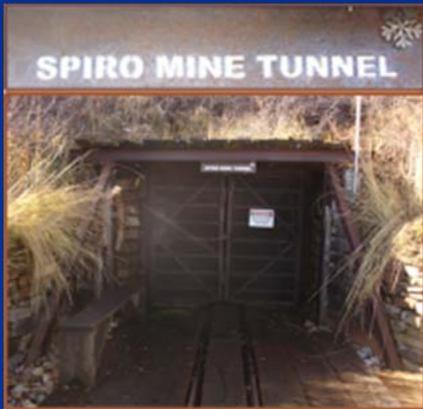


PARK CITY

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Thaynes Canyon Neighborhood Water Quality Meeting



Clint McAfee, PE, Water Manager
Michelle De Haan, Water Quality Program Manager
Kyle MacArthur, Water Operation Team Leader

March 15, 2012

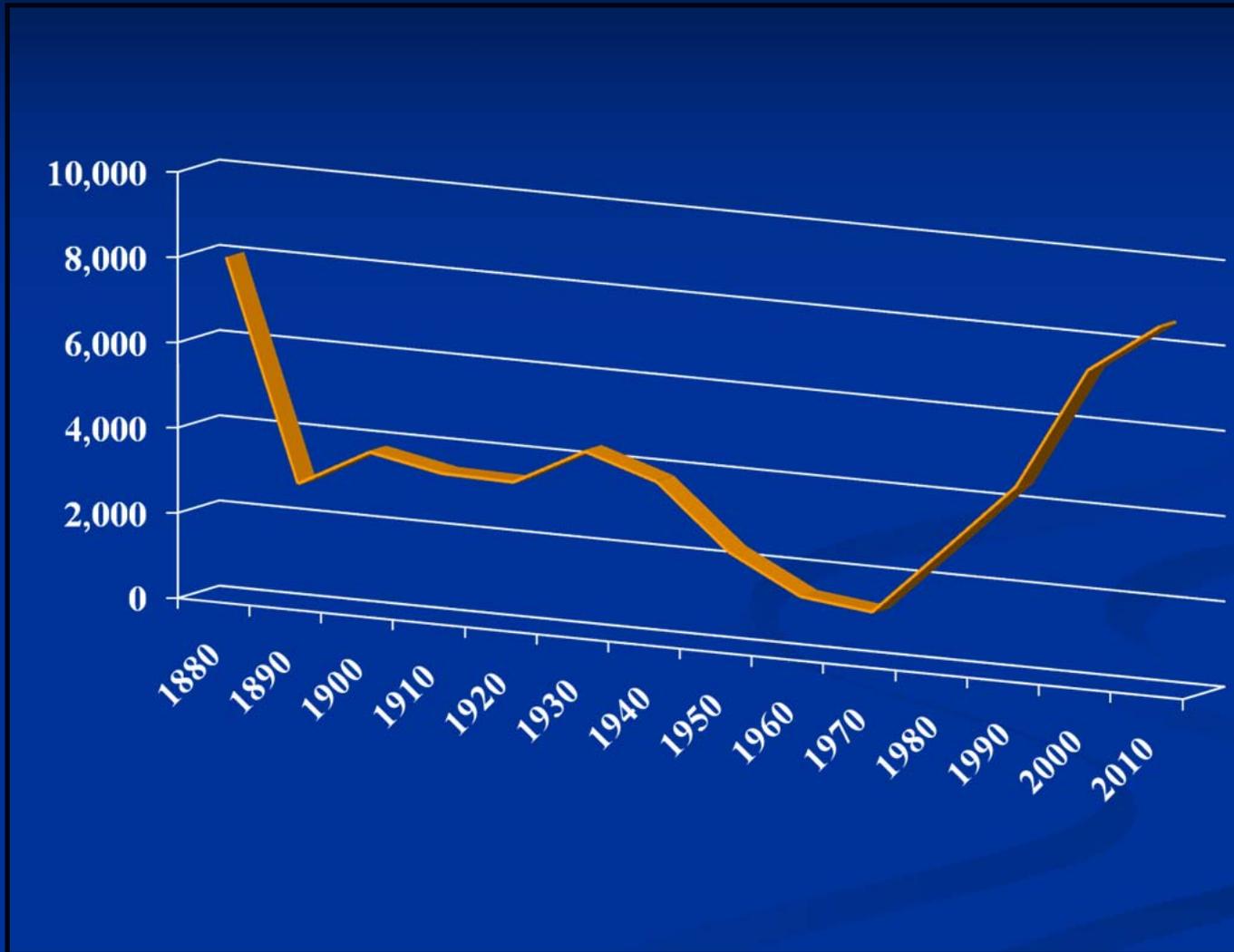
Presentation Agenda

- History of Park City Water System
- Water Quality Events in Thaynes Canyon
- Theories for Water Quality Events
- Recommendations and Actions to Avoid Future Events
- Upcoming Area Projects
- Long Term Projects Will Improve Drinking and Stream Water Quality
- Questions



