



Well Water Quality Update and Next Steps



Public Works Commission Meeting
April 17, 2017



Background

- The Water Treatment Plant (WTP) was taken off-line in February 2015 for maintenance rehab & upgrades to a portion of the existing WTP to enhance plant operability including:
 - Plant industrial waste pipeline reconstruction and repairs.
 - Corrosion repairs & new coatings to existing piping, valves, supports & inside the clear well.
 - New SCADA enhancements including SCADA process monitoring reports.
 - Chemical pump skid upgrades.
 - RO membrane backwash process improvements.
- The treatment plant rehabilitation was focused on limited specific operational improvements to the plant.



Background

- Prior to the WTP shutdown in 2015, the well water quality was within manageable ranges & successfully treated for Constituents of Concerns (COCs) with existing plant processes & equipment.
- No visible or noticeable signs of well water quality issues that would require additional plant processes.
- COCs including dissolved iron, manganese, sulfur, Total Dissolved Solids (TDS), hardness, & other water quality parameters successfully treated by the WTP.
- Prior to WTP shutdown in 2015, well water quality then is different from the water quality encountered during wet commissioning.



Background – Pre-Startup Discoveries

During pre-startup activities during the plant wet commissioning, a water quality change was evident in the plant. A “new normal” was observed. The problems that occurred included:

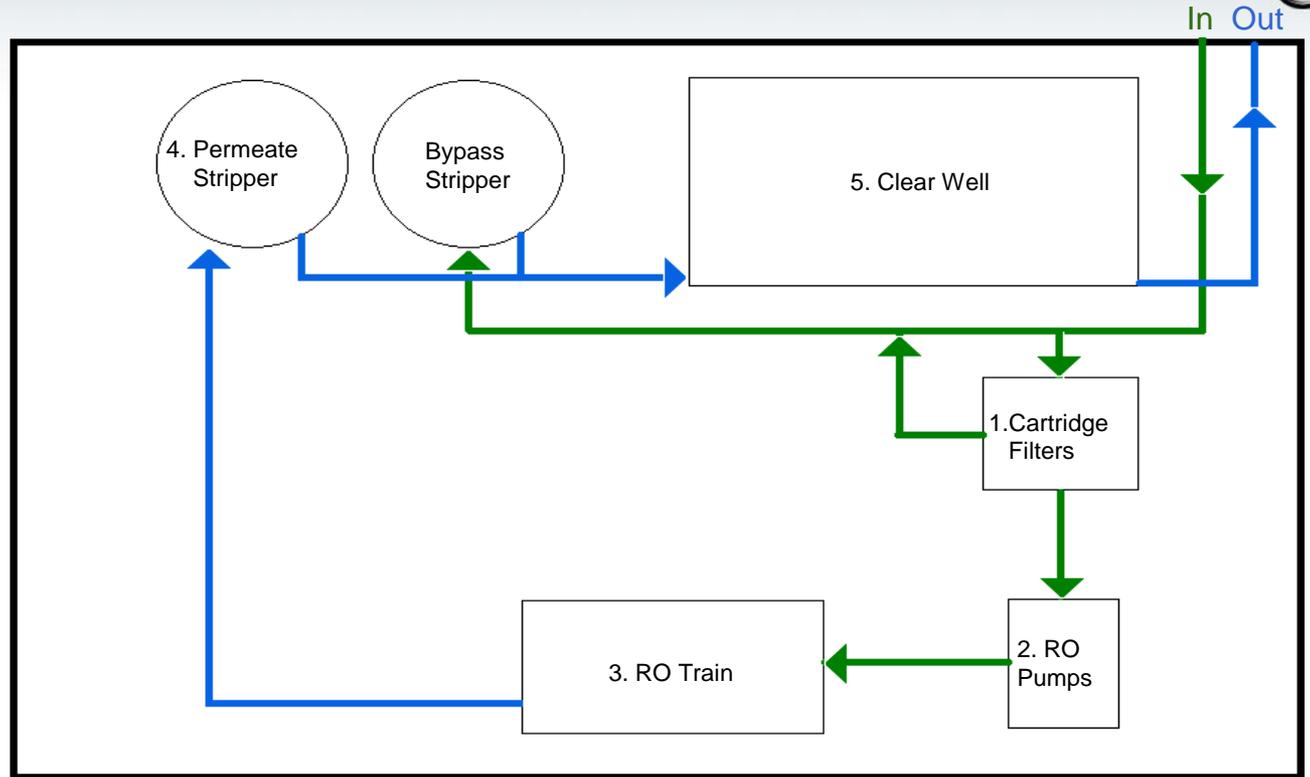
- Accumulation of black particulate matter in the protective cartridge filters prior to the RO membrane train (refer to Treatment Plant Flow Diagram).
- Much more prevalent sanding with very fine sand particles.
- High variable range and steady state levels of dissolved manganese in groundwater.



