# Enabling Port Expansion through Beneficial Use of Contaminated Sediment: A Case Study from Mosjøen, Norway

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**Background/Objectives.** In 2015, Alcoa received approval from the Norwegian Environmental Protection Agency to remediate the sediment adjacent to their active plant located in Mosjøen, Norway. Mosjøen is located in northern Norway within the Municipality of Vefsn. To support its aluminum manufacturing facilities, Alcoa operates a wharf along its harbor to export and import materials required by the operations. Alcoa's harbor wharf adjoins the municipality harbor wharves operated by the Port of Mosjøen (PoM). The PoM is the second largest cargo harbor in northern Norway, with regular trade routes to North America, mainland Europe, and Iceland. Together, the harbors handle approximately 3 million metric tons of cargo each year and operate a daily ferry service. There is interest in expanding the wharf that serves the PoM to increase the capacity of the operation.

**Approach/Activities.** The remediation included dredging approximately 30,000 cubic meters of impacted sediment. In addition to traditional landfill disposal approaches, Alcoa evaluated several confined disposal facility (CDF) options to identify a creative solution that could provide for beneficial use of the dredged sediments and also benefit the local community's economy. Working closely with the PoM, Alcoa selected an alternative to extend the existing wharf shared by both parties to nearly double the wharf space available. This option also increased the length and draft of both main slips used by Alcoa and PoM. This expansion has led to increased throughput capacity, opportunities for new tenants, and increased operational efficiency.
To cost-effectively deal with site-specific design challenges, a series of cellular cofferdam structures was selected as the method to engineer the CDF. This approach has been implemented successfully at other Norwegian ports and had previously been approved by the local environmental authorities. The long-term stability of the CDF was enhanced by integrating an in situ stabilization (ISS) approach into the design. The ISS will reduce the long-term potential for contaminant leaching and will provide an immediate improvement in geotechnical properties of the fill, allowing for rapid development of the reclaimed land. Additional assessments to predict and monitor long-term CDF settlement and impacts on existing wharf structures were also performed.

Construction of the remedial action and CDF was completed in November 2017. The work required close management and coordination among all parties to ensure harbor traffic and port operations were not impeded.

**Results/Lessons Learned.** The Alcoa Mosjøen Harbor cleanup is a good example of a remediation project that integrated creative solutions through effective stakeholder engagement and cooperation. It demonstrates that beneficial use of contaminated sediment can be implemented as part of a comprehensive industrial site cleanup strategy. This presentation will provide an overview of the project, summarize the unique challenges that were overcome through innovative design and effective project management, and summarize the lessons learned that can be applied to similar projects.