

Investigating iron release in distribution systems with blend variations of source waters and phosphate inhibitors

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Received 12 September 2008; Accepted 5 July 2009

ABSTRACT

The impact of phosphate-based inhibitors and pH adjustment on iron release in distribution systems was examined. Iron release was sensitive to water quality variations (alkalinity and chloride) associated with blending finished water (surface, ground, and desalinated). Finished waters with high alkalinity content (between 151 and 163 mg/L as CaCO₃) consistently mitigated iron release regardless of inhibitor use. Dissolved iron constituted about 10% of total iron release. An empirical model was developed that related water quality, inhibitor type, and dose to iron release. Blended orthophosphate (BOP) minimized total iron release followed closely by increasing pH (between 7.9 and 8.1), while orthophosphate (OP) dose did not affect iron release.

Keywords: Corrosion; Iron; Phosphate; Distribution systems; Source blending; Modeling

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