

Design of a Corrosion Control and Ultraviolet Disinfection Facility for Groundwater

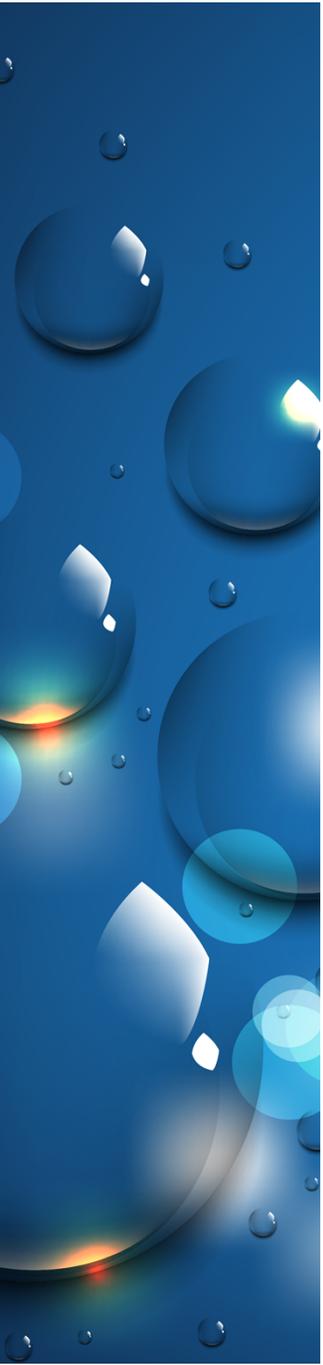
Presented by:

Andy Szatkowski, P.E. (OR, WA, ID)

MSA

Murray, Smith & Associates, Inc.
Engineers/Planners

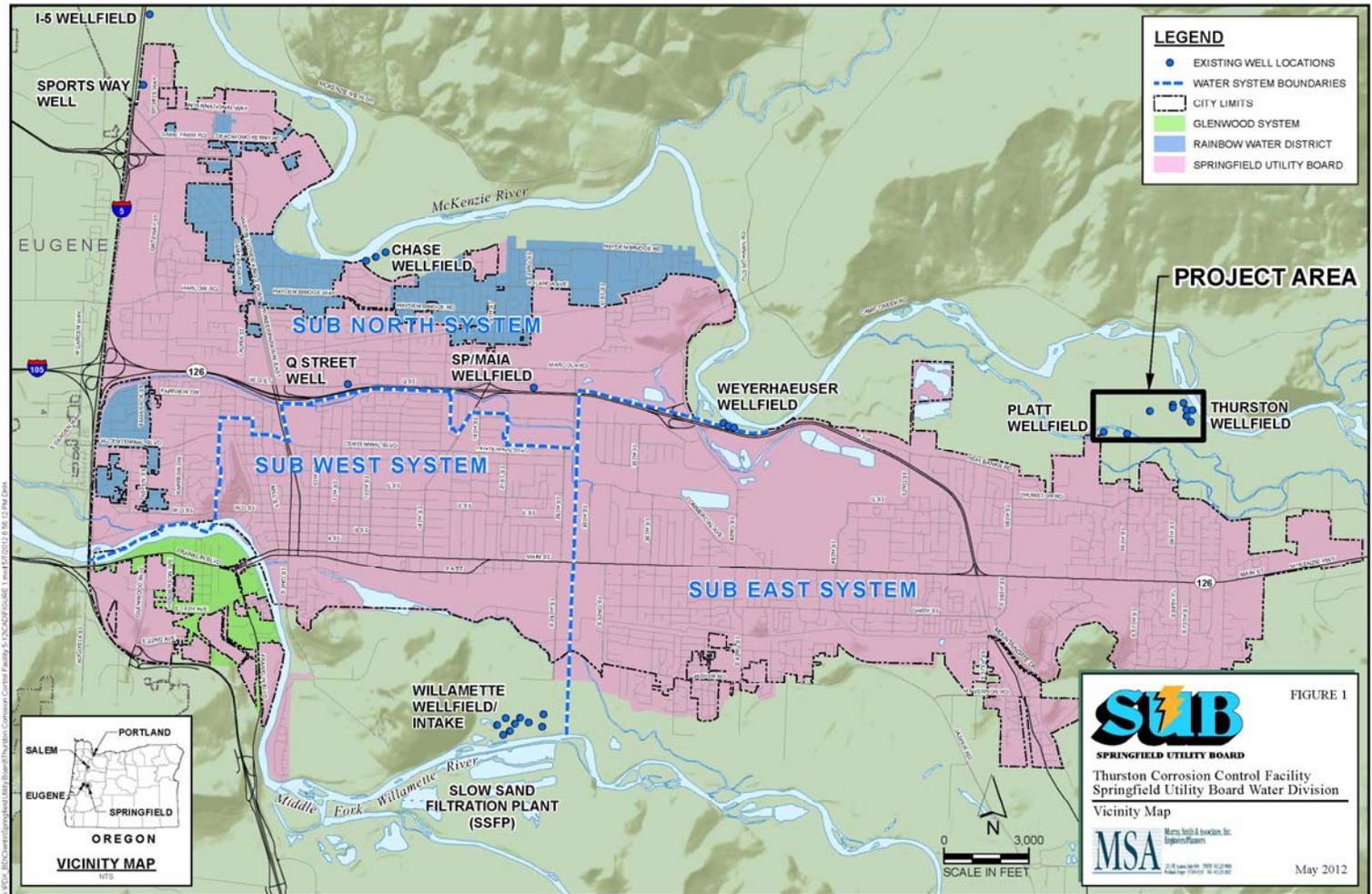
121 S.W. Salmon, Suite 900 PHONE 503.225.9010
Portland, Oregon 97204-2919 FAX 503.225.9022



