

NEWPORT RESTORATION ADVISORY BOARD
Project Committee Report
March 17, 2004

Since dredging has become more active and accepted within the environmental community, there is good news, because there are many alternatives for dewatering of dredged sediment, including filter presses, dryers, confined aquatic spaces, and chemicals.

This article is a report about a new technique of dewatering using a woven geotextile filter tube. It reveals the use of these filter tubes at a Quonset/Davisville, R.I. site of 890 acres, with a man-made fire pond, 200 feet by 100 feet, receiving storm water as well as a stream flow. The area was extremely contaminated with petroleum hydrocarbons, pesticides, PCBS, and was three to four feet high.

Hydraulic dredging from a barge was used along with large geotextile filter tubes. This dredging produced slurry that went through a twelve-inch pipe to several large filter tubes, eventually producing a filter cake, which required minimal post-dredged treatment.

A detailed description of the site set up is provided, which realized significant savings in time, material, transportation, and disposal costs.

Submitted by:



Emmet E. Turley
Chairperson

DEWATERING OF CONTAMINATED FINE-GRAINED SEDIMENT USING GEOTEXTILES

Dewatering of dredged sediment has proven in many cases to be a costly and time-consuming process, which may be compounded by the presence of environmental contamination. Many dewatering alternatives exist in today's marketplace including filter presses, dryers, confined disposal areas, and chemical dewatering. This case study present the use of woven geotextile filter tubes as a cost-effective alternative to conventional dewatering. This method has been gaining industry acceptance over the past several years, and was utilized by Nobis Engineering, Inc. at a U.S. Army Corps of Engineers (USACE) New England Division (NED) dredging project located on a demilitarized Construction Battalion Center located in North Kingstown, Rhode Island.

A man-made fire pond, approximately 200 feet by 100 feet was located on the subject site, which was slated for future development by the Rhode Island Economic Development Corporation. The pond received storm water and stream flow from approximately 890 acres of the facility. Environmental investigations determined that the pond sediment had become contaminated with petroleum hydrocarbons, pesticides, and polychlorinated biphenyls (PCBs). Based on observed concentrations as high as 6,700 parts per million (ppm), petroleum hydrocarbons were the primary constituent of concern. The Rhode Island Department of Environmental Management (RIDEM) required that the pond sediment be remediated to meet their leachability goal of 500 ppm.

It was determined that the use of a hydraulic dredging coupled with large geotextile filter tubes would be the most efficient and cost-effective approach. To meet cleanup goals, approximately three to four feet of contaminated sediment required removal. Removal was completed using a barge-mounted hydraulic dredge, equipped with a steel cutterhead. Dredging of the sediment produced slurry that was an average 10 % solids by weight. The slurry was discharged through a 12-inch diameter HDPE pipe to several large woven-geotextile tubes that provided a dewatering (filter) media which retained solids and discharged water. This process, coupled with slurry pretreatment, produced a filter cake, which required minimal post-dredge treatment,

and with minimal environmental risk.

Since the fire pond was part of an active drainage system, removal of the sediment had to occur without releasing suspended solids. To eliminate the release of suspended sediment back into the stormwater system, Nobis designed a stormwater diversion system to discontinue flow to the fire pond that allowed the remediation to occur as a closed system. At the request of RIDEM, the diversion system was designed to handle flows expected from a 10-year storm event. The diversion system entailed the use of five high-volume self-priming diesel pumps and was designed to handle over 13,400 gallons per minute (gpm).

Due to the physical characteristics of the sediment (very fine particle size), the contamination present, and the amount to be removed, Nobis employed a unique remedial system that employed a one-step treatment and dewatering process. To increase the efficiency of the dewatering system, and to obtain the remedial objectives, pH adjustment coupled with two aqueous polymers were introduced into the dredge slurry in-line at predetermined locations. The polymers assisted in the emulsification and capture of petroleum hydrocarbons and enhanced the permeability by increasing particle size. The geotextile tubes contained all contaminated sediment during the drying process, which minimized exposure and maintained a clean and safe environment for workers.

The geotextile tubes were staged on a large lined area, constructed during the site preparation phase of the project. This dewatering pad was pitched to allow drainage discharging from the tubes to reenter the fire pond. The filtrate water discharged from the tubes was continuously monitored for pH, flow volume/rate, turbidity, TPH, as well as aesthetic parameters as specified by the Rhode Island Pollution Discharge Elimination System (RIPDES).

Utilizing this unique dewatering method approximately 1,700 cubic yards of contaminated sediment was removed in a timely fashion, with minimal downtime. Once confirmation samples indicated that the action levels were met, the dredge was demobilized and the tubes remained on-site for additional drying. The sediment remained in the tubes for a period of one to two months. Based on waste characterization of the material contained within the tubes, the dredged material was found to be acceptable for use as daily cover/landfill contour material at an unlined landfill in accordance with Massachusetts DEP policies as long as it passed the paint filter test. The addition of minimal amounts of

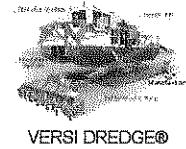
cement kiln dust finalized the drying process, increased the workability of the material and allowed for transport in unlined trucks.

Significant savings were realized since treatment of the water generated during the dredging process was not necessary, and transportation and disposal costs of the sediment were much lower due to a decrease of contaminant levels and water content.

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Source:<http://www.vironews.com/>

Date: March 4, 2003



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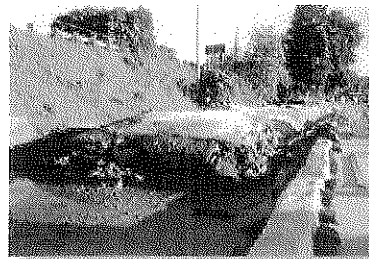
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- Dredging Mud and Silt

Geotextile Tubes

Great Lakes Harbor Management performs marina maintenance on Harbor West Marina in Traverse City, Michigan. Utilizing an IMS Model 4010 VERSİ DREDGE® , Great Lakes Harbor Management filled 45' x 200' geotextile bags manufactured by Synthetic Industries.



A geotextile tube dewatering behind Harbor West Marina.



Same geotextile tube at end of dewatering process. At the end of the project, the sand could either be spