

ALGA Awards 2019

Category 6: Innovation or Research that Advances the Land & Groundwater industry

Kendall Bay Remediation Project Trial Works

Underwater in-situ immobilisation of coal tar impacted sediment

a. Demonstrated progress in uncovering new knowledge in soil or water contamination

Ventia has completed laboratory and field trial works towards developing a technology for the underwater remediation of marine sediment contaminated by historical coal tar from the Mortlake Gasworks. The technology, insitu solidification, is regularly used to remediate soil contamination on land, however it has not been applied to marine sediments, where the presence of overlying seawater and challenging environmental conditions (wind, waves, tides etc.) present significant scientific and engineering challenges to its implementation.

To overcome these challenges, Ventia initially conducted an insitu solidification laboratory treatability study to test a matrix of remediation stabilisation additives including solidification agents, grout modifiers (to facilitate workability), accelerants, and anti-washout agents (to mitigate seawater interaction). Optimal mix designs which met the project performance criteria, including unconfined compressive strength, contaminant leachability and hydraulic conductivity, were selected for use during the subsequent field trials. The laboratory trials also allowed the refinement of the required validation testing to enable a timely demonstration of the project's success.

One of the findings of the laboratory trials related to the relationship between strength gain of the treated sediments and the volume of seawater incorporated into the mix. The results showed a clear reduction in the achievement of strength as the volume of seawater that was incorporated into the mix increased. This was a significant revelation for the project and resulted in the Ventia team evaluating several innovative methods to mitigate seawater interaction during insitu stabilisation in the subaqueous environment.

Following the laboratory treatability study, field pilot studies were undertaken using the optimal additive mix designs identified during the laboratory study. During the field trials, mix injection was undertaken to construct columns and raft slabs via insitu solidification of the contaminated sediments. To best simulate performance under project conditions, the same (or similar) plant, equipment, environmental controls to those proposed for the full-scale remediation works were used.

The trials demonstrated, using multiple lines of evidence, the successful application of insitu solidification for the remediation of contaminated sediments in Kendall Bay. These results have been endorsed by the NSW EPA Accredited Site Auditor, and full-scale remediation has now commenced for the client, Jemena.

Significant lessons learnt during the field trials are currently being used to design the approach to the full-scale remediation so that best practice environmental controls are implemented, works are constructible, and productivity is maximised in the challenging marine setting.

b. Demonstrated applicability of research outcomes to improve industry practice

The in-situ stabilisation solution has been designed to meet strict environmental performance criteria for protecting both the health of human users of Kendall Bay and to create an environment suitable for recolonisation of benthic microorganisms in the seabed. The performance criteria set for the trial were met during the laboratory and field trials and therefore Ventia is confident that the

results will be replicated during full-scale remediation, increasing the possibility that the solution will be used by the industry in the future.

In addition, a new and more stringent method of testing the leachability of the treated sediment, based on US EPA methods (LEAF 1316 and 1315), was implemented by Ventia and accepted by the NSW EPA – which may lead to the more stringent testing method being considered for adoption in NSW.

Thirdly, the trial works scientifically refined the laboratory testing required for validation during full-scale remediation, resulting in a reduced project duration and increased value for the client. The remediation method also provides increased value to the client compared with alternatives which involve offsite treatment and disposal.

Finally, a major social benefit of the insitu stabilisation method is that it minimises impacts for nearby residents and the community because highly odorous sediment does not have to be excavated and transported over water and by road to treatment and disposal sites. As such, this demonstrates a ‘best practice’ benefit of the insitu stabilisation solution for the industry.

In summary, the trial and full-scale remediation project provide a precedent for similar applications in Australia and internationally. Ventia is also aware that outcomes to date have been closely watched by consultants and contractors in the US, and no doubt this observation will continue during full-scale works.

c. Demonstrated communication of new findings and their value to industry.

Ventia made a platform presentation about the field trials and a poster presentation about the laboratory trials at the 2019 International Battelle Sediment Conference in New Orleans. The team received verbal and written feedback that those in attendance were impressed with the project. An abstract for a platform presentation about the trials has also been accepted by the 2019 CleanUp Conference, which will be held in Adelaide in September.

In addition, the NSW EPA, Site Auditor and environmental consultants have endorsed the trial reports prepared by Ventia and accepted the use of insitu solidification technology for the remediation of contaminated sediments in an underwater marine environment in Kendall Bay.