History of Park City Water System

Historical Population of Park City







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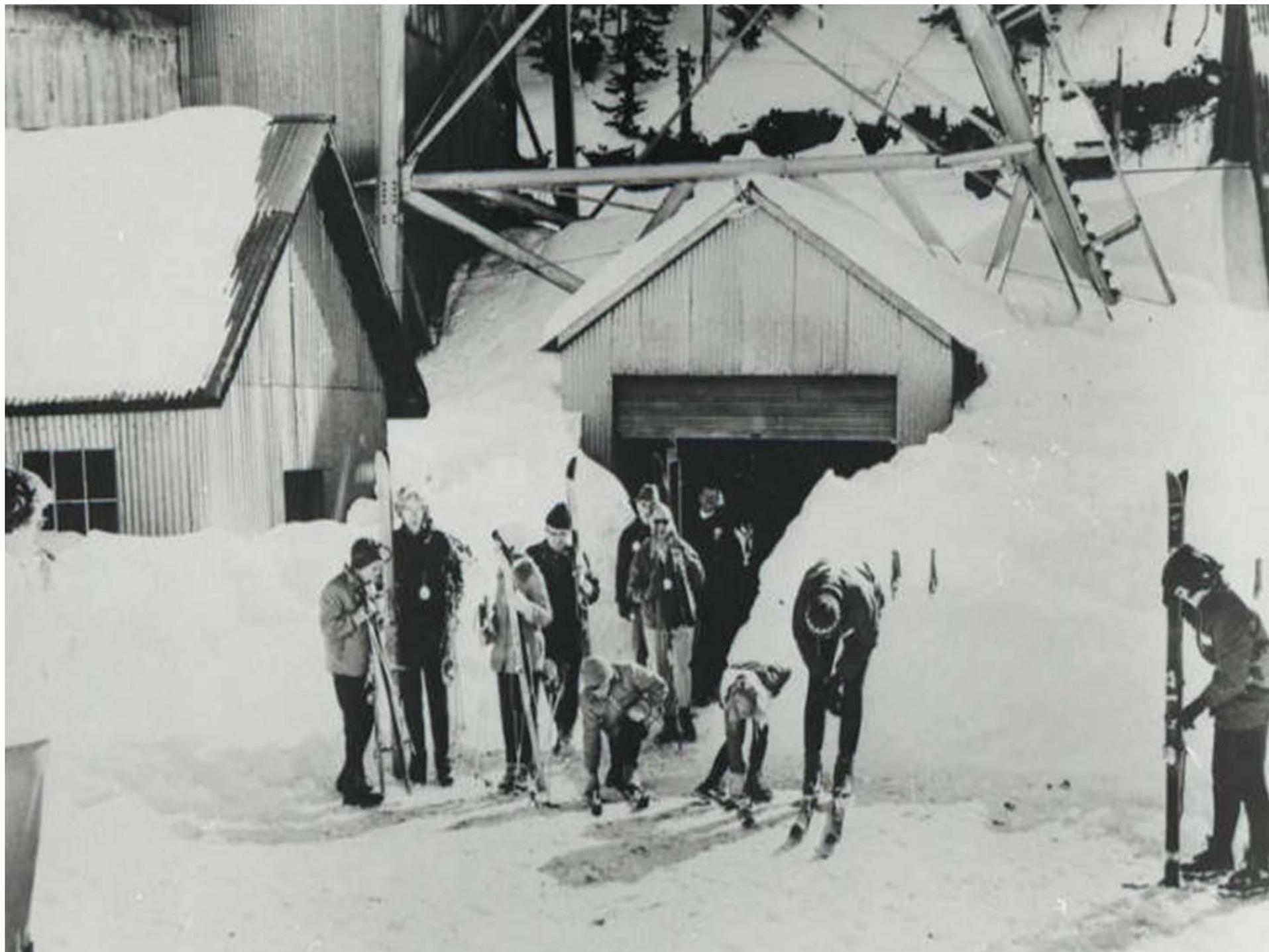
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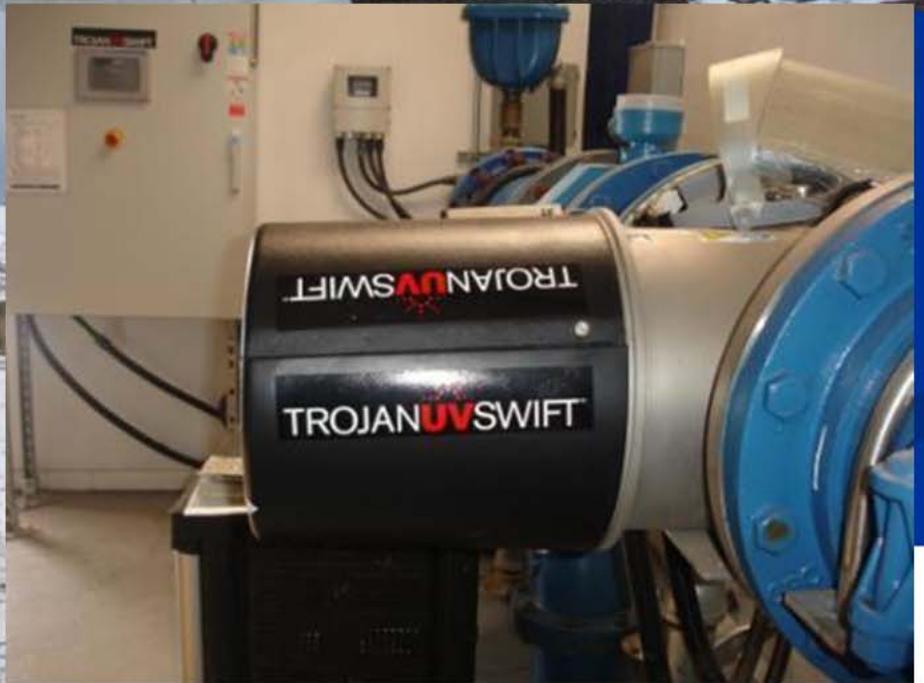