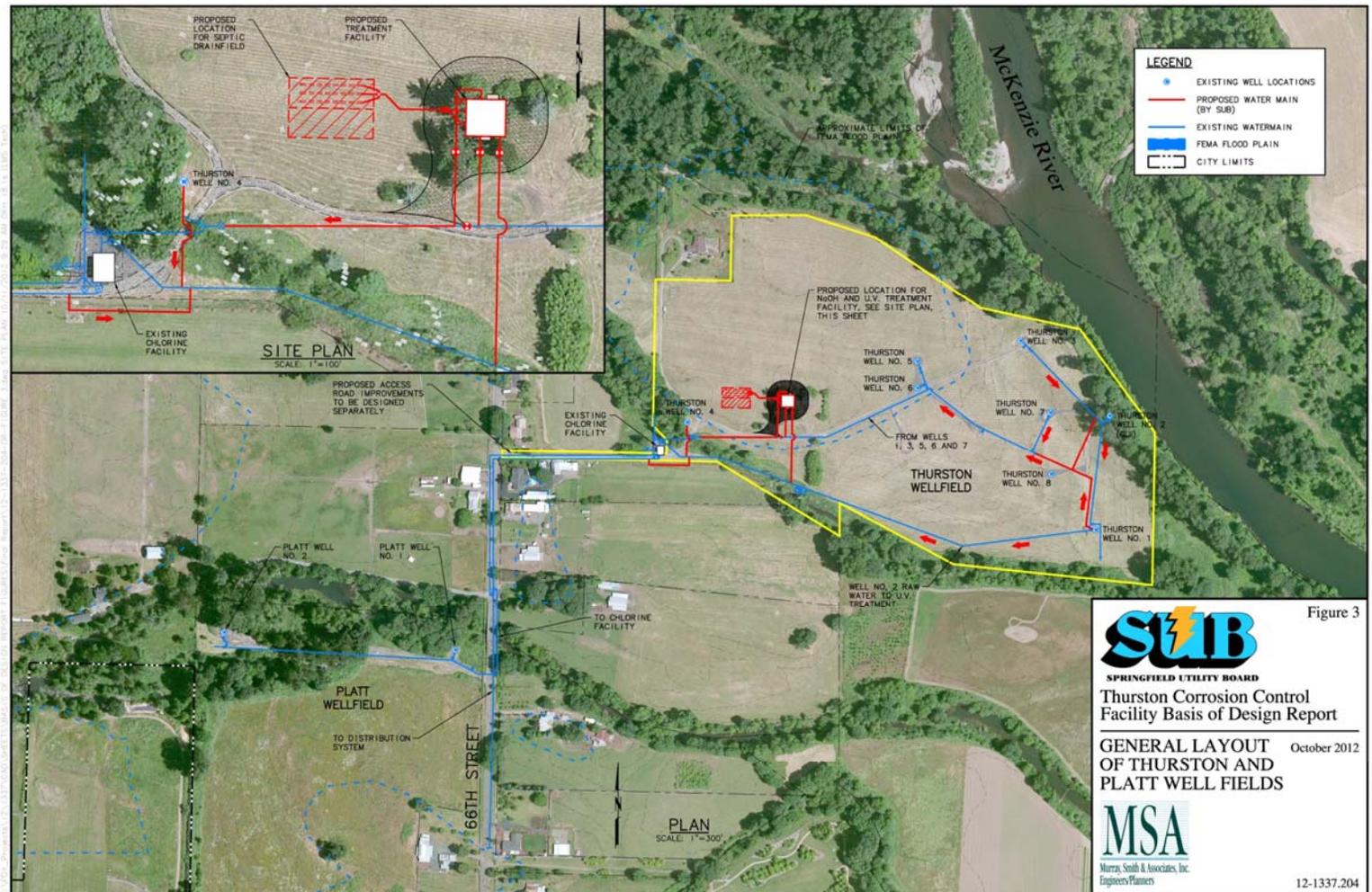
Project Objectives

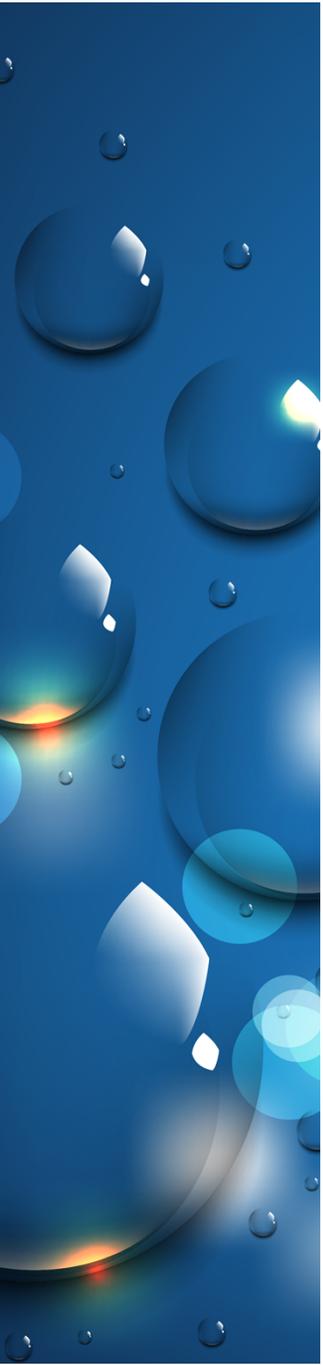
- **Adjust pH of water from all wells in Thurston & Platt Well Fields**
- **Primary disinfection for well producing groundwater under the influence of surface water**

Project Vicinity



Thurston & Platt Well Fields





Background: Corrosion Control

- Oregon Health Authority Drinking Water Program required SUB to adjust $\text{pH} \geq 7.5$
- 7 Thurston wells, 2 Platt wells
- Total production capacity = 7 mgd



Prelim Design: Corrosion Control

- **Caustic soda & packed tower aeration both feasible**
- **Caustic Soda: lower capital cost, higher annual cost, lower NPW**
- **25% caustic soda use:**
 - 8 gal/day min use
 - 308 gal/day max use
