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Success Story

Pilot Demonstration Shows *In-situ* Stabilization and Solidification Can Be Effective for Treating Sediments in Water

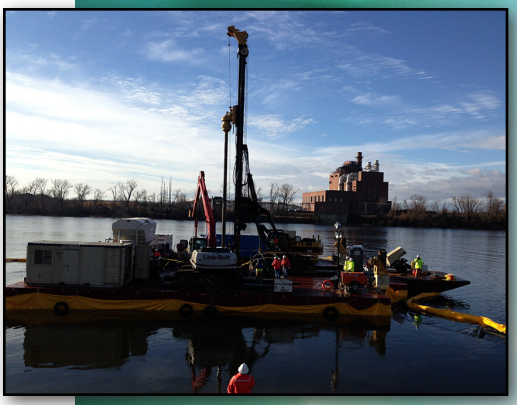
NiSource Volunteers Former MGP Site on Connecticut River to Test In-situ Stabilization and Solidification

NiSource is responsible for a number of former manufactured gas plant (MGP) sites located in several states. MGP sites often contain various contaminants that must be remediated to comply with environmental regulations. Several technologies have been developed to characterize and remediate contaminated soil and groundwater in the upland portions of MGP sites across the country. One of these technologies is in-situ stabilization and solidification (ISS), which involves injecting and mechanically mixing a cement/reagent mixture into soils and letting it cure. EPRI and several of its member companies sought to evaluate whether ISS could be effective in remediating underwater sediments. MGP-impacted sediments in rivers are most commonly cleaned up using dredging which is expensive and sometimes stirs up contaminated sediments that could harm aquatic organisms and require additional treatment.

NiSource had been successfully using ISS on land since the late 1990s and volunteered to host a pilot ISS demonstration at its MGP site on the Connecticut River in Springfield, Massachusetts. "I thought it would be a suitable site for ISS because it's primarily a sandy bottom river and the river flows pretty quickly in this stretch, so you don't get a lot of fine grain sediment that you would get in a slow moving river or lake," according to Robert Cleary, Principal, Environmental, Safety & Sustainability - Remediation at NiSource. Cleary worked with the Massachusetts Department of Environmental Protection, the Massachusetts Division of Fish and Wildlife and the Massachusetts Natural Heritage and Endangered Species Program to explain the project and secure the necessary permits. The company also briefed the Army Corps of Engineers and federal marine fisheries staff on the project.

Once the permits were in place, modular barge sections were transported to the launch site and floated six miles downstream to the MGP site. The barge was assembled and a full scale crane fitted with a 4 foot diameter hollow stemmed auger was installed on the barge. In addition, two layers of silt curtains were installed around the perimeter of the barge to keep any sediment or sheen inside the 900 square foot work area. The augurs drilled 13 columns through 16 feet of water and up to 17 feet of sediment below the river bottom. Cement, blast furnace slag and additives were mixed with the sediments to solidify it. A sample was then withdrawn from each column and brought to a laboratory for testing to determine if various performance requirements had been met.

> ***"Now we have another tool in our MGP remediation toolbox."***
>
> ***~ Robert Cleary, NiSource***



In-situ stabilization and solidification was successfully pilot-demonstrated at a former MGP site on the Connecticut River.

Challenge

NiSource sought an alternative to dredging to remediate contaminated sediments in the Connecticut River from a nearby legacy manufactured gas plant site.

Solution

NiSource hosted a pilot demonstration of in-situ stabilization and solidification (ISS), a technique that had previously only been used on land.

Results and Benefits

ISS successfully solidified sediments through a column of water and was able to meet regulatory goals.

Turbidity, pH levels and sheen were all effectively controlled.

ISS of sediments is ready to be tested at a larger pilot scale and should be applicable at full scale as a cost-effective remedial technology.

ISS Pilot Demonstration Results Encouraging

Two key permit conditions for the project were that pH and turbidity levels meet specified limits. Field sampling showed that turbidity and pH levels were all within the required limits. In addition, follow-up work was required to ensure that two local species—yellow lamp mussels and sturgeon—had not been harmed. Some lamp mussels were relocated, and the sturgeon were monitored during the testing period. Other micro-invertebrate species that were disturbed during the drilling were found to recolonize the site within several months of the completion of the field work. Overall, the pilot ISS project demonstrated that ISS can be used effectively on submerged sediments in a river. The next step is to test ISS at a larger pilot scale and eventually apply it full scale to achieve broader acceptance as a cost-effective alternative to dredging or capping.

At the request of state regulators, NiSource will be testing and then monitoring a capping system at the Springfield MGP site over the next three to five years before deciding on a permanent remediation approach. Although they may not end up choosing ISS for the Springfield site, NiSource would consider using ISS at one of its other MGP sites with contaminated sediments. Cleary, Joe P. Ferry and Peter LaGoy were recipients of an EPRI 2014 Technology Transfer Award recognizing their leadership in hosting the demonstration and working with regulatory officials to obtain the required permits.

Related EPRI Products

Title	Product ID
In-Situ Solidification of Contaminated Sediments	3002005216
Technology Development Needs for Application of In-Situ Stabilization and Solidification to Contaminated Sediments	1021213

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com)

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3002005122 May 2015

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