One of Most Complex Water Systems in the West

- 5,098 Connections
- Elevation range = 6,500' – 10,000'
- 54 pressure-reducing stations
- 19 storage reservoirs with capacity of 14,650,000 gallons
- 120 miles of pipeline
- 950 fire hydrants
- 1,775 mainline isolation valves
- 182 control valves
- 26 pump stations
- 50 pumps of varying size and capacity
- 11 stream flow monitoring stations
- Annual average snowfall = 350"
- Shoulder season demand swings

Existing Water Sources

- Three wells
- Two tunnel sources
 - Judge
 - Spiro with coagulation/filtration WTP for metals reduction, primarily arsenic
- Thiriot Springs
- Jordanelle Special Service District wholesale
- Weber Basin Conservancy District wholesale
 - Quinns Junction WTP online in April 2012



Judge Tunnel

- UDEQ antimony variance



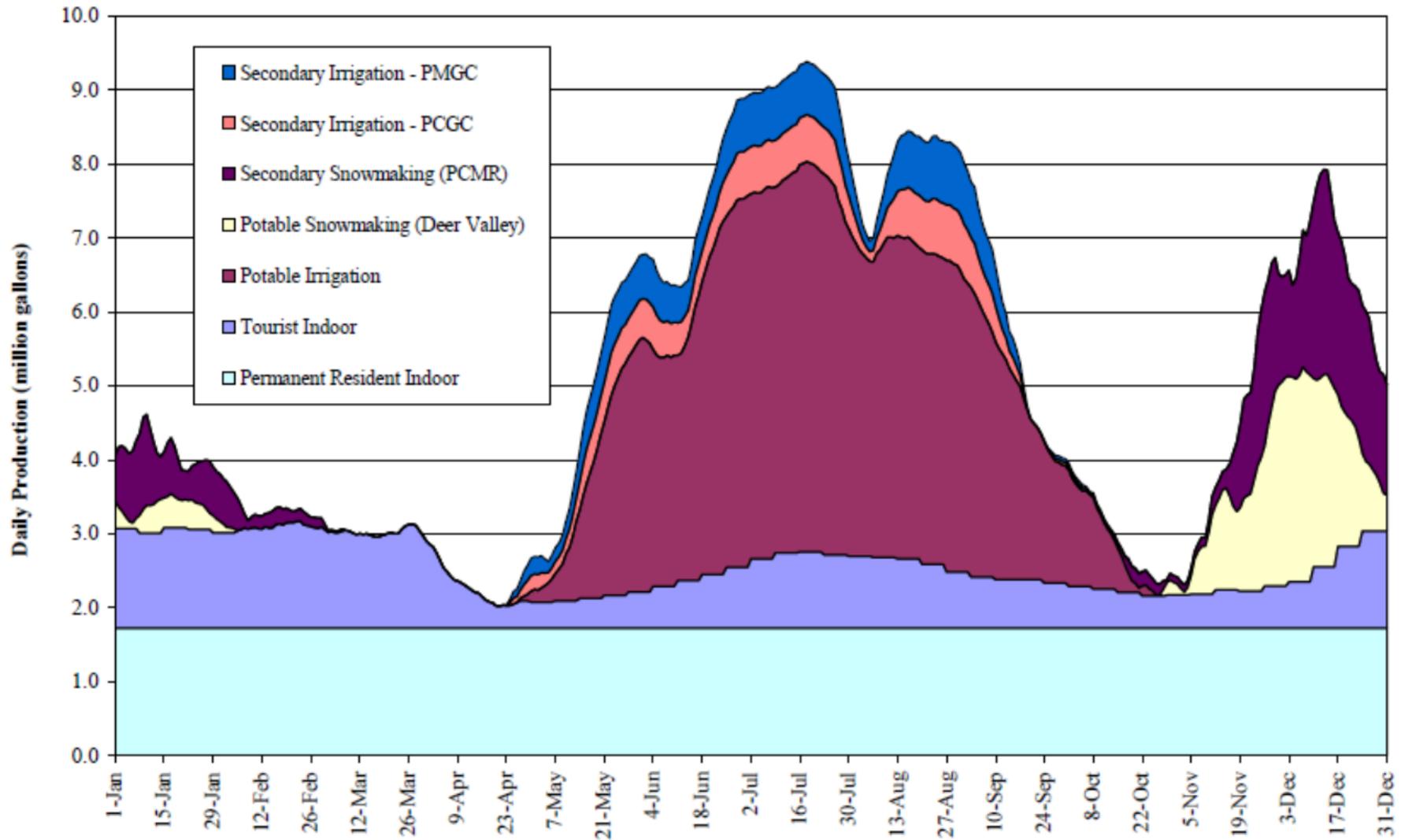
Spiro WTP

- Coagulation/Filtration WTP, primarily for arsenic reduction
- Solids handling facilities\
- Blends with Thiriot Spring



Annual Demand Type

Average Daily Park City Water Production





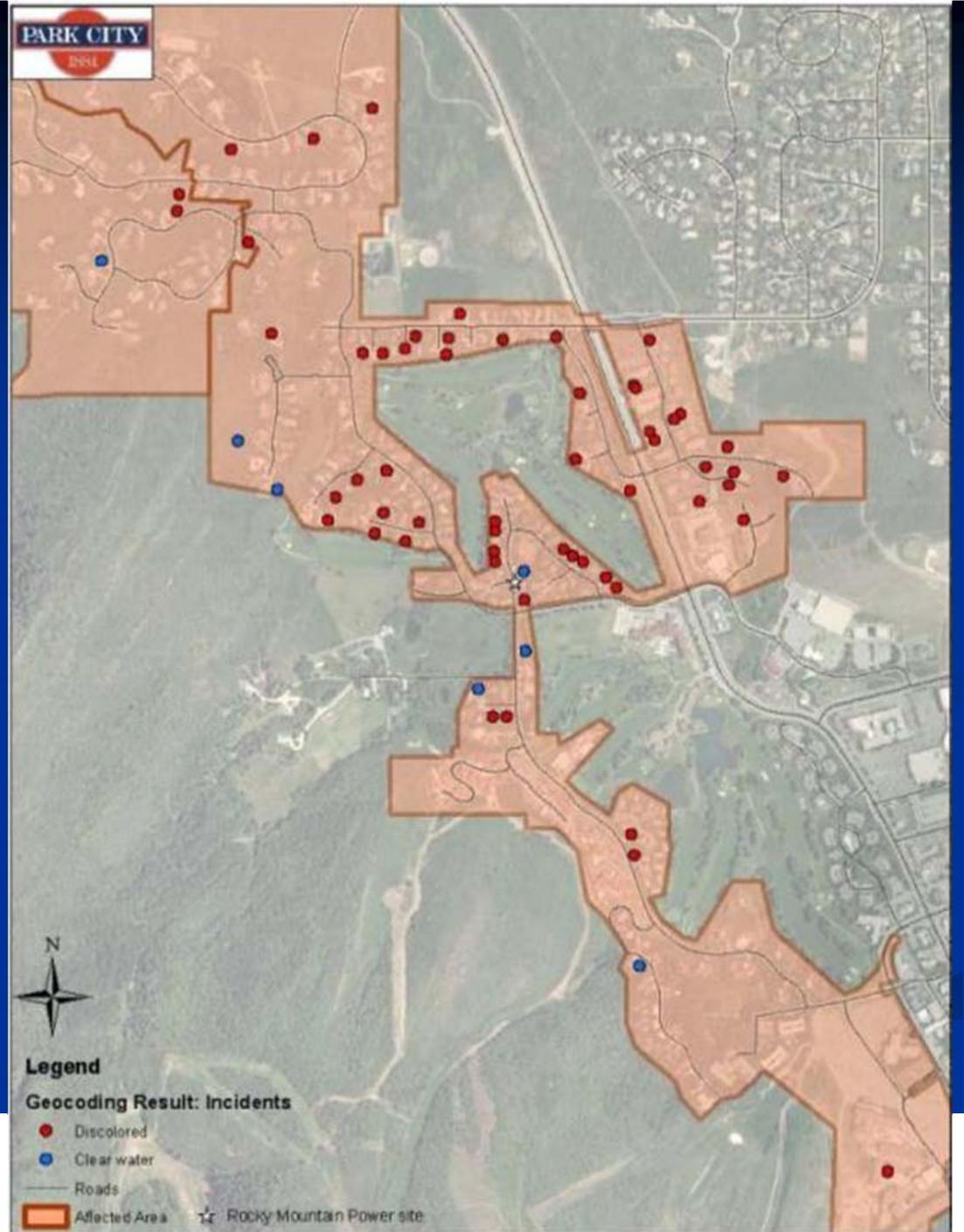
Water Quality Events in Thaynes Canyon Neighborhood