 - 4,000 gallons max month use



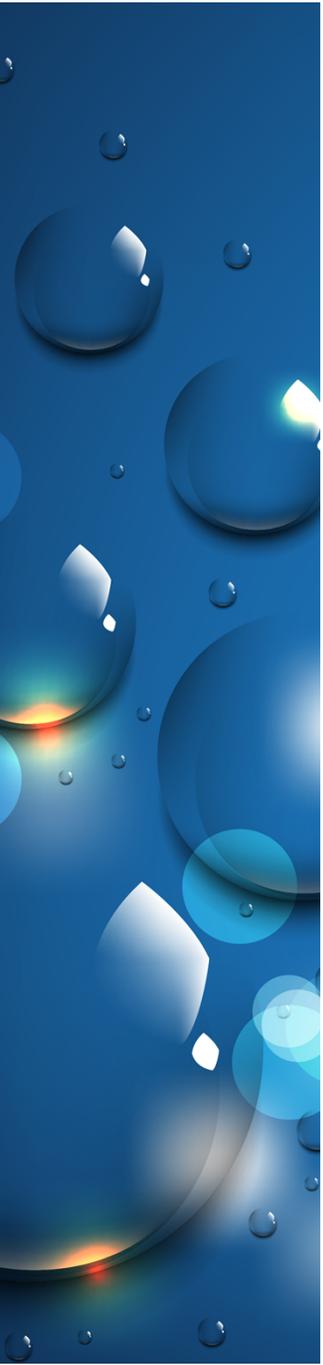
Background: UV Disinfection

- **Thurston Well No 1 – Not GUI**
- **Thurston Well No 2 – GUI**
- **Thurston Well No 7 – likely to be GUI**
- **Remaining wells – status not yet determined**



Design Criteria: UV Disinfection

- Initial firm capacity – 2.3 mgd
- 1 duty, 1 standby initially
- Build out firm capacity – 7 mgd
- Max 3 duty reactors at build out
- 3.0-log *Giardia*, 3.5-log *Crypto*
- Min UVT at 254 nm = 80%
- Virus inactivation from chlorine



Project Schedule

- Corrosion control implemented under a regulatory schedule
- UV disinfection implemented at same time as CCF
- Pre-purchase of UV equipment
- Design to accommodate all UV alternatives until equipment selected (~60 to 90% level)

