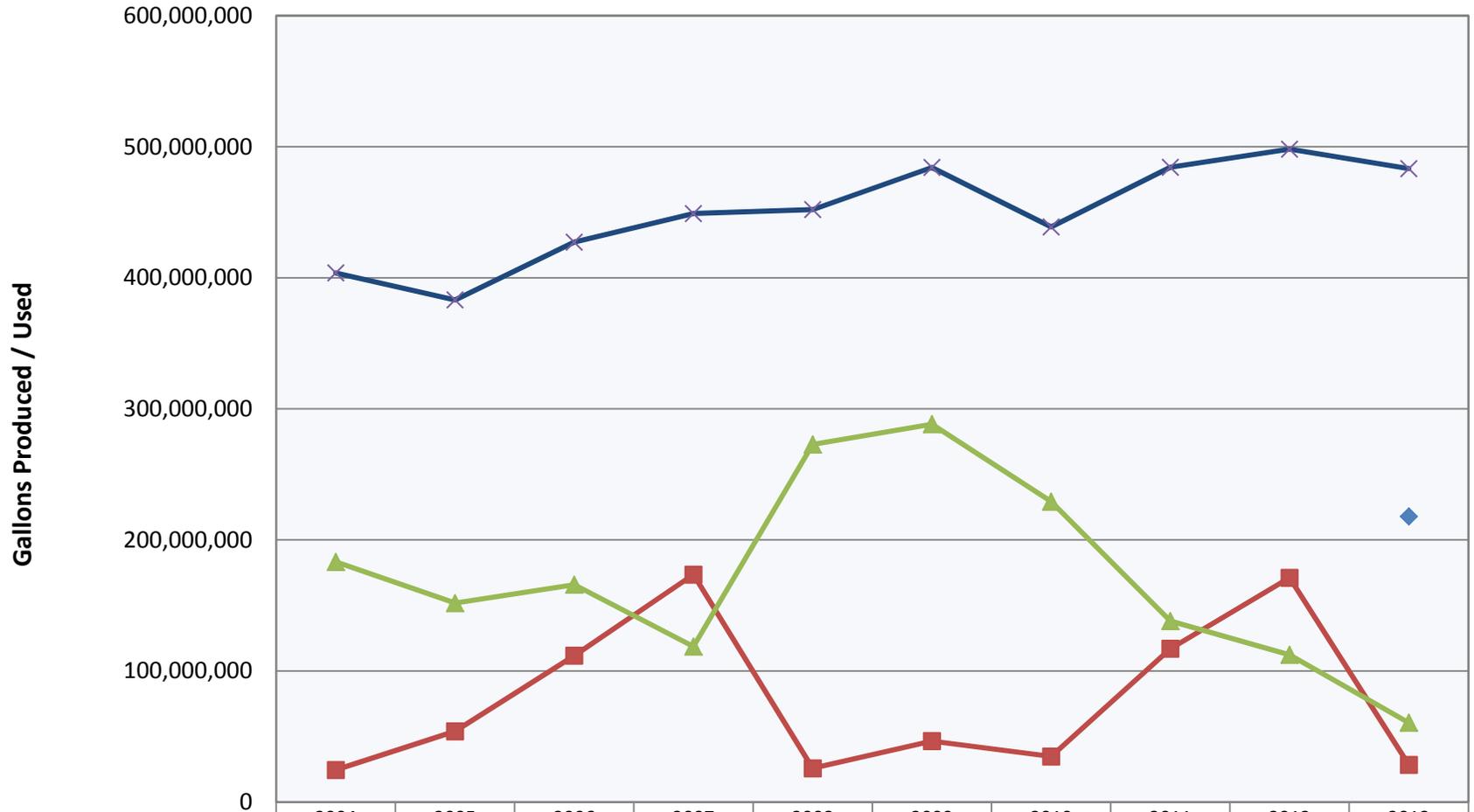


CITY OF AIRWAY HEIGHTS

Monthly Water Production / Reclaimed Water Recovery