Thaynes Area Water Quality Event(s)

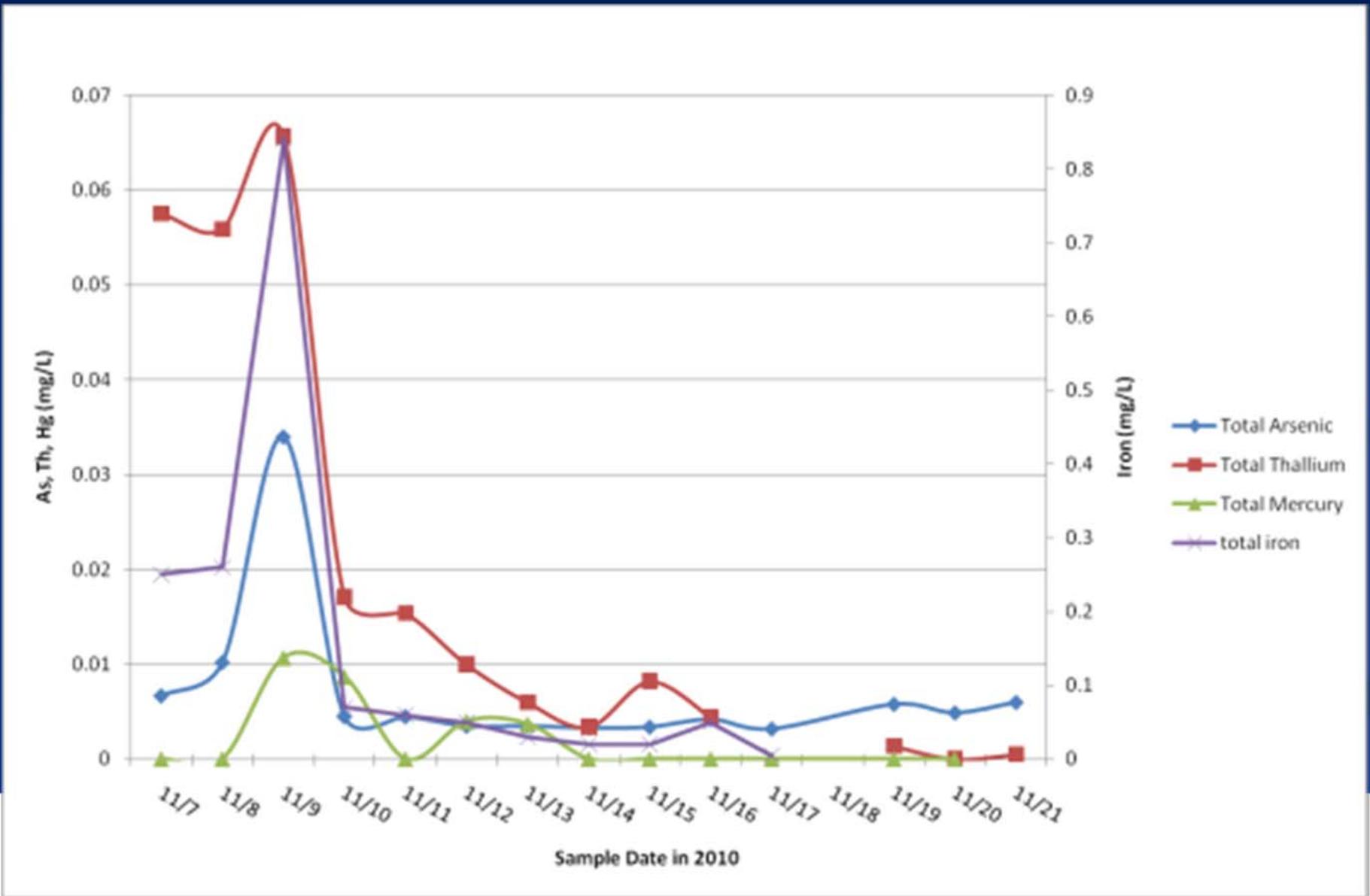
- In fall 2007 & Nov. 2010, customer complaints of discolored brown, coffee-colored water
- Water quality samples exceeded EPA regulations in distribution system
 - Arsenic, thallium, manganese and mercury
- Water Department responded quickly to potential public health concern
 - Public information campaign, bottled water
 - Flushed system and collected water samples
 - Worked in collaboration with Utah Dept. of Drinking Water and national water quality experts