Fine Sand and Black Particles at RO Inlet



Treatment Plant Flow Diagram



Treated Water	Blue
Raw Water	Green



Background – Pre-Startup Discoveries

- Staff and H&S postponed the installation of new RO membranes as a precautionary measure and started an investigation of whether this is a “new normal” in water quality, or if it was a temporary occurrence related to the extended downtime of the wells and raw water pipeline and restarting.
- The postponement was performed to prevent permanent fouling of the new membranes and protect other plant equipment / instrumentation.
- A series of investigative actions were taken by staff and H&S to protect the City’s investments at the treatment plant, determine options for operations and identify opportunities for system improvements.



The New Normal

- Fine black particulates were observed with the sand analysis of the material captured at each well, in the plant feed and passing through existing & new cartridge filter vessels was identified and confirmed the presence of iron sulfide in all four (4) wells.
- The iron sulfide is formed from iron and sulfur that are naturally occurring in the reducing environment of the Hollywood Basin.
- Limits options for isolating wells.



Black Particles inside a Plant Cartridge Filter (a quarter is shown in the image for scale)



The New Normal

- Iron sulfide will cause the RO membranes foul up.
- During testing, RO membrane fouling decreased plant run time from 1 week to 2 days to eventually < 45 minutes.
- It is estimated that the frequency of Clean in Place (CIP) backwashes for the RO membranes could be on the order of once per week.
- A typical CIP backwash could take approximately 2-1/2 days to perform and bring the plant back on line. This would equate to approximately 36% downtime for the WTP.
- Detrimental for the existing wells as extended well downtimes leads to degrading water quality.



The New Normal

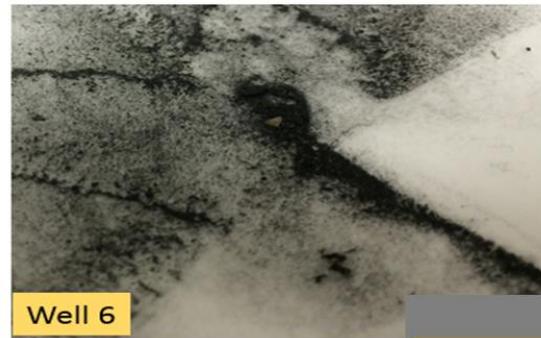
- Since the plant incorporates a blend of chlorinated raw water with the treated RO permeate water in a clear well (storage tank), iron sulfide would eventually show up in the City's distribution system.
- Iron sulfide can lead to customer complaints regarding discoloration, "metallic" taste, and odor issues and equate to negative public perception issues.





The New Normal

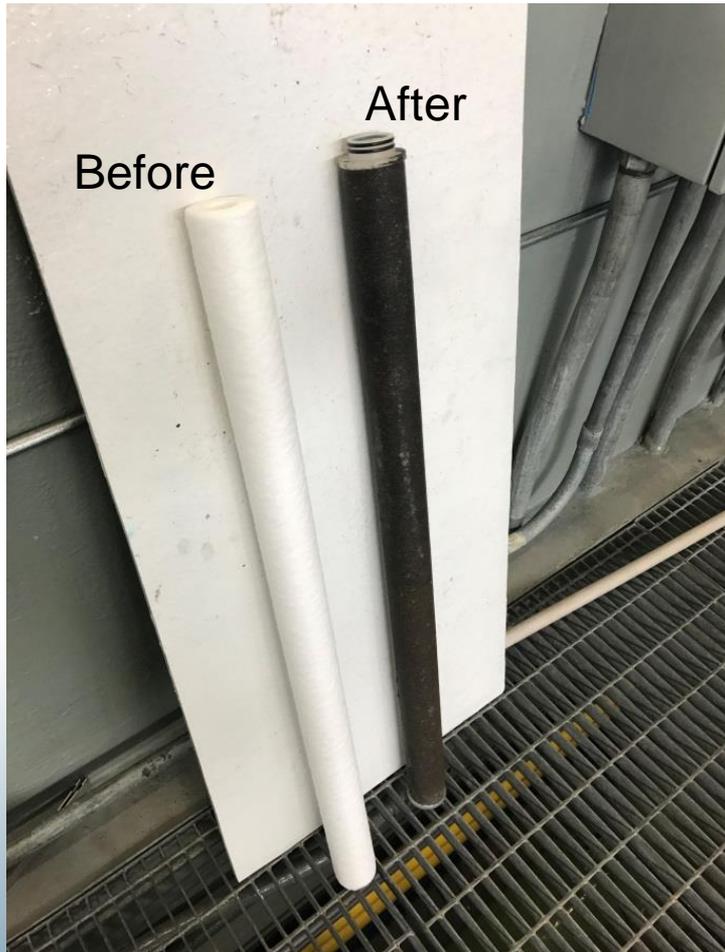
- Sanding volume is greater than the plant staff had observed historically and was no longer filtered by the WTP cartridge filters. (both existing & new).
- A well investigation for particulate intrusion confirmed the sand and fine black particulate matter present in all four wells.