Timeline

Workshop
No. 1: CCF
Concepts

Draft
Basis of
Design
Report

Workshop
No. 2: UV
Concepts

30%
Design
Submittal



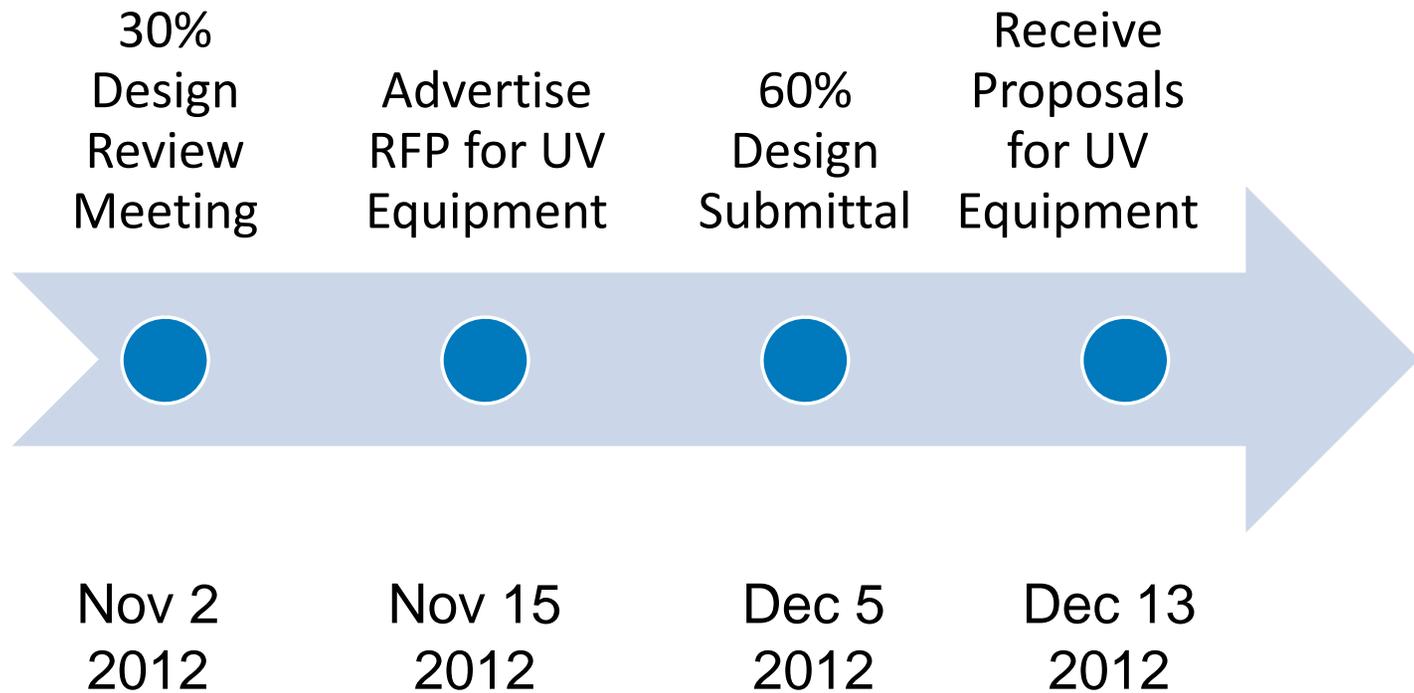
Jul 24
2012

Sep 7
2012

Sep 27
2012

Oct 12
2012

Timeline



Timeline

60%
Design
Review
Meeting

Notice of
Intent to
Purchase UV
Equipment

90%
Design
Submittal

Submit
Validation
Report to
OHA DWP

Dec 21
2012

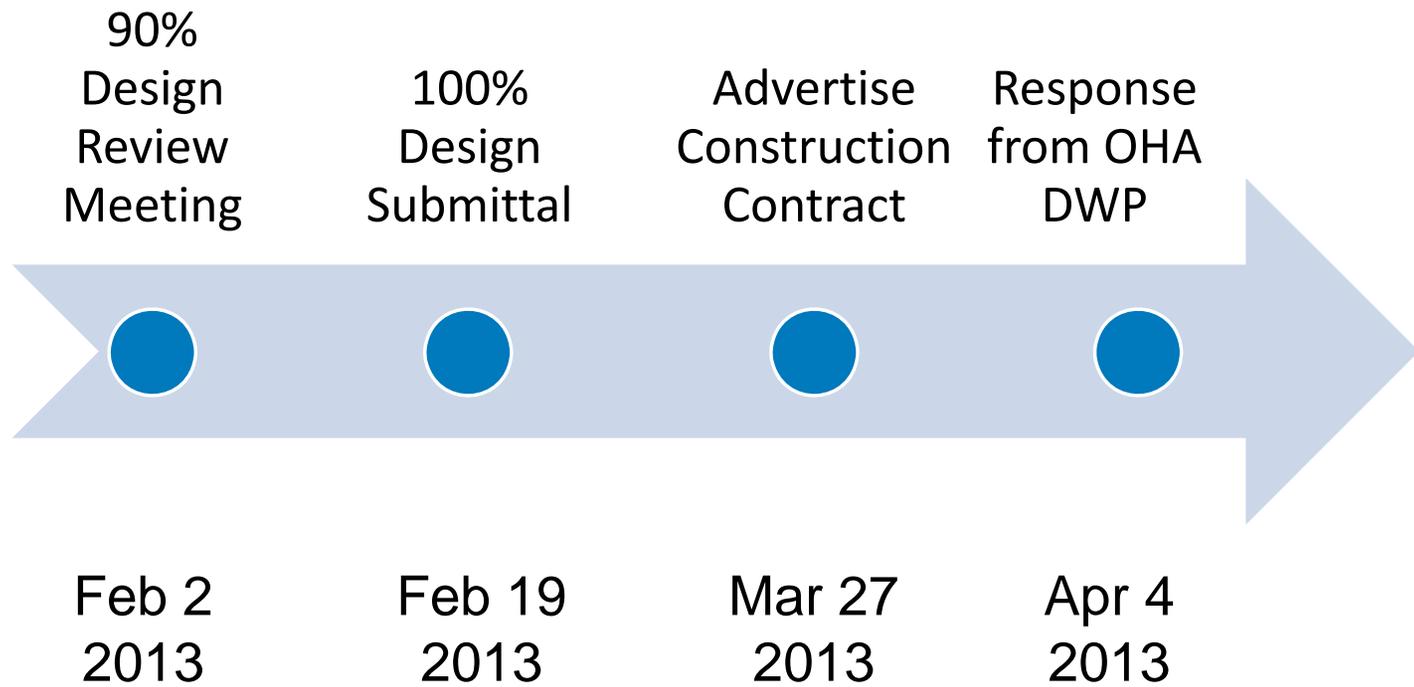
Jan 16
2013

Jan 18
2013

Jan 21
2013



Timeline



UV Equipment Procurement

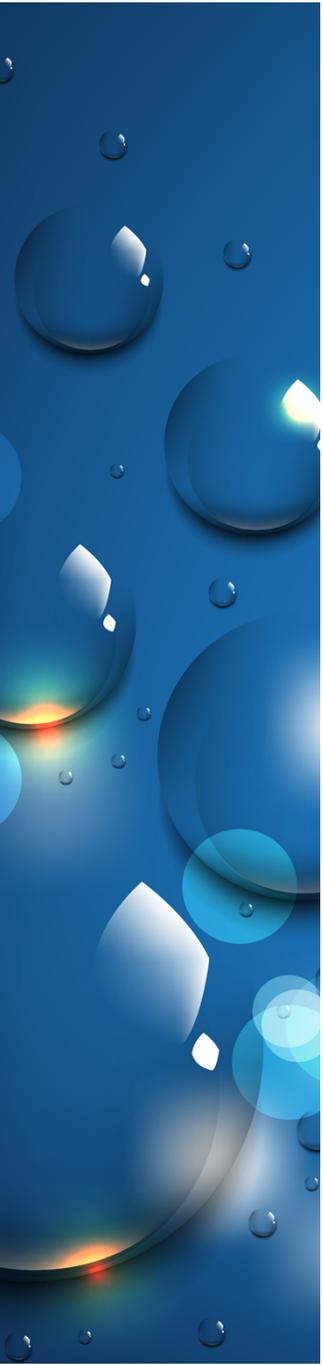
- Existing LP UV reactors at Willamette WTP - Wedeco BX400





UV Equipment Procurement

- **BX400 model discontinued**
- **Remaining models in BX series oversized for this project**
- **Replacement model validation report still in process in fall 2012**
- **Existing reactor dose for 3-log Giardia inactivation per DVGW & ONORM, not UVDGM**



UV Equipment Procurement

- **Conducted analysis of three manufacturers**
- **Included LP and MP systems**
- **Identified no obvious benefit from sole source procurement**
- **Selected competitive process for procurement**



UV Equipment Procurement

- **MP and LP systems allowed**
- **Max 3 duty reactors at 7 mgd**
- **Submit validation report with proposal for review by OHA DWP**
- **Purchase contingent on OHA acceptance of report**



