

West Coast Water Treatment – Supporting the NEXT Permit Cycle

Scalable + Adaptable Treatment

Speaker



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Overview

Nationwide Turnkey Water Treatment Solutions

Comprehensive Approach

- Permitting & Compliance
- Design/Build
- Treatability/Pilot Studies
- Multiple Technologies

Markets Served

- Construction Stormwater & Dewatering
- Remediation
- Industrial/Municipal Storm & Wastewater
- Natural Resources
(Oil/Gas, Mining, Forest Products)

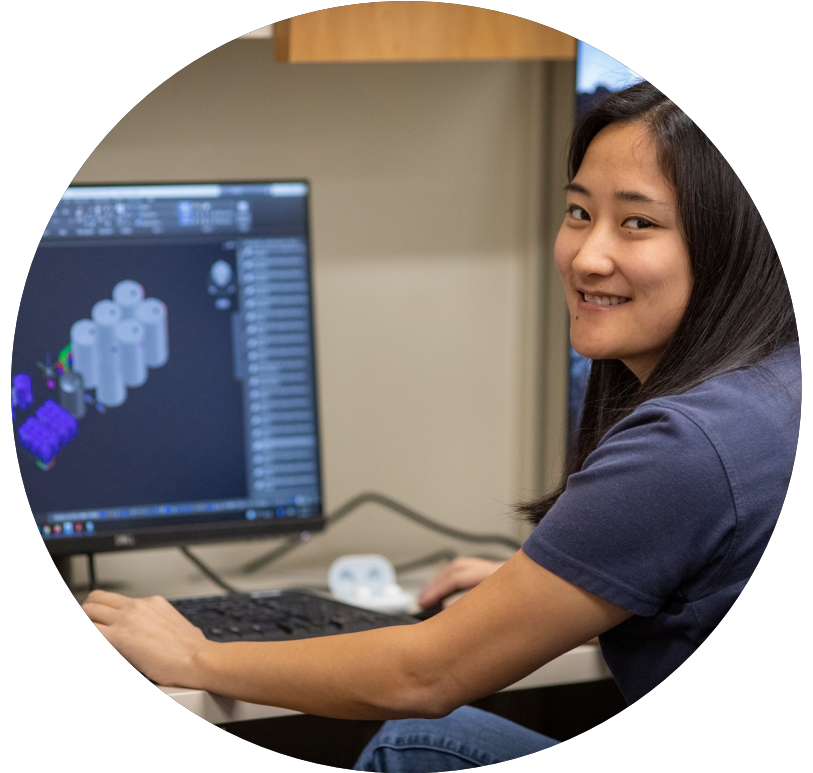
Services

- Consulting/Design/Permitting
- Installation & Training
- On-Going O&M Support
- Manufacturing Capabilities



Turnkey Solutions

- Design/Build Expertise
- Site Characterization
- Proof of Treatment Planning
- Project Management
- Rentals, Purchases, & Pass-Throughs
- Effective and Efficient: Automation
- Ongoing Operations and Maintenance
- Permitting Support and Consulting



Why Clear Water?



People

- Industry Recognized Experts
- Training & Safety Record
- Company Culture
- Regulatory & Consulting Expertise
- Vendor Support Network
- Woman-Owned Business Enterprise (WBE)



Equipment

- Quality & Craftsmanship
- Innovative
- Reliable & Repeatable
- Smart & Scalable
- Options-Based



Data/Truth Driven

- Technology-Neutral
- Smart Automation
- Alarm Management & Machine Learning
- Dashboard Experience



Client Focus

- Timely & Straightforward Communication
- Fiscally Flexible
- "Best Fit" Solutions
- DBOM - "For the Life of Your Treatment System"
- Repeat-Customer Focused

Water Treatment Evaluation



Pilot Systems

What's Possible?

- Determine full-scale treatment efficiency
- Low-Flow Pilot:
 - Multiple treatment trains may be analyzed based on bench-scale testing
- Full-Scale Pilot:
 - Interim Compliance (60-Day NOI & AO)
 - Rent to Purchase Options (RPO)
- Helps to Identify:
 - Long Term O&M Costs per Technology
 - Variable Influent Water Quality Conditions
 - Onsite Infrastructure Challenges
 - Overall Treatment Feasibility Design
 - Design Modifications



Pilot Systems – What’s Beneficial?



