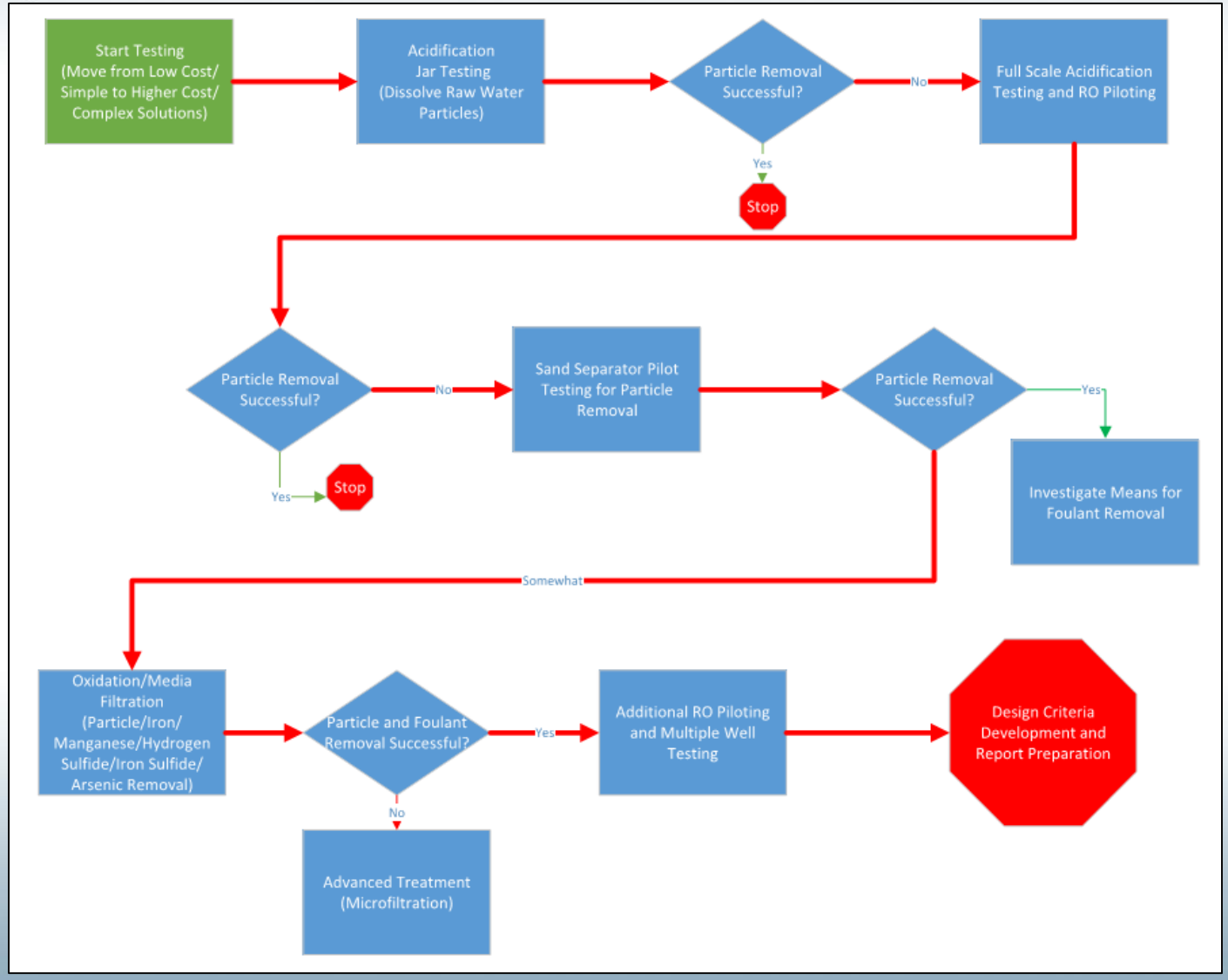
WTP Bench-Scale/Pilot Testing

Public Works Commission
May 10, 2018

Current Water Quality Issues

- Increased levels of fine sand, manganese, and iron sulfide causing RO membrane fouling => decrease in RO operational time due to high feed pressure shutdown
- High levels of manganese (> 5 times MCL) in newly constructed Maple Wells
- Hydrogen sulfide odor complaints from surrounding neighbors due to air stripper operation
- Arsenic levels dependent on blending, DDW preference for proactive treatment