Thaynes Area

- Complaints 1-month after source change
 - Spiro WTP off-line
 - Thiriot Springs and Judge Tunnel on-line
- 3-weeks of flushing



Metals Concentration Changes During Flushing



Thaynes Area Source Water History

- 1971 Judge Tunnel sole source
- 1974 Thiriot Spring developed
- 1981 Spiro Tunnel Bulkhead installed
 - Distribution water could be a blend of Judge Tunnel, Spiro Bulkhead and Thiriot Springs
- Spiro Portal was unfiltered, and not used as a drinking water source

Spiro WTP Source Water History

- Originally built SWTP in 1992
- Treated 1,000 gpm of portal flows with filtration using naturally occurring iron to meet 50 parts per million arsenic MCL
 - Also treated for thallium, iron, manganese, turbidity
- Bulkhead water untreated
- Blended with Thiriot Springs water for antimony reduction

Spiro WTP Source Water History

- Upgraded in 2003, added two pressure filters to treat 3,000 gpm
- Added ferric chloride coagulant to treat to below 10 parts per billion MCL (new EPA standard)
- Combined and treated portal & bulkhead flows





Theories for Water Quality Events

Theory for WQ events in system

- Severe water quality changes occurred when major source change occurred after turning off Spiro WTP
 - SWTP/Thiriot Springs blend is significantly different than Thiriot Springs & Judge Tunnel waters
 - Mineral scale with metals accumulation released upon source change

	Spiro WTP & Thiriot Springs Blend	Thiriot Springs	Judge Tunnel
Minerals, TDS, Sulfate	Higher	Low	Low
Heavy Metals	•Trace levels of As, Sb	Low	•Trace levels of As, Fe, Mn, Pb, Tl, and Sb

Water Quality Modeling and Pipe Sampling Support Causation Theory

Judge Tunnel/Empire Tank Sediment (dl000833)



Walker Court A/C pipe material (dl000834)

