

Innovative Treatment Alternatives to Minimize Residuals Containing Nitrate, Perchlorate, and Arsenic

HIGHLIGHTS

Biological treatment of ion exchange brine.

Thermal treatment of perchlorate ion exchange brine.

Review of perchlorate and arsenic discharge/disposal regulations.

Development of perchlorate, nitrate and arsenic decision tree

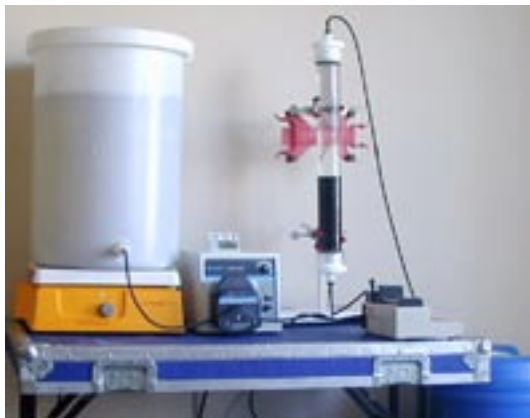
Recent regulatory changes have necessitated the development and evaluation of technologies used to treat perchlorate, nitrate, and arsenic in drinking water. Currently, the most widely used and accepted treatment technologies for the removal of these contaminants involve the generation of a concentrated waste stream, which must be further treated or disposed. Carollo's team, including ARA, EE&T, and Caltech, was selected by the American Water Works Association Research Foundation to investigate perchlorate, nitrate, and arsenic brine and concentrate treatment alternatives, which are critical waste management issues. The objectives of this proposed research are to: 1) identify different types of residuals generated and approaches required to meet overall perchlorate, nitrate, and arsenic treatment goals; 2) develop and evaluate processes to manage

and treat concentrate waste streams; 3) review pertinent regulations and compare costs and implementation issues associated with various treatment and disposal scenarios; and 4) describe the results of this work in a document that will serve as a tool to help utilities develop residuals minimization and handling strategies.

A limited number of accepted treatment options are commercially available for perchlorate—these include direct biological treatment and ion exchange processes. Since only ion exchange has been demonstrated and validated at full-scale for drinking water, the perchlorate/nitrate portion of the proposed research focuses on different types of ion exchange resins and regeneration techniques available.

Different resin regenerants (e.g., NaCl and FeCl₃/HCl) were investigated to minimize brine regeneration volume. Various brine treatment technologies that include biological and thermal processes, as well as treatment at a wastewater treatment plant were also investigated.

This study demonstrated technologies that can be implemented for the treatment of various arsenic-, perchlorate-, or nitrate-laden concentrates. The final assessment provided a basis for utilities to evaluate overall arsenic, perchlorate, or nitrate management strategies and will include evaluations of various residual management costs, discharge alternatives, and regulatory perspectives.



Carollo is evaluating perchlorate treatment at a wastewater treatment plant for AwwaRF.