WTP Testing Process Flow



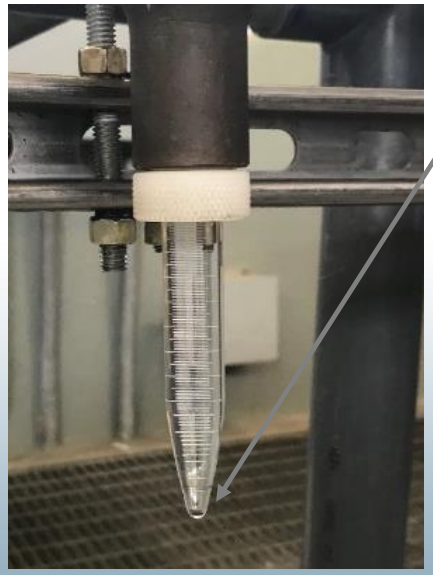
WTP Testing Summary

- Conducted bench- and pilot-scale testing for treatment of sand, iron sulfide, hydrogen sulfide, iron, manganese, and arsenic
- Hollywood wells (2, 4, 5, and 6) and Maple wells (1 and 2)
- Draft pilot report submitted by Carollo, initial review completed by staff
  - Executive Summary
  - Testing Background, Methodology, and Results
  - Proposed Design
  - Project Delivery Methods
  - Cost and Schedule
  - Recommendations

Sand/Iron Sulfide

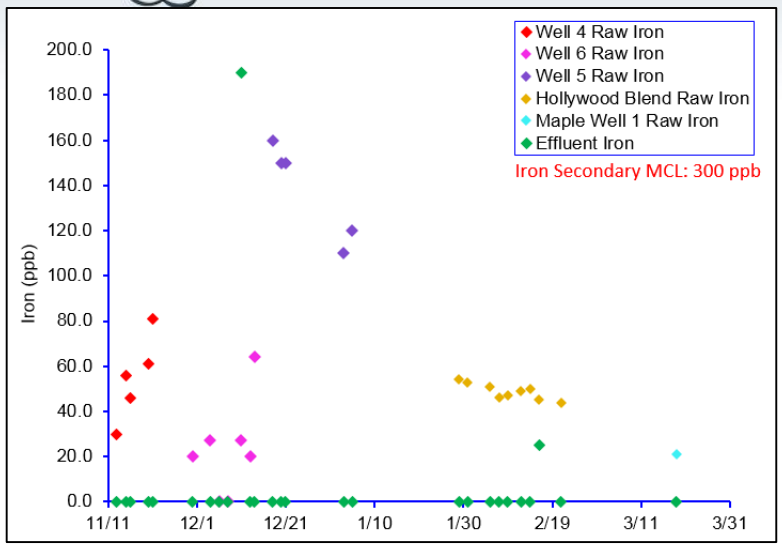
- Achieved > 80% suspended particles removal
- Significant reduction of particles in Rossum sand tester (visual indication)
- Optical micrographs and SEM analysis confirmed no iron sulfide and “very, very few particles”