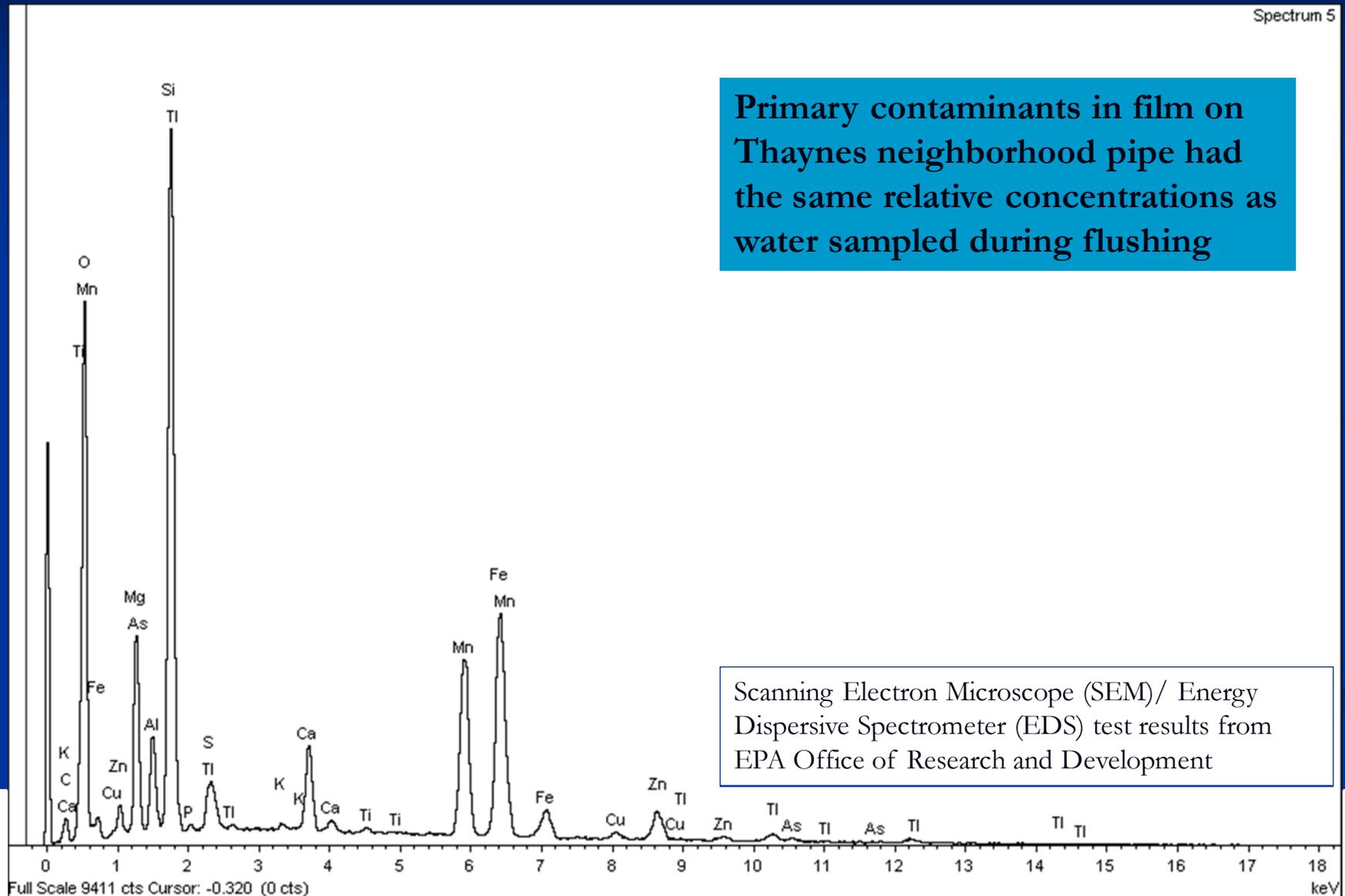


X-Ray Fluorescence (XRF) Testing by EPA Office of Research and Development

Sample ID	Element Weight%																		
	C	O*	Na	Mg	Al	Si	P	S	K	Ca	Mn	Fe	Co	Cu	Zn	As	Tl	Pb	
Walker Ct.	0.23	38	0.8	4.15	2.45	20	0.2	0.7	0.2	2.5	5.6	9.4	0.3	0.4	2.4	0.2	2.1	0.5	
Empire Tank	0.57	33	0.2	0.02	0.06	2	0.1	0.8	ND	0.2	0.5	70	ND	0.2	0.5	0	0	0	
	*Calculated																		
	ND=Not Detected				Parameters with ND and ≤ 0.1 for both sites have not been reflected														