The New Normal

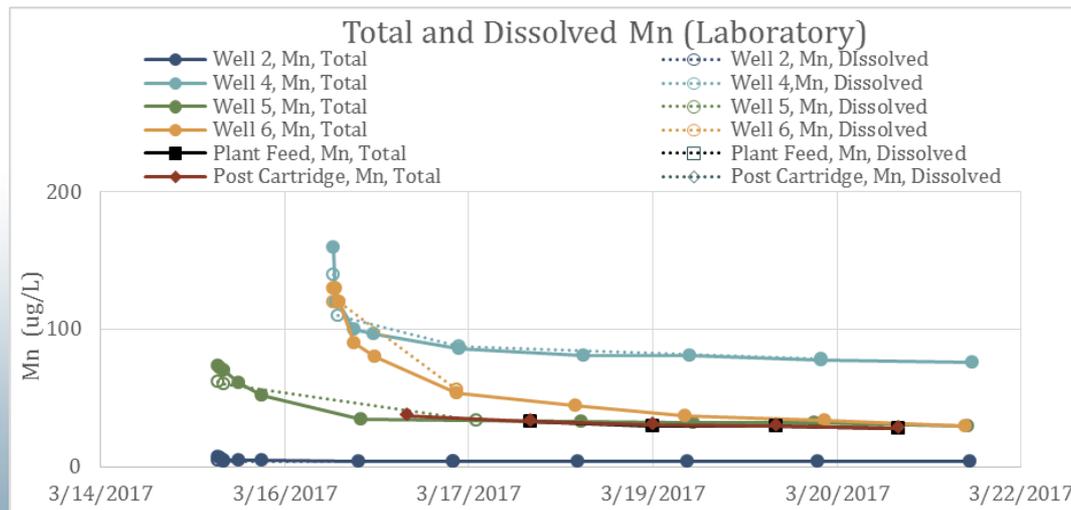
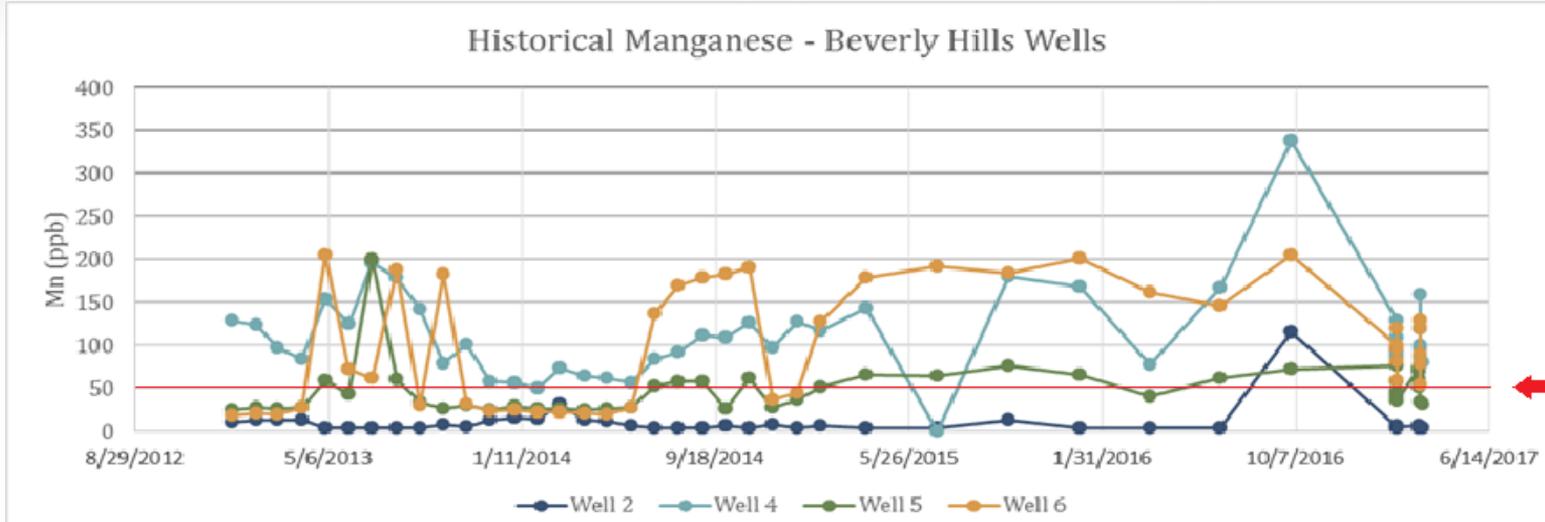
The following photographs show the material that was collected during the investigation:



- Sand/Particulate matter are passing through both existing and new cartridge filters.
- Sand/Particulate matter would break through to the distribution system.
- Sand and Particulate matter are both very fine (90% less than 10 microns); Current instruments are unable to detect break through.