Evaluation Criteria

- **Equipment Performance – 40 points**
 - Disqualify any vendor failing to meet min requirements for either Q or UVT
 - SUB wanted a margin of safety on Q and UVT
 - 0 to 20 pts: Q_{max} for 3.5-log Crypto at 95% UVT = 1.0 to 1.3 times Q/reactor at build out
 - 0 to 20 pts: min UVT required for 3.5-log Crypto inactivation at Q/reactor at build = 95% to 85%



Evaluation Criteria

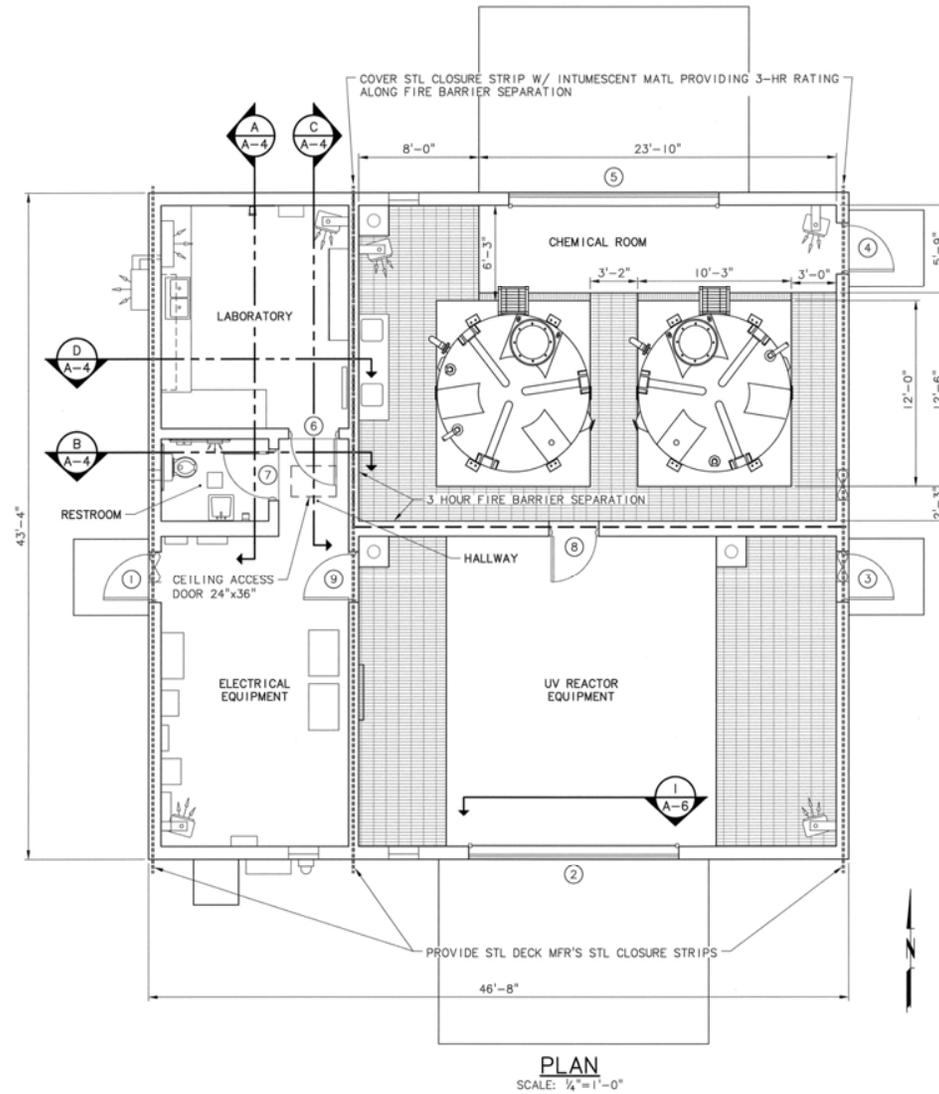
- **Length of warranty on lamps & ballasts – 20 points**
- **References – 30 points**
- **Experience and number of installations – 10 points**
- **Meet the delivery date – 10 points**
- **Life Cycle Cost – 20 points**
 - Lowest cost received 20 points; more expensive units scored as a ratio of unit cost to lowest cost