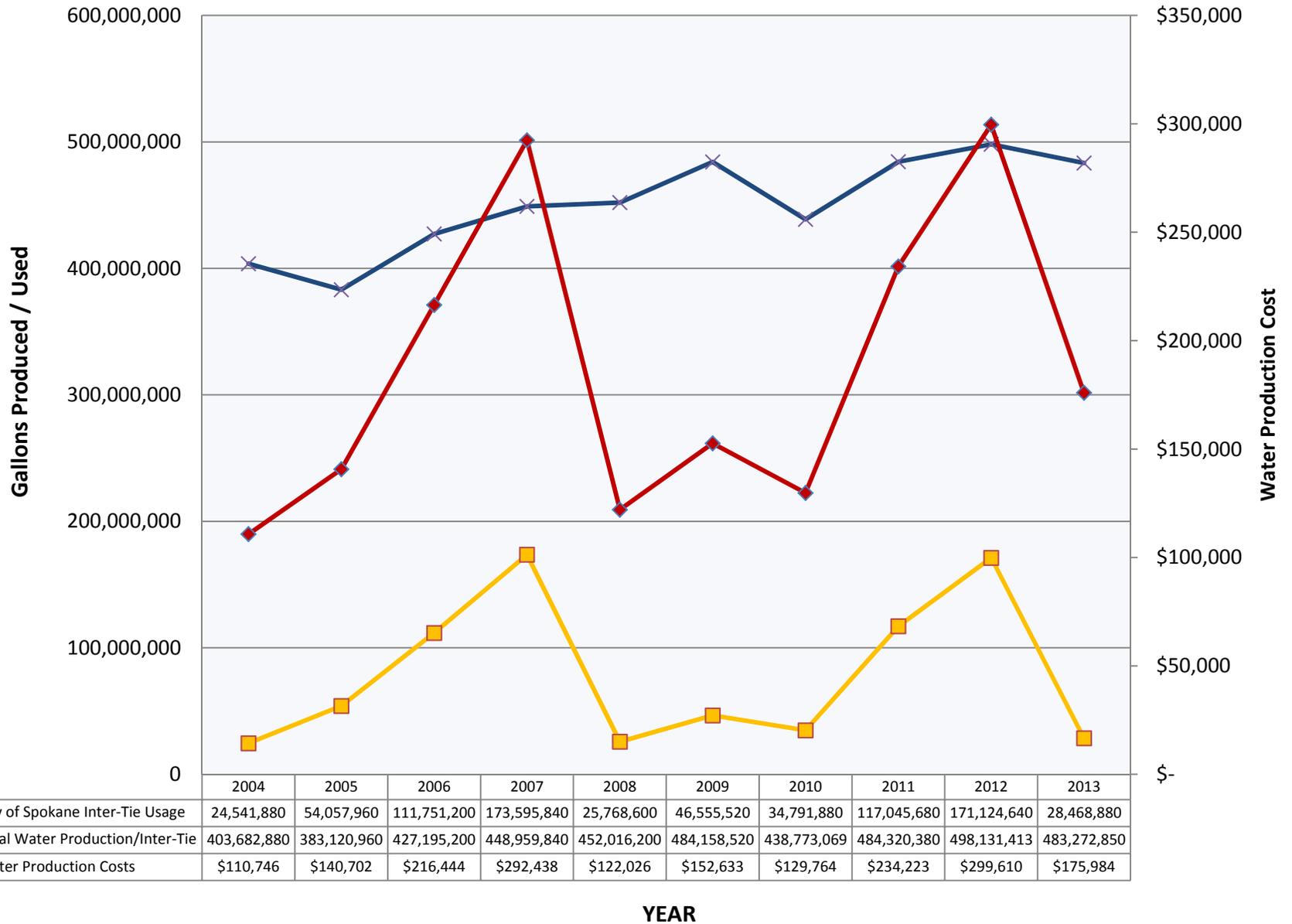
CITY OF AIRWAY HEIGHTS Historical Water Production/Inter-Tie Use