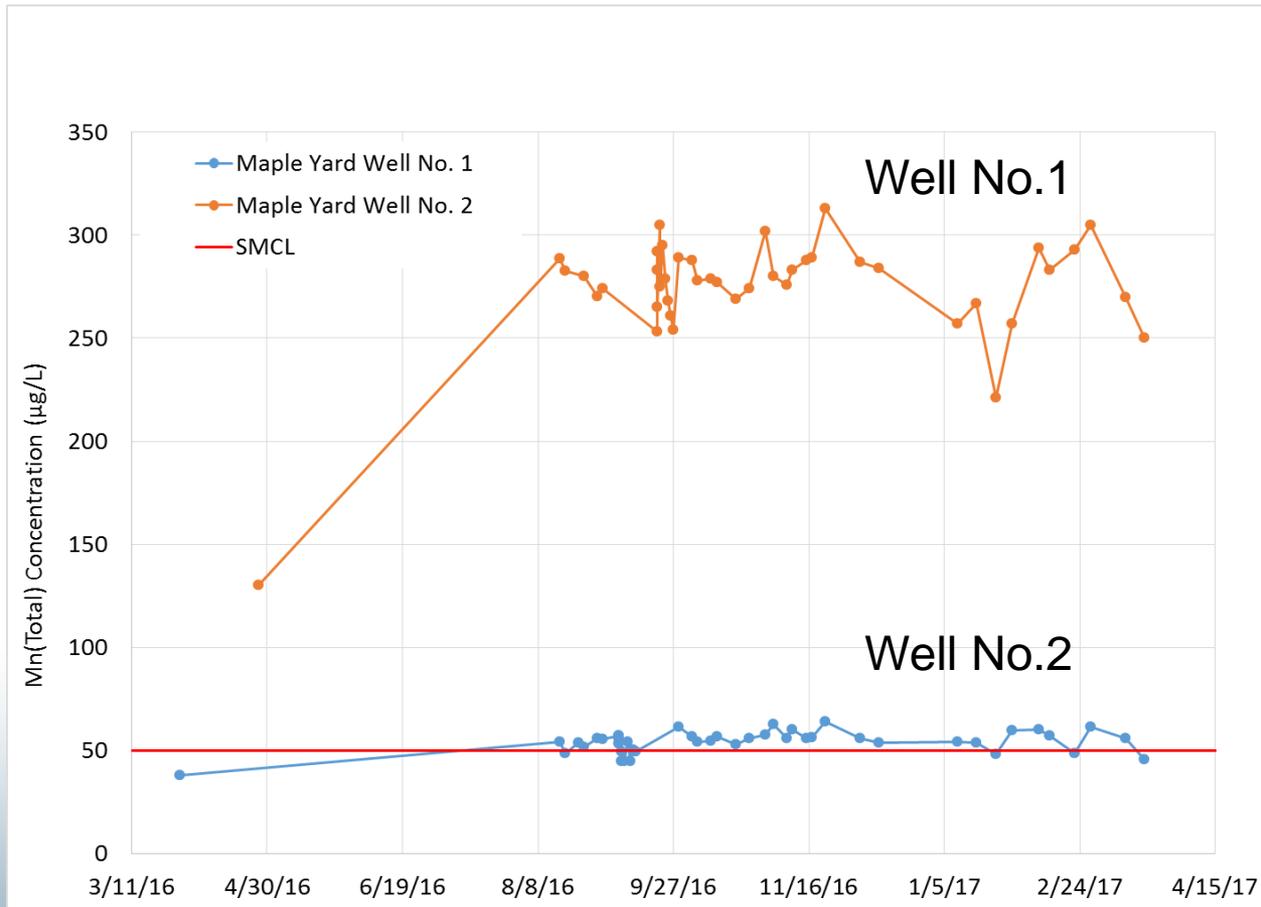
The New Normal





The New Normal – Dissolved Manganese

Maple Yard Wells





Recommendations and Next Steps

1. There are no short term solutions for the issues of sand, manganese, and iron sulfide.
2. H&S and staff are recommending to place the WTP offline in “standby” mode to pursue long-term alternatives.
3. Next steps include a feasibility analysis of these potential alternatives:

Multiple Approaches:

- Well Rehabilitation / New wells
- Pre-Treatment
- Permitted blending station at Sunset Reservoir



Any Questions