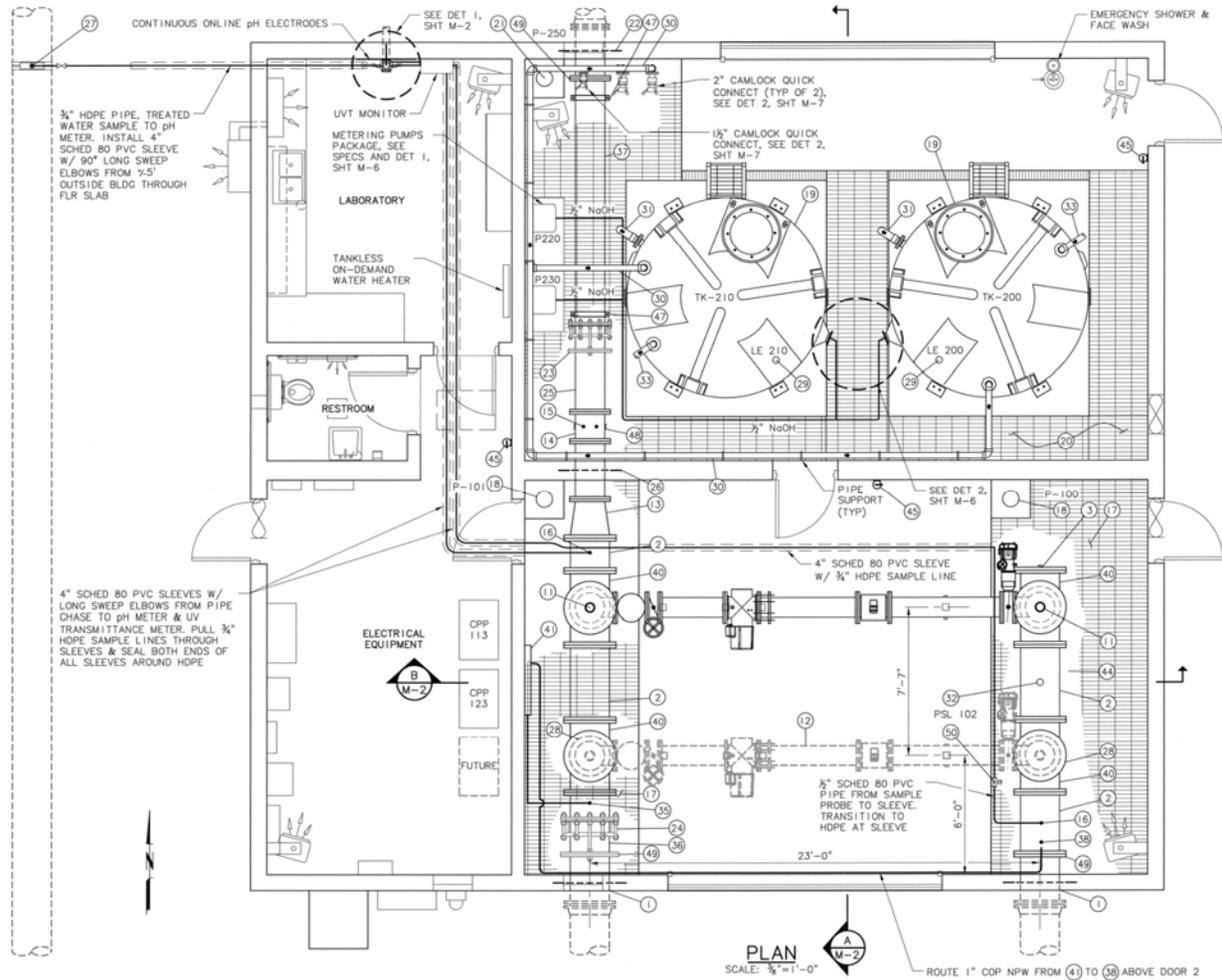
Procurement Process

- Received 4 proposals from 4 manufacturers
- None disqualified
- 3 MP, 1 LPHO
- Selected a MP reactor
- Validation report reviewed and accepted by OHA DWP