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
City of Spokane Inter-Tie Usage	24,541,880	54,057,960	111,751,200	173,595,840	25,768,600	46,555,520	34,791,880	117,045,680	171,124,640	28,468,880
Total Water Production/Inter-Tie	403,682,880	383,120,960	427,195,200	448,959,840	452,016,200	484,158,520	438,773,069	484,320,380	498,131,413	483,272,850
Recovery Well										217,932,000
ParkWest Well Production	183,239,000	151,823,000	165,868,000	118,685,000	272,837,000	288,309,000	229,186,189	138,107,500	112,349,400	60,551,900

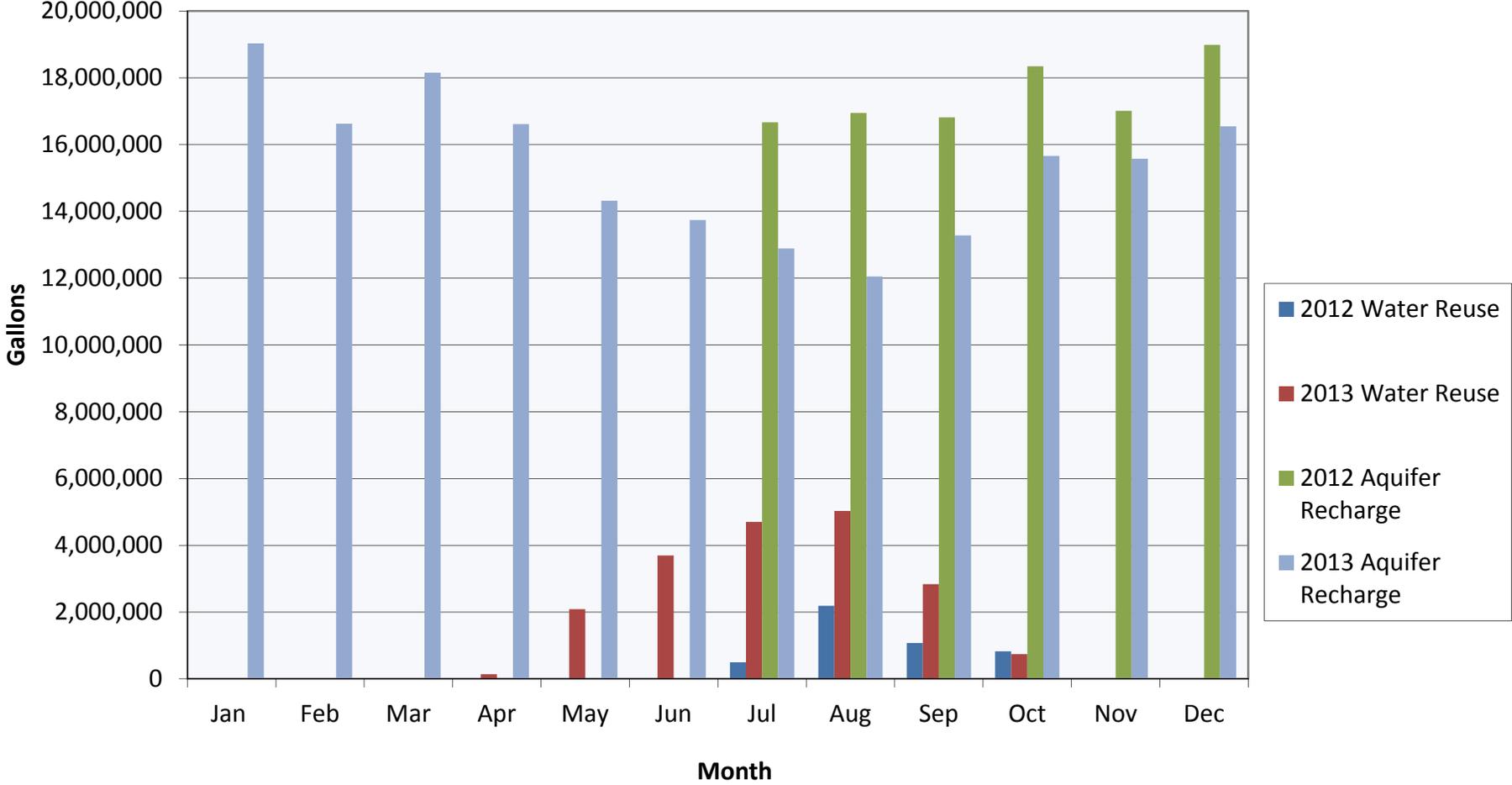
YEAR

CITY OF AIRWAY HEIGHTS Production/Inter-Tie Use And Production Costs

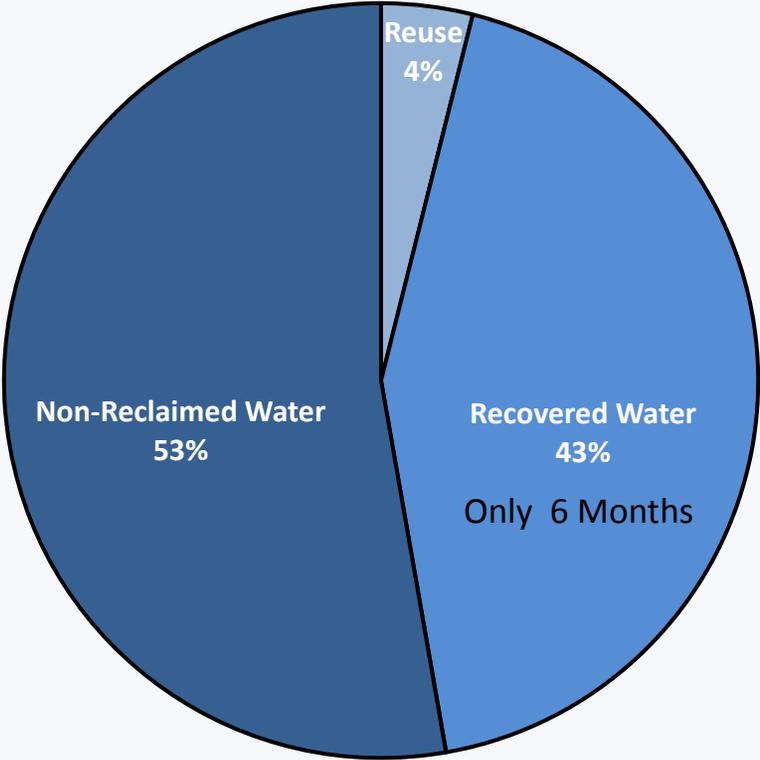


CITY OF AIRWAY HEIGHTS

Monthly Aquifer Recharge and Water Reuse



CITY OF AIRWAY HEIGHTS 2013 Water Use



STEPS TOWARD WATER SOURCE INDEPENDENCE

- 
- Water Intertie with City of Spokane: 1989
 - Comprehensive Water System Plan: May 2002
 - Comprehensive Sewer Plan: April 2003
 - Study of Available Water Sources: January 2004
 - Wastewater Facilities Plan: February 2005
 - Water Reclamation Plant Design: September 2007
 - Treatment Plant Construction Began: February 2009
 - Water System Plan Update: May 2009
 - Ordinance Requiring Reuse in New Developments: July 6, 2010
 - Treatment Plant Construction Complete: May 2012
 - Initiated Flow to the Percolation Basins: June 2012
 - First Reuse System Connection: October 2012
 - Reclaimed Water System Plan: September 2013
 - Reclaimed Water Recovery Well Complete: November 2013



WHAT'S NEXT?

- **Develop Hydro-Geologic Model and Aquifer Storage and Recovery Application to Support “Recovery Water”**
- **Promote Reuse to Existing Water Customers**
 - Washington Department of Corrections
 - Sunset Elementary School
 - Kalispel Tribe Northern Quest Casino
- **Add New Reclaimed Water Customers**
 - Fairchild Air Force Base
 - Residential Uses
 - Proposed Spokane Tribe Casino
 - New Commercial Customers
- **Evaluate Other Reuse & Recovery Opportunities**
 - Second Recovery Well in Paleo-channel