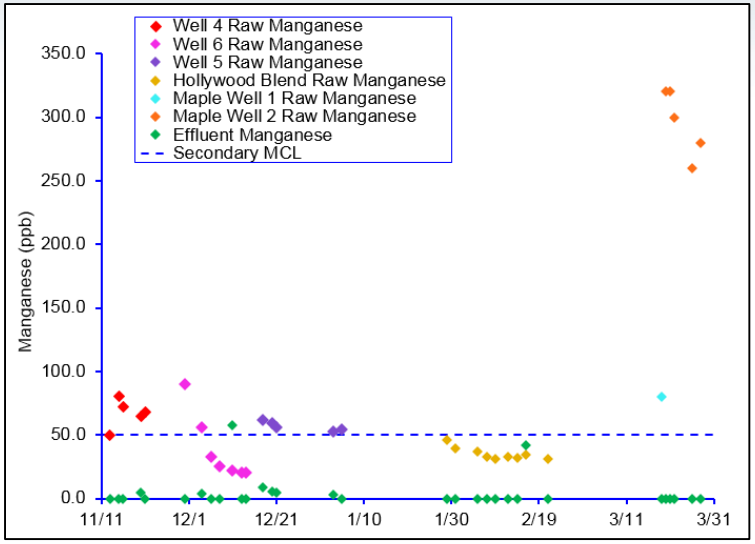
Particles captured in raw water column

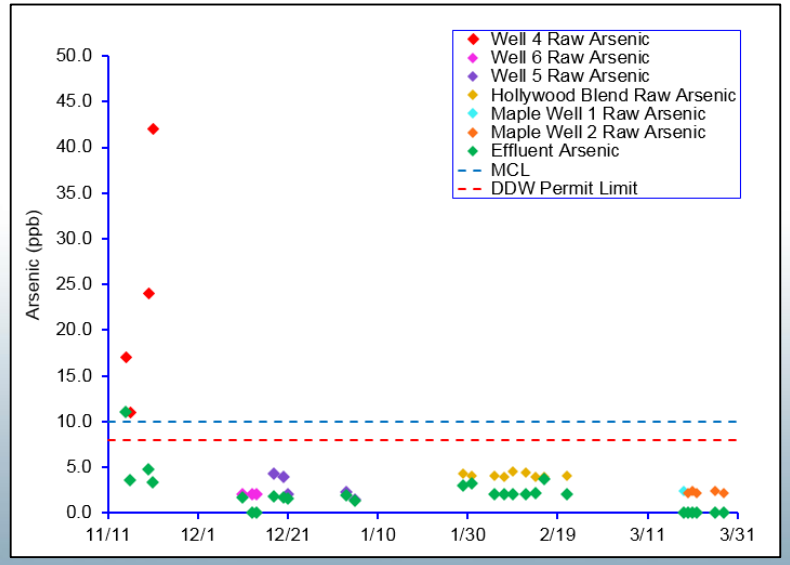


Particles captured in post-sand separator column

Iron/Manganese/Arsenic



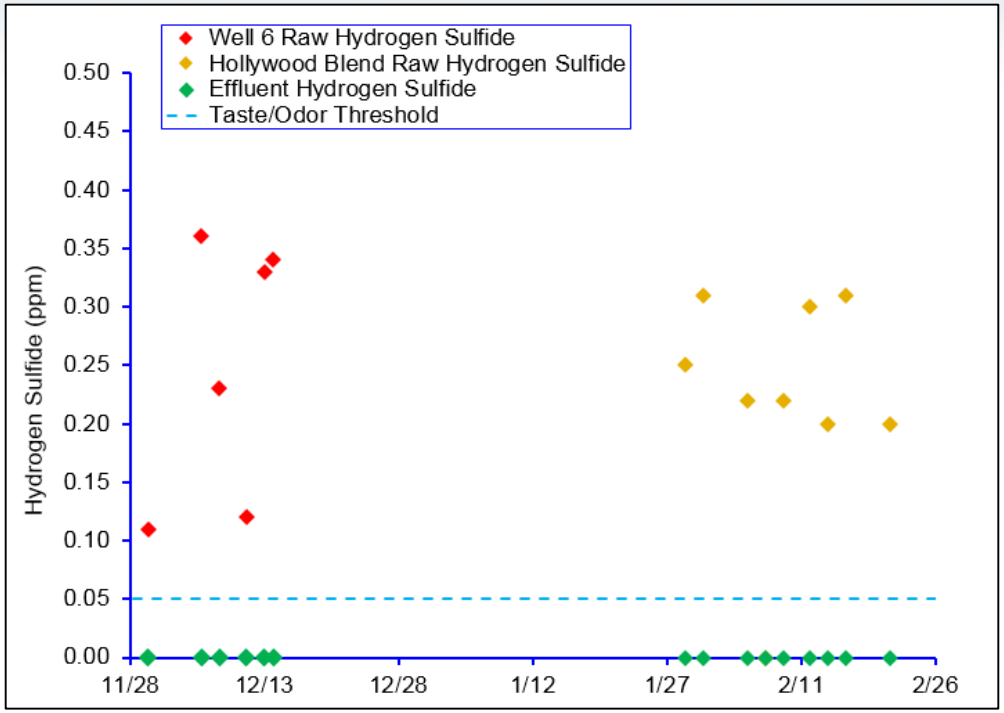




Summary:

- Removed iron, manganese and arsenic to non-detect levels or below their respective MCLs and permit limits
- Couple of anomaly data points due to insufficient chemical dosing and/or power outage

Hydrogen Sulfide

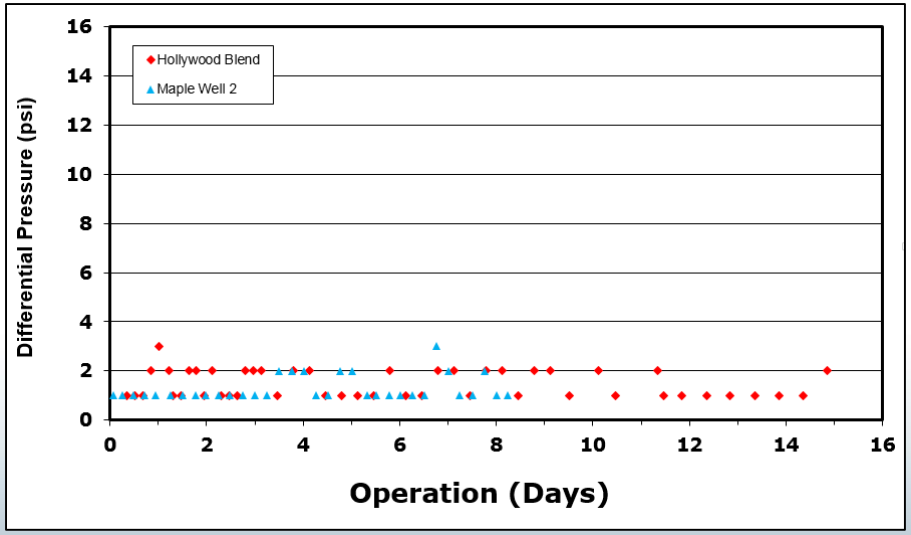


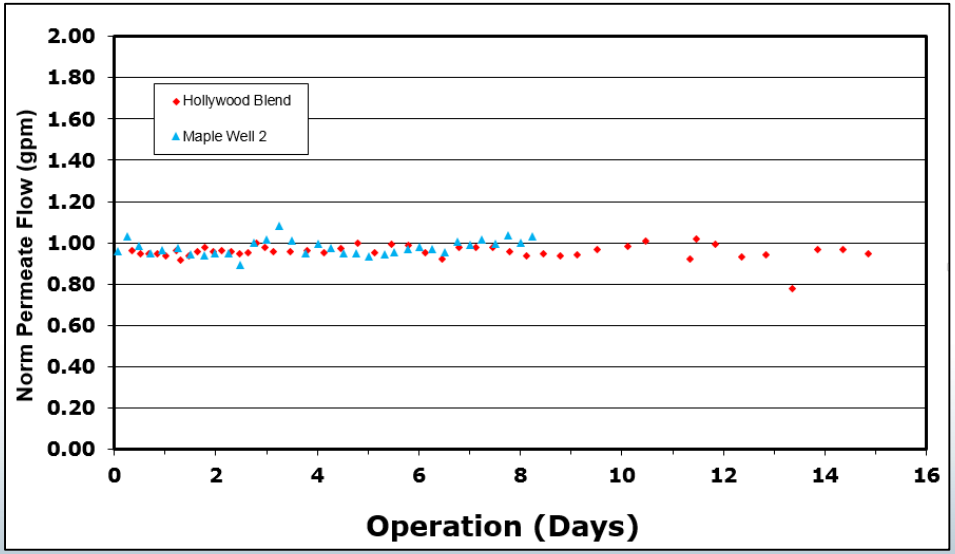
Summary:

- Removed hydrogen sulfide to non-detect levels, verified by HACH test kit and laboratory analyses

RO Operation

- TDS, hardness, silica removed to non-detect in RO permeate
- No accumulation in differential pressure or salt passage, and no decline in normalized permeate flow after 15 days of continuous operation => Minimal RO fouling





Recommendation: Raw Water Blowdown

- Remove particles within the well raw water pipelines upon well start-up
- Flush out constituents with large chlorine demand

Recommendation: Sand Separator

- Capture particles such as iron sulfide and sand, which wells produce during operation
- Reduce particle loading to RO process, prevent membrane fouling and differential pressure shutdown

Recommendation: Oxidation/Media Filtration

- Remove iron sulfide, hydrogen sulfide, iron, manganese, and arsenic
- Stabilize raw water and provide RO with particle-free water

Preliminary Cost Estimate

- Class 3 Estimate (-10% to +30%): $7.1M to $10.3M, most probable cost approx. $8M

Description	
Direct Costs	
Raw Water Blowdown	$76,100
Sand Separator System	$190,100
Media Filter System	$1,779,600
Chemical Systems	$189,300
Cartridge Filters	$3,800
General Conditions	$792,200
Civil Yard Piping	$38,000
RO Process and Electrical	$965,800
Total Direct Costs	$4,034,900
Contingency (30%)	$1,210,500
Subtotal	$5,245,400
General Contractor Overhead and Profit (10%)	$524,600
Subtotal	$5,770,000
Escalation to Mid-Point of Construction (3%)	$173,100
Subtotal	$5,943,100
Sales Tax (50% of Direct Costs)	$261,500
Subtotal	$6,204,600
Bid Market Allowance (2%)	$124,100
Total Estimated Construction Cost	$6,328,700
Engineering (18%)	$1,139,200
Owner's Agent (6%)	$379,800
TOTAL	**$7,900,000**

Project Delivery

- Carollo and City staff recommends Progressive Design-Build, due to following advantages:
  - Early selection of project team and City input on design elements and costs throughout process
  - "Open Book" estimating by contractor, allows City to be involved in development of a guaranteed maximum price (GMP) for project
  - Availability of "off-ramps", which allows City to abandon contractor and engineer if an agreed upon GMP cannot be reached
  - Time savings of at least 4 months (no bidding phase, overlapping design and construction activities, and early equipment purchase etc.)
  - May include short-term (6-12 months) operational phase to facilitate start-up and fulfill regulatory compliance requirements

Preliminary Schedule

- Based on progressive design-build project delivery:
  - ***14*** to ***18 months*** including design, construction, coordination with agencies (DDW), and start-up/commissioning
  - Schedule subject to change depending on DDW requirements (e.g., prolonged demonstration period)

Actions to Date, Next Steps

- Presented to PWC Ad hoc April 30, 2018
- Presented to PWC May 10, 2018

- City Council Liaison
- City Council Study Session

- Initiated discussion with Planning re: Neg. Dec. La Brea, Cat. Exemption for WTP
- Continued discussion with DDW re: permitting

Staff Recommendations

Staff Recommendations:

- Receive and file Final Piloting Report, Carollo, May 2018
- Support and affirm the recommended enhancements to the Water Treatment Plant identified in the report; and
- Support and affirm that the recommended enhancements be modified to include allowances/provisions/tie-ins to accommodate future expansion to the Water Treatment Plant to receive and treat additional flow from the La Brea sub-basin as it becomes available; and
- Support and affirm future maintenance of the Hollywood Basin wells; and
- Support and affirm a Progressive Design- Build-Commissioning Delivery method