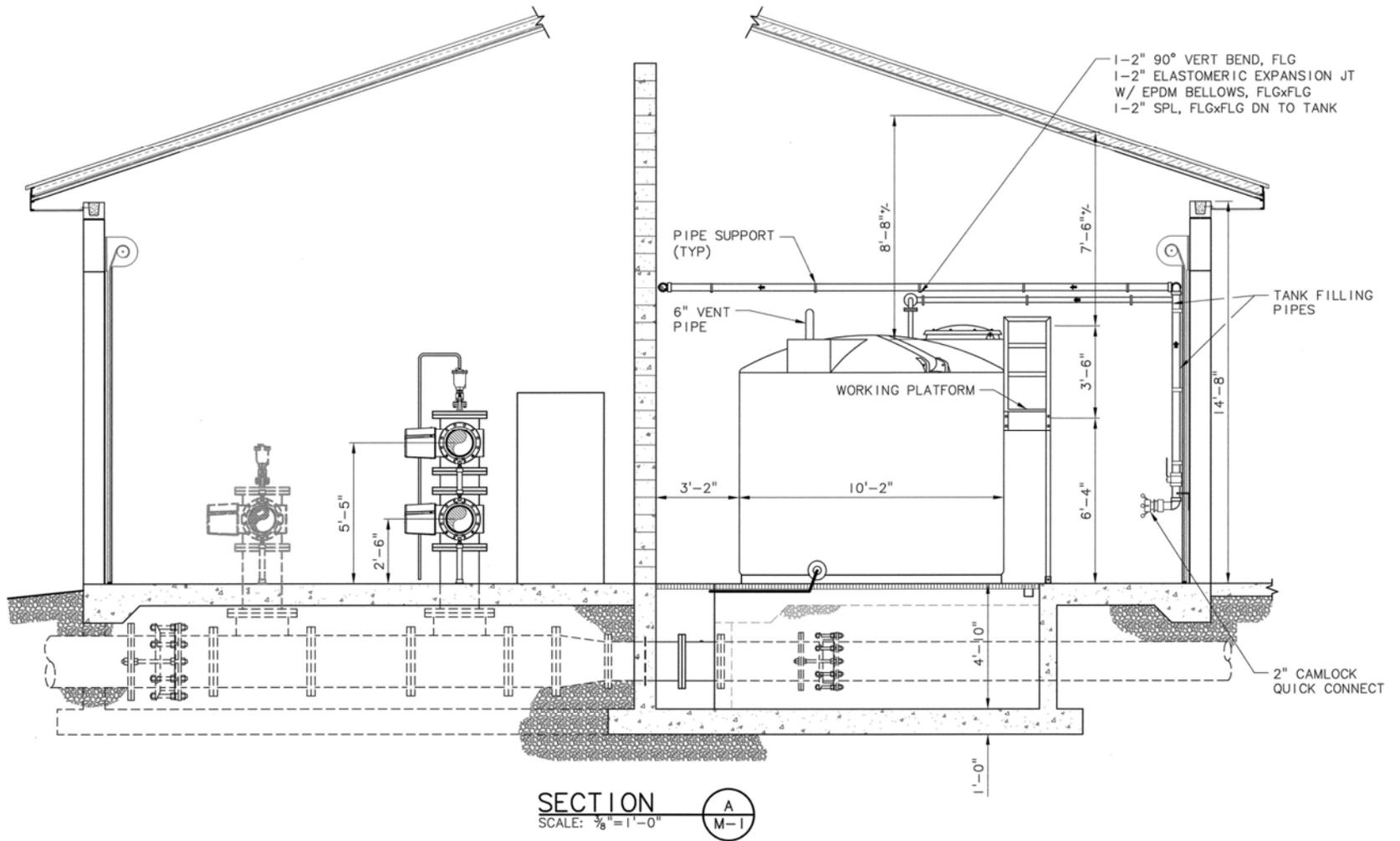
Facility Layout



Facility Layout



Facility Layout



Facility Layout



Facility Layout



Facility Layout





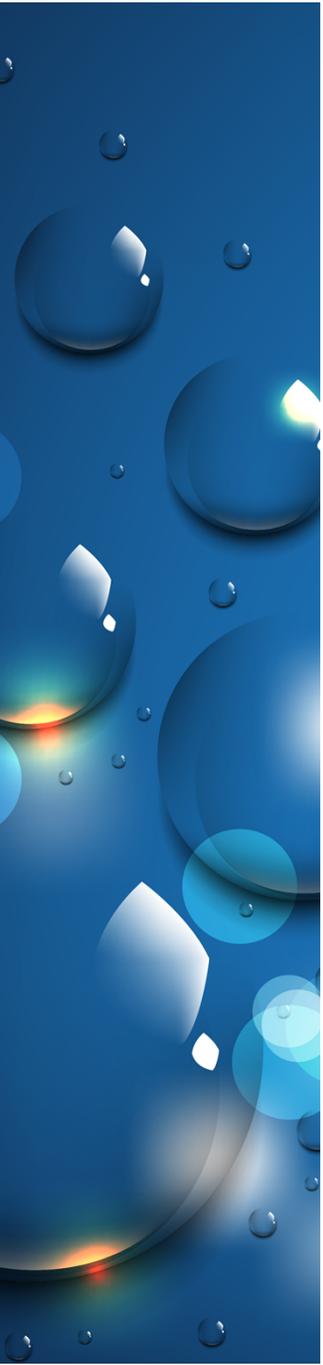
Caustic Soda Design

- **Two tanks each 4,600 gallons**
- **Secondary containment**
- **Chem pumps & injection quills within containment area**
- **Allow tank removal for future replacement of tanks**



Caustic Soda Design

- **Camlocks for filling tanks & pumping spills above containment area**
- **On demand water heaters for lavatory, lab sink, eyewash & emergency shower/facewash**



UV Design

- **Two reactors, initially stacked**
- **Space for future third reactor**
- **Control and power panels in separate electrical room**

QUESTIONS



Andy Szatkowski,
503 225 9010
as@msa-ep.com

MSA
Murray, Smith & Associates, Inc.
Engineers/Planners
Portland, Oregon