TEMPORARY
TREATMENT TO
MEET NALS
AND
REQUIREMENT
S OF NGO



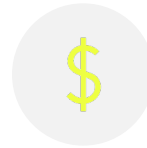
TEMPORARY
AND/OR
IMMEDIATE
WAY TO MEET
NEEDS OF
NGOS



A MEANS TO
EVALUATE
DIFFERENT
CHEMISTRIES
AND/OR MEDIA
BLENDS



ACTUAL
CONSUMABLES
\$



ACTUAL O&M
BUDGET

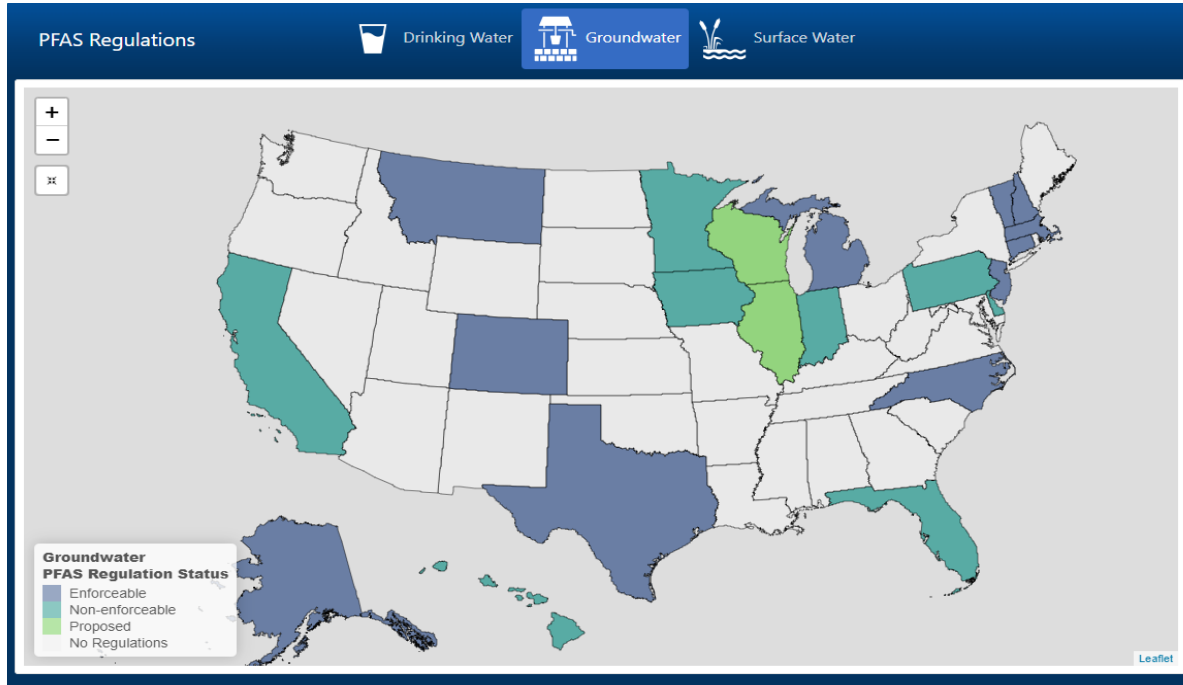


REAL WQD
WITH VARIOUS
RAIN
INTENSITIES



PROVIDE
OPTIONS
BASED ON
RISK/PERFORM
ANCE

Emerging Contaminants PFAS, 6ppd-quinone, PCBs, etc.



WA Boatyard Permit

- Covers industrial wastewater AND/OR stormwater runoff from boatyards that do construction, repair, or maintenance of small vessels
- Changes in this Permit bring the BYGP closer to alignment with ISGP

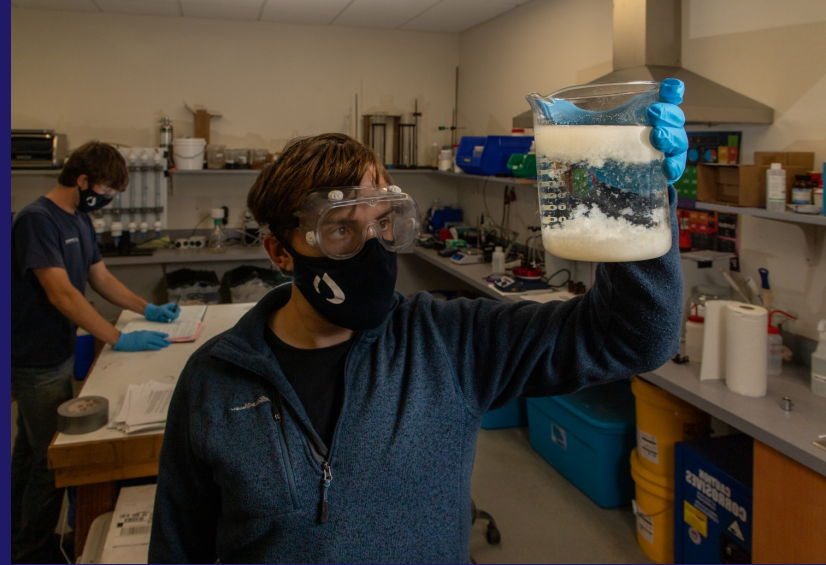
Significant changes to daily benchmarks:

