Date: November 3rd, 2025

Project: City of Albany, OR – Phase I-Surface Water Treatment Facility Process & Capacity Improvement Project - Onsite Training Course

To: Chris Germond – Water Treatment Facility Manager, City of Albany, OR
Scott LaRoque – Public Works Manager, City of Albany, OR

Attending: Chris Germond – Water Treatment Facility Manager, City of Albany, OR
Scott LaRoque – Public Works Manager, City of Albany, OR
Operators: Susan Turner, Ray Leipold, Tim Wainwright, Dan Morgan, Ruth Rietman, Albert Valencia

Chris Beebe – President, BWS, Inc.
Gregory F. Nieckarz – Scientist, BWS, Inc.

Purpose, Scope, & Objectives

The objective of the recent onsite engagement at the City of Albany, OR-Conventional Water Treatment Facility was to undertake a comprehensive assessment of current water treatment operations and identify practical opportunities for process improvement and optimization. The action plan initiated during this visit focused on supporting operators in the evaluation and enhancement of raw water conditioning, with an emphasis on chemical control, treatment efficacy, and process adaptability.

Facility Overview and Baseline Conditions

The Albany Conventional Plant is designed for a capacity of up to 20 million gallons per day, drawing surface water with notable seasonal and event-driven fluctuations in quality. Source water is characterized by:

- Chronic low alkalinity (routinely < 20 mg/L as $CaCO_3$), which impacts coagulant performance.
- Variable turbidity, ranging from <1 NTU up to 50 NTU following significant storm events.
- Elevated dissolved organic carbon (DOC), typically 3–7 mg/L, which affects coagulant demand and disinfection byproduct formation potential.
- pH values in the range of 6.5–7.2 at the raw water intake, with modest daily fluctuation.
- Occasional elevated manganese and iron associated with the canal source and agricultural runoff.

The conventional treatment strategy in place utilizes aluminum chlorohydrate (ACH) as the primary coagulant, dosed according to feedback from jar testing and historical seasonal performance. The plant also has the capacity for pre-alkalinity addition (magnesium hydroxide or sodium bicarbonate) and employs polyaluminum hydroxychloro sulfate (PAHCS) as an alternative coagulant as needed.

Onsite Engineering Evaluation and Activities

The onsite evaluation consisted of:

Direct measurement and chemical analysis of raw and settled water, focusing on alkalinity, turbidity, pH, and DOC (via UVA/UVT).

Baseline jar testing using the facility's standard ACH dosing (ranging from 15 to 35 mg/L as Al_2O_3). Results confirmed that charge neutralization was often incomplete without supplemental alkalinity, and floc formation was suboptimal in low-alkalinity scenarios.

Alternative chemistry trials: Addition of magnesium hydroxide (targeting a post-addition alkalinity of 40–50 mg/L as $CaCO_3$) prior to ACH, and comparative runs using PAHCS at various dosages. These tests consistently demonstrated improved floc formation, reduced settled turbidity (down to 0.3 NTU in optimal conditions), improved UV transmittance (increases of 5–10%), and more stable pH in the clarified water.

Visual and instrumental assessment of water clarity, pin-floc formation, and sludge characteristics.

The training component was deliberately structured to utilize the facility as a real-world classroom, allowing operators to participate in hands-on chemical adjustments, data collection, and interpretation. This enhanced operational awareness not only of conventional treatment but also of the advantages and decision criteria for adopting alternative coagulants and pre-treatment strategies.

Findings and Action Items

The plant's raw water alkalinity is typically insufficient for optimal coagulant performance; supplemental chemical addition (magnesium hydroxide or sodium bicarbonate) should be integrated as a routine procedure during low-alkalinity periods.

Alternative coagulants (such as PAHCS) demonstrated clear performance benefits in terms of turbidity removal and organics reduction, particularly during periods of high DOC or variable influent quality.

Operators demonstrated proficiency in implementing and interpreting jar tests and are now better equipped to adapt chemical strategies in response to raw water changes, especially during storm events or periods of agricultural runoff.

Continuous monitoring of UVA/UVT and systematic recording of dosing regimes and performance metrics are recommended to track improvements and support regulatory compliance.

Further testing is planned to refine dosing protocols for chemical additives and to prepare for anticipated increases in turbidity and DOC during late-season rainfall events.

Conclusion

The evaluation confirmed that the Albany Conventional Water Treatment Plant can achieve improved process stability and finished water quality by implementing routine alkalinity supplementation and leveraging a broader range of coagulant options. The collaborative onsite effort established a robust framework for ongoing process validation and operator-led optimization. The next phase will focus on developing standard operating procedures for chemical addition and verifying performance under varying raw water conditions.

