Rapid Deployment of Engineered Solutions for Environmental Problems at Hanford - FIU's Support for Uranium Remediation at the Hanford Site

FIU's Applied Research Center (ARC) is supporting the U.S. Department of Energy's Hanford Site in developing a strategy to improve the efficiency of uranium stabilization process through polyphosphate injection technology.

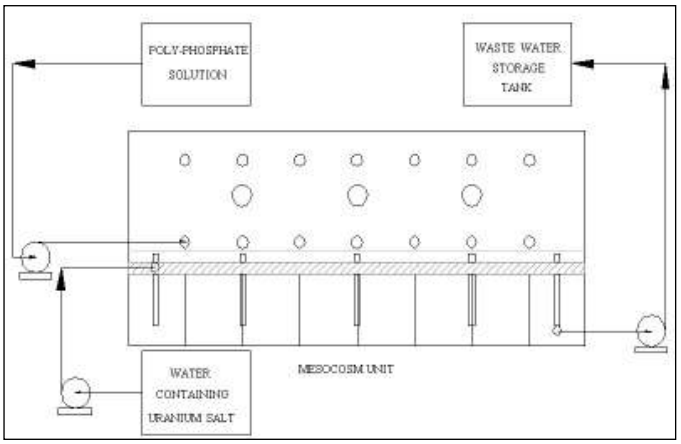
Uranium occurs in high concentrations at several contaminated sites in the United States including Hanford Site. Due to its potential threat on human health, the U.S. Environmental Protection Agency (USEPA) has set a maximum contaminant level of 30 parts per billion for uranium concentration in groundwater. Once released, the uranium radionuclides persist in the environment and can have severe toxic effects on living organisms. However, by using polyphosphates, uranium in groundwater can be made immobile, thus preventing its release into the surface water system. This study will look into the interaction of polyphosphate with organic and inorganic constituents of the aquifer matrix, along with the rate of reaction of polyphosphate with uranium under a controlled flow regime simulating a groundwater system. This study will also examine the discrete effect of the carbonate complexation on the dissolution of autunite mineral created as a result of the uranium stabilization through polyphosphate injection.

Task Objectives

- Conduct laboratory batch experiments on sorption and desorption of phosphate and polyphosphate using Hanford sediment/soil materials.
- Determine the influence of calcium and iron on polyphosphate adsorption on Hanford sediments.
- Carry out Groundwater mesocosm studies to evaluate transport phenomenon of polyphosphates and uranium.
- Determine polyphosphate mass balance that would take place during polyphosphate injection at Hanford sites.

Task Benefits

- The adsorption or desorption coefficients obtained from this study will be helpful in determining the concentrations of polyphosphate that are lost in the aquifer through the sorption process and the amount that is needed to stabilize uranium in the same aquifer.
- This experimentation can form a basis to improve injection volume and the rates of polyphosphate injection into the aquifer contaminated with uranium.
- Additionally, the findings from this study will also contribute towards the understanding of fate and transport of polyphosphates in the aquifer, in presence of uranium and other chemical factors.



An experimental set up for the tracer test and uranium-polyphosphate interaction study using mesocosm system

Batch sorption experiments with Hanford soil and phosphate solution under progress

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