

ACTIFLO® Softening: Removing Hardness at the Source

Clarification | Case Study

Okeechobee Utility Authority

The Client

The ACTIFLO® pilot was operated at the Okeechobee Utility Authority (OUA) groundwater plant in Okeechobee, Florida.



The Benefits

- Reduced coagulant consumption
- Extremely small footprint
- High upward flow up to 40 times better than conventional systems
- Easy installation
- Improved mixing
- Accelerated chemical precipitation reaction

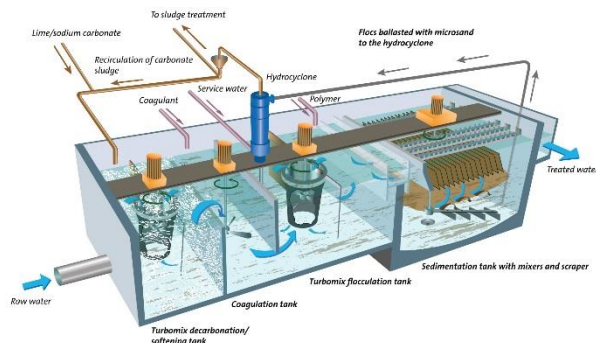
The Client's Needs

A pilot study was conducted to demonstrate the ACTIFLO® Softening process in the removal of total hardness and alkalinity from the Okeechobee plant's ground water source. The groundwater plant, with a capacity of 1 MGD, is located in Okeechobee, Florida and pumps water from shallow wells. Average daily production for potable drinking water is just over 2 MGD with a maximum of over 3 MGD.

The Solution

The ACTIFLO® process is a compact, high-rate, micro-sand ballasted clarification system capable of enhanced total hardness and alkalinity removal from drinking water. The process utilizes coagulant and polymer addition to remove pollutants from the water and micro-sand to aid in rapid settling and clarification.

The ACTIFLO® Softening process combines the high-rate, micro-sand ballasted clarification system with a Turbomix™ softening reaction tank to chemically optimize the removal of total hardness and alkalinity. Based on the project demands, the ACTIFLO® Softening process was shown to be an excellent solution for the OUA groundwater plant.



Process Description

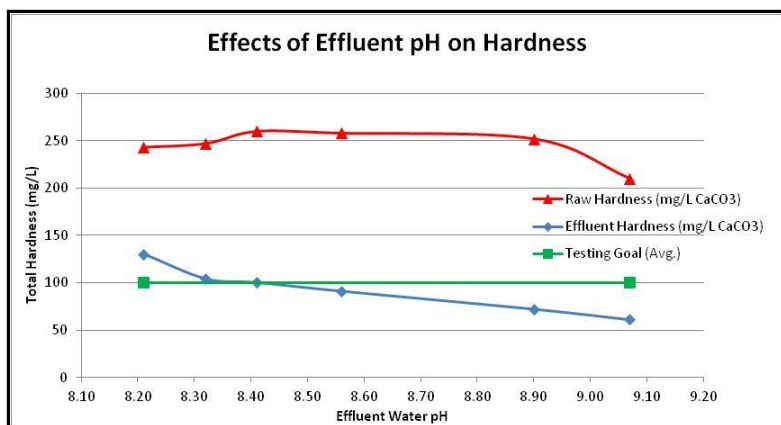
The purpose of the pilot study was to demonstrate ACTIFLO® Softening's ability to provide optimum clarified effluent for Okeechobee's distribution systems and consistently maintain reduced effluent total hardness and alkalinity from the groundwater sources. In order to simulate different potential conditions, the ACTIFLO® Softening process was operated using a variety of constituent levels and operational criteria. Standard runs using typical plant raw water were carried out to optimize chemical dosages. Chemical additions consisted of ferric chloride and calcium chloride coagulants and Hydrex™ 3596 (dry, anionic) polymer. Clarified effluent samples were analyzed throughout the study for total hardness, alkalinity, turbidity, pH, temperature, UV-254 and color.

Ferric Chloride mg/L	Polymer mg/L	pH		Total Hardness (mg/L)	
		Raw	Effluent	Raw Hardness (mg/L CaCO ₃)	Effluent Hardness (mg/L CaCO ₃)
7.0	0.7	7.48	9.07	210	61
7.0	0.7	7.54	8.90	252	72
7.0	0.7	7.24	8.56	258	91
7.0	0.7	7.24	8.41	260	100
7.0	0.7	7.24	8.32	247	104
7.0	0.7	7.24	8.21	243	130

Optimal pH levels between 8.3 - 8.7
No calcium chloride used during this testing

Results

The ACTIFLO® Softening process met the required effluent total hardness and alkalinity quality at the groundwater plant and demonstrated the ability to maintain performance over a period of time. Typical raw water total hardness and alkalinity concentrations were observed at 250 – 280 mg/L and 280 – 310 mg/L, respectively. The ACTIFLO® Softening process was able to consistently achieve total hardness and alkalinity removal to 90 – 110 mg/L and 130 – 160 mg/L, respectively. Chemical doses were 7.0 mg/L ferric, 225 mg/l calcium chloride (for alkalinity reduction only) and 0.6 mg/L of polymer Hydrex 3596. The pilot also determined the optimal effluent pH range to be between 8.3 and 8.7.



Based on the pilot study data obtained on the groundwater well at OUA, Kruger recommends using the above operating parameters to achieve desired effluent water qualities. The robust characteristics of the ACTIFLO® Softening system allow for increased removal of total hardness and alkalinity to minimize scaling and corrosion. Furthermore, the ballasted flocculation system allows for high-rate treatment over a short period of time minimizing the effects of variations in influent water quality.

Kruger

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