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Geotube® Dewatering Technology A Key Component In Hylebos Waterway Cleanup

Geotube® units used in cleanup of one of the largest Superfund sites in the nation; Considered an example of large-scale dredging success.

The Hylebos Waterway was named after a 19th century priest who served parishes in Tacoma and Steliacoom, WA. For years, however, the name was associated with one of the largest Superfund sites in the nation.

The Hylebos Waterway contains a toxic layer of sediment contaminated with PCBs, PAHs, arsenic, hexachlorobenzene, hexachloro-butadiene, and other organics and metals. The contamination comes from a variety of industries that have been operating in the area for more than a century, including chemical manufacturing plants, scrap metal recycling, log transfer facilities, and shipbuilding.

But the waterway is now becoming recognized as one of the most successful large-scale dredging cleanup operations ever attempted, thanks in part to Geotube® dewatering technology.

TenCate develops and produces materials that function to increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions. For this situation, Geotube® dewatering technology would provide a cost-effective way to help contain hazardous materials, isolate them, and allow effluent to be released back into local waterways safely.

In late 2005 and early 2006, marine dredging began at the headwaters of the Hylebos Waterway, part of the Commence Bay/ Nearshore Tideflats Superfund Site in Puget Sound. A total of 150,000 cy (115,000 cm) was dredged during the operation. While the majority of the dredged material was dewatered using settling ponds and mechanical separation systems, the challenge remained to effectively capture the 2.5% solids in the overflow from the sediment barge used in the dredging operation.

Geotube® containers deployed at the Hylebos Waterway cleanup site. Three units were manifolded together. As one reached its designated fill height, the next unit would come online to provided uninterrupted dewatering.

The environmental engineering firm of Dalton, Olmstead and Fuglevand (DOF) in Kirkland, Washington, value engineered the use of Geotube® dewatering technology to dewater 75,000 cy (57,000 cm) of turbid water in the sediment barge. The barge sediments represented just 6% of total *in situ* material; however, failure to dewater the fine marine sediments contained in the barge would have resulted in a three to four inch (7.6—10.2 cm) thick layer of residual sediments covering the ***entire dredged waterway*** . Without the Geotube® dewatering technology solution, the project's clean up objectives would not have been met.

The majority of the dredging was conducted by Envirocon, Inc., of Portland, Oregon, using an articulated fixed arm dredge with a 3.0 cy (2.3 cm) closed hydraulic clamshell bucket. A second crane barge belonging to Quigg Bros., Inc., of Aberdeen, Washington, was outfitted with a 2.5 cy (1.9 cm) conventional rehandling clamshell bucket and a 4.0 cy (3.0 cm) cable arm closed bucket. Dredged material was then placed in a barge with 4 ft (1.2 m) high water tight walls and transported to a nearby dock for offloading.

To test the dewatering capabilities of Geotube® dewatering technology with the Hylebos Waterway marine sediments, DOF engineers decided to deploy pilot units. *(More)*

Dredging was done using an articulated fixed arm dredge with a 3.0 cy (2.3 cm) closed hydraulic clamshell bucket.

Two 30-foot circumference/50 ft long (9.1/15.2 m) Geotube® MT units were chosen because of their quick availability and small footprint. Each unit has a capacity of 96 cy (73.4 cm) at its maximum pumping height of 6 ft (1.8 m). The units dried to 58% TSS in just 7 days.

As a result of the successful pilot tests, DOF engineers utilized ten 60-foot circumference/100 ft long (18.3/30.5 m) Geotube® units to meet the project volume dewatering requirements of over 4000 cy (3058 cm). At the sediment capture barge, dredged material was pumped to settling basins to separate sand and larger sized particles. From the basins, the overflow was then pumped into 18,000 gallon (68,137 liter) mix tanks supplied by Rain for Rent. A grab sample from the tanks was taken to determine the proper dosing of the polymer used to flocculate the fine material prior to pumping into the Geotube® units.

Three Geotube® units were placed side by side. When one reached maximum capacity, the conditioned material was manifolded to the next unit until all units were filled. The filling regimen was repeated until all 75,000 cy (57,000 cm) of marine sediments were pumped into the containers.

The final stage of the project was to pump the effluent from the Geotube® units through sand filters before discharge back into the Hylebos Waterway.

The use of Geotube® dewatering technology allowed the project managers to meet the clean water objectives set forth by the EPA and state of Washington's Dept. of Ecology and Dept. of Fish and Wildlife. Further, the Geotube® units assured completion of the project before the deadline that coincided with the seasonal Salmon run.

Geotube® GT 500 dewatering fabric

A simple test can be used to determine how well the dewatering technology will work with a particular material. A TenCate Geotube representative can work with an organization to administer the test and to provide suggestions as to the best dewatering approaches.

Readily-available Geotube® MT units were used for the pilot project to gauge dewatering effectiveness.

How Geotube® Dewatering Technology Works

Dewatering with Geotube® technology is a three-step process.

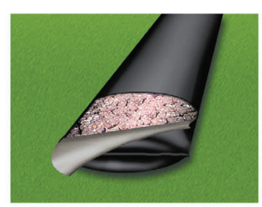
In the ***confinement*** stage, the Geotube® container is filled with dredged waste materials. The Geotube® container's unique fabric confines the fine grains of the material.

In the ***dewatering*** phase, excess water simply drains from the Geotube® container. The decanted water is often of a quality that can be reused or returned for processing or to native waterways without additional treatment.

In the final phase, ***consolidation***, the solids continue to densify due to desiccation as residual water vapor escapes through the fabric. Volume reduction can be as high as 90 percent.

Step 1: Filling

Step 2: Dewatering



Step 3: Consolidation

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