- Addition of daily benchmark maximums for **turbidity, pH, and diesel-range hydrocarbons**; previously, the permit only included total Cu and total Zn.
- Total Cu benchmark lowered an order of magnitude for marine and western freshwater, from 147 ug/L to **40 ug/L**

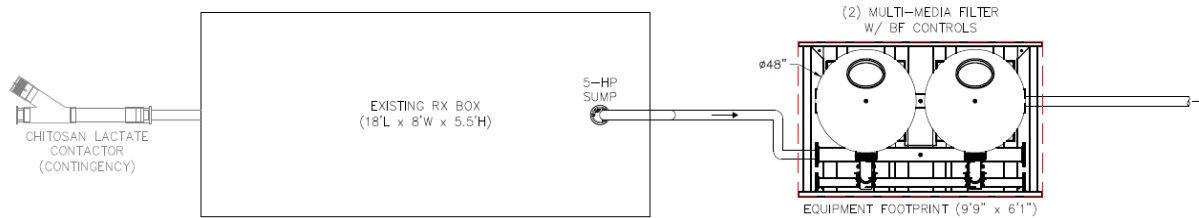
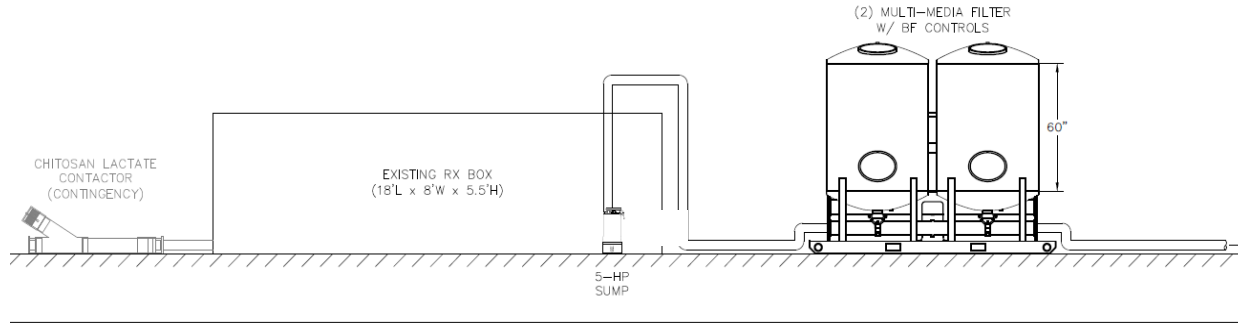


The 'Simple' Retrofit

- Permitted boatyard in Greater Seattle area
- Struggles with copper, zinc, TSS, turbidity, oil, TPH
- Drawing from stormwater treatment experience with similarly high metals levels
- treatability testing using two different polymer treatments, four different adsorptive media, and various dosing and filtration approaches
- Conclusion: passive chemical additive, filtration + adsorption
- 2-pod deep-bed media filtration system designed with future contingency planning for additional permit changes.



Built-In Contingency



Findings?

- Proactive = success
- Small amounts of additional tweaking, and initiation of contingency planning, will likely be needed to achieve standards at this site as currently proposed
- Massive reductions in runoff with extraordinarily high copper levels show benefit of application at other boatyards and similar industries with similar contaminants
- Retaining and augmenting existing infrastructure saves money and time!

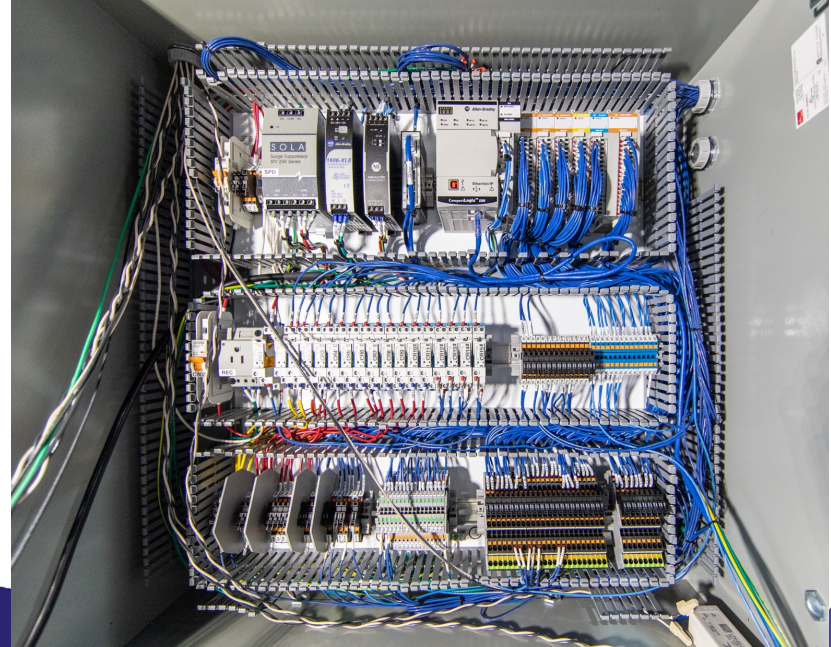


Scalable Case Study – Controls & Telemetry

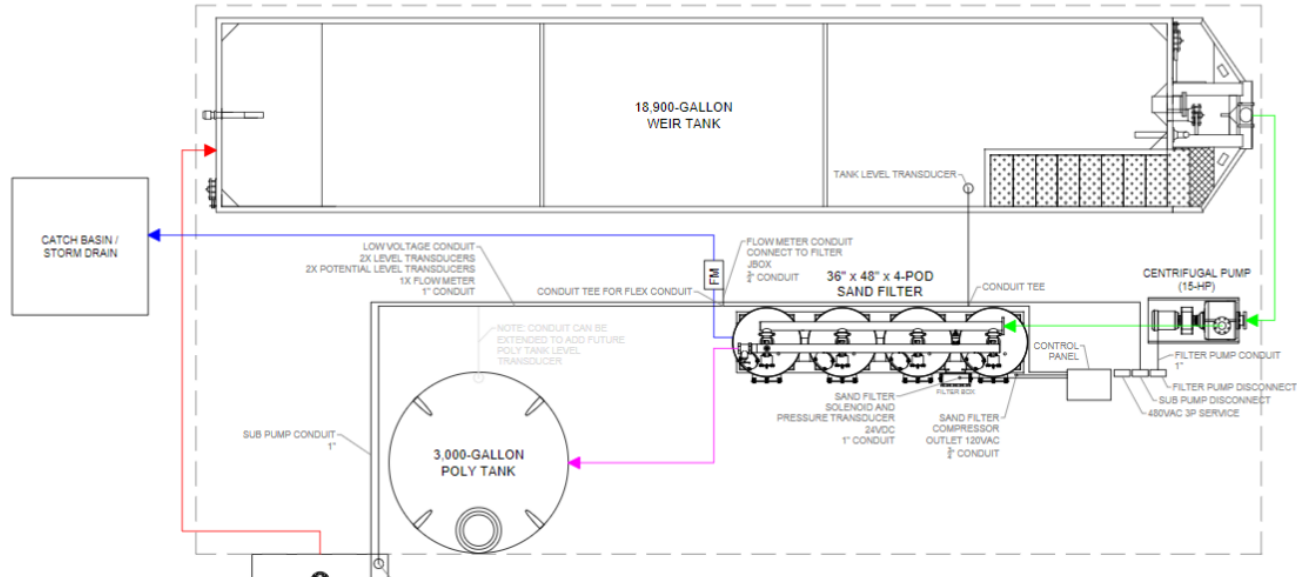
- Los Angeles, CA
- Compliance under IGP
- Early Treatment Design
- 300-GPM
- Particulate Bonded Al, Fe and Zn



Built-In Contingency



Final Configuration



The Complex 'Adaptable' Case Study



Built-In Contingency

- Variable Influent TSS and pH
- Metals Mostly in Dissolved State
- Scalable Treatment Capacity
- 300 – GPM Pump & Treat
- 4 Year Operational
- Keeping a close eye on...
- Recirculation & Bypass Events
- Media Breakthrough Rate



Final Treatment - Conclusions



Settling

Chemical
Treatment

Particulate
Filtration
(20 um)

Particulate
Filtration
(5 um)

Adsorption
Multi-Media

Takeaways

- Treatment DOES work.
- Can be cost effective IF designed early – phased in approach is always an option.
- Balance RISK and PERFORMANCE
- What's NEEDED vs. What's Beneficial LATER
- System Performance Monitoring
- Automation and Telemetry



Thank you!