

Treatability study predicts phosphorus and arsenic reduction

A patent-pending remediation process removes arsenic and phosphorus from groundwater, rather than requiring different unit operations for each contaminant.

The US company Blue Water Technologies successfully concluded a treatability study of its Vandal-ION™ process to predict reduction of phosphorus (P) and arsenic (As) from groundwater in the Eastern Michaud Flats Superfund site near Pocatello, Idaho, where groundwater from the area of Batiste Springs has been associated with excess orthophosphate entering the Portneuf River System.

The Portneuf River has a Total Maximum Daily Load (TMDL) that lists nutrients, including phosphorus, as pollutants of concern that must be remediated. The contaminant originates from phosphate ore processing facilities in the area. Arsenic contamination of groundwater has occurred in the same area.

This situation offers an interesting perspective on the subject of non-point source (NPS) contaminant remediation. The US Environmental Protection Agency (EPA) calls NPS the leading cause of water pollution in the United States. NPS is defined as pollution from diffuse sources rather than from a specific site, such as wastewater treatment plant discharge. NPS contaminants can account for a significant amount of the TMDL allocation in a given river system. Regulatory agencies issue National Pollutant Discharge Elimination System (NPDES) permits for point-source dischargers; however, treatment of NPS sources may need to be considered in the search for more discharge allocation for viable municipal and industrial plants.

Blue Water's patent-pending Vandal-ION process, developed at the University of Idaho,

continuously regenerates reactive filtration media. It uses co-precipitation and sorption removal mechanisms, lowering concentrations of contaminants in water more efficiently than traditional coagulation or filtration processes. The continuous regeneration of media that exhibits a high affinity for sorbing contaminants improves the cost-effectiveness of the process, which does not require backwashing or exchange of media.

Testing of the Vandal-ION process has shown efficacious reduction of phosphorus, arsenic, metals, and other contaminants from drinking water, wastewater, and industrial processes, including mining run-off. The process meets a variety of contaminant permit limits, from NPDES permits for wastewater dischargers to the arsenic Maximum Contaminant Level for drinking water suppliers. The process also improves other water quality characteristics, such as suspended solids and turbidity. Waste solids from the process pass the toxicity characteristic leaching procedure (TCLP) test for arsenic and other metals.

The Vandal-ION treatability study is designed to show efficacy of the Vandal-ION process for contaminant removal from a given sample of water. The study includes extensive EPA-certified analysis of the water sample submitted in addition to a 1:100-scale model of the process. This bench-scale treatability study predicts phosphorus, arsenic, metals, and other contaminant removal rates observed with pilot-scale Vandal-ION equipment in a variety of applications.

The study showed that the process lowered the total phosphorus concentration in the Batiste Springs groundwater sample from 36 to 0.27 mg/L P for 99.2% removal. The concentration of total arsenic in the sample dropped from 0.013 mg/L As to less than the detection limit of the method, 0.0005 mg/L As. This process accomplishes concurrent removal of these contaminants rather than requiring different unit operations for each one.

The Pocatello office of the Idaho Department of Environmental Quality sponsored this treatability study. A mobile pilot test is slated for the Batiste Springs area in the summer of 2005 to corroborate the results at a higher flow rate. A scale facility may be constructed in 2006 if this test supports the



preliminary data.

The groundwater remediation project at Eastern Michaud Flats is estimated to take 10 years to complete. After this time, studies show that the groundwater plume may pass from the site and no longer be a threat for contaminant contribution to the Portneuf River System. Blue Water is exploring the possibility of setting up a modular mobile water treatment system that can be easily disassembled for relocation after the 10-year treatment period.

Author's Note

Dr. Remy Newcombe is the chief technology officer for Blue Water Technologies, a US company that develops aqueous contaminant remediation technologies. Based in Coeur d'Alene, Idaho, the company has licensed several patent-pending technologies from the University of Idaho for commercialisation. For more information, visit the website: www.blue2o.net.



■ A mobile pilot trailer provides a water treatment system that can be relocated once the remediation project is completed.

Photo by Blue Water Technologies