Further testing is to be coordinated and scheduled in anticipation of the seasonal increase in turbidity following significant rainfall later in the year.

Thank you and best regards,

Chris Beebe – President, BWS, Inc.

Gregory F. Nieckarz – Scientist, BWS, Inc.

Appendix

Attribute assessment of visual water clarity and pin-floc formation provided valuable indicators for evaluating treatment efficacy. Dissolved organic carbon, monitored via UVA/UVT analysis, served as the primary continuous variable for water quality comparison.

An initial set of Jar Tests was evaluated to baseline Surface Water Treatment Performance using the incumbentl Aluminum Chlorhoydrate at various dosages. The dosage variation bracketed the current dose being utilized by the plant.

Photo #1

A comparative Jar Test was conducted utilizing the incumbent coagulant bracketing the current plant dose in jar 1, 2 and 3. Jar 4, 5 , 6 were comparative utilizing alkalinity enhancement and an alternate coagulant, BWS, Inc. CTC-00011 (PAHCS) (see Photo #1). Substantial clarification and pronounced floc formation can be seen in Jars 5 and 6 indicating the pronounced advantage of alkalinity enhancement.

Photo #2

With in minutes substantial clarification occurs in Jars 4,5 and 6 while pinpoint floc is still developing in jars 1, 2 and 3. This further indicates the proper utilization of the clarification step can be accomplished in the conventional plant.

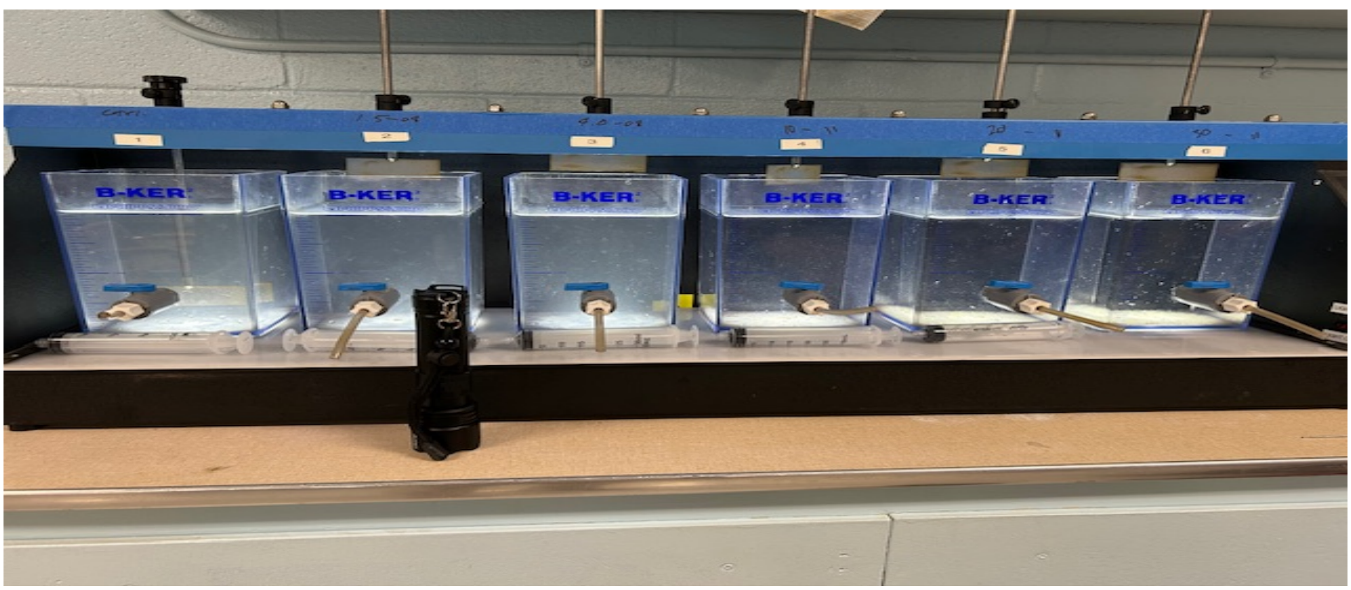

Photo #3

At the conclusion of the settling time moderate improvement to clarity in Jars 4, 5 and 6 were observed, indicating the very rapid clarification is nearly complete within the first few minutes of the clarification/settling step. This indicates a string settling floc not prone to carryover in a clarifier. Pinpoint floc in Jars 1, 2 and 3 never proceed to substantial settling, and assumes an incomplete coagulation due to insufficient alkalinity.