SEM/EDS Results from Pipe Samples

Spectrum 5



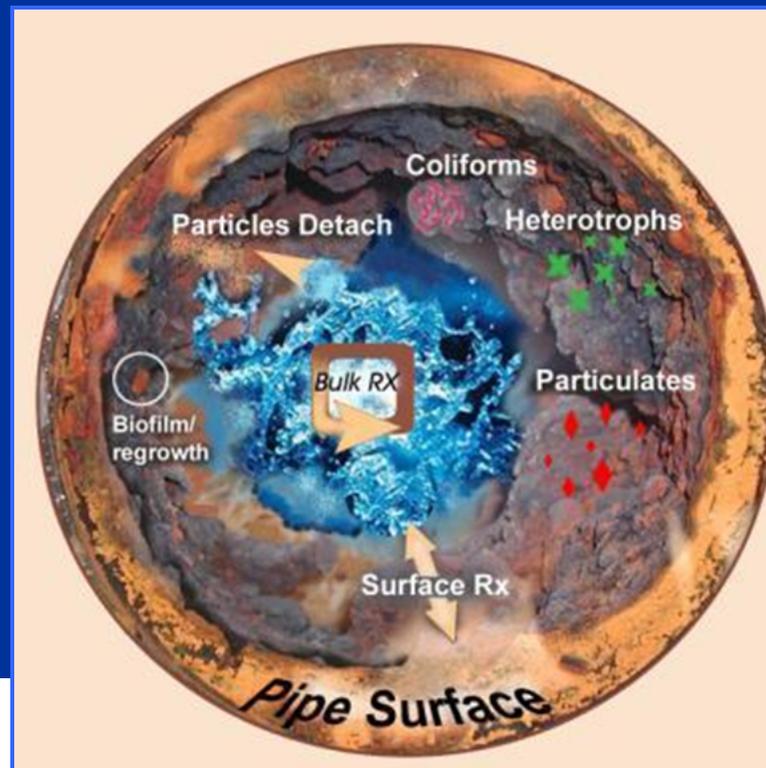
Primary contaminants in film on
Thaynes neighborhood pipe had
the same relative concentrations as
water sampled during flushing

Scanning Electron Microscope (SEM)/ Energy
Dispersive Spectrometer (EDS) test results from
EPA Office of Research and Development

Pipe Reactions Are Complex within All Distribution Systems

- It is likely that some or all of these interactions were involved in stabilization and/or destabilization of deposits

Pipe Reactions are Complex





Recommendations and Actions to Avoid Future Water Quality Events

Summary of Recommendations

- Infrastructure replacement not recommended at this time
- Manage source changes
- Mix water sources
- Continuous operations of Spiro WTP
- Pipe cleaning and flushing
- Optimize Spiro WTP for further metals removal
- Enhance water quality program

Avoid Drastic Source Changes/Mix with Other Water Sources

- Continuous year round operation of Spiro WTP
- Pumped Spiro WTP/Thiriot blend to Boothill Tanks for mixing with well and system water
 - Supply to Thaynes area from Judge Tunnel and Boothill Tanks blend
 - May not be feasible in dry years; Quinns WTP water would make up supply

Pipe Cleaning

- Periodic flushing
 - Enhance flushing program to avoid mineral bound metallic scale from forming on pipe walls and/or to remove any existing scale
 - Flush in fall and spring periods with lower demands
 - Flush when making a major source change



Pipe Cleaning

- Investigating new cleaning techniques such as swabbing, pigging and icing that allows for much more effective pipe cleaning

Optimize Spiro WTP for Further Metals Removal

- Spiro WTP currently removes metals to below drinking water MCLs, but trace amounts of metals concentrate onto scale that has accumulated on pipe walls
 - Water department is starting to evaluate optimization options to increase metals removal in short term before implementing longer term plans, which will be covered in upcoming slides

Enhance Water Quality Program

- Further develop water quality program to address source management, treatment optimization and distribution system monitoring
 - Evaluating implementation of information technology synergies with water quality source, distribution system, and customer contact data that support tracking and reactionary tools



Water Department Upcoming Projects

Quinns Junction Water Treatment Plant

- Community Open House and Tours
 - April 5th, 4 – 6 pm
 - 3800 Richardson Flat Road



Quinns Junction Water Treatment Plant

- Critical component of water supply and distribution system infrastructure
- State-of-the-art facility will treat up to 3 million gallons per day (mgd) initially with ultimate capacity of 9 mgd
- Treats Weber River water

Empire Avenue Water Line Replacement

- Planned as part of Summer 2012 Empire Avenue reconstruction
 - Required due to routine leaks
 - Public meeting held in February 2012



Long Term Projects to Improve Drinking and Stream Water Quality

New Treatment Needs and Facilities

- Tunnel sources
 - Investigating integrated treatment for drinking and stream water quality improvements
 - 5-7 year timeframe
- Prospector Drain
 - Stream water quality improvement
 - 5 year timeframe
- Antimony reduction
 - 2 year timeframe

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 - Michael Schock, Ph.D., P.E.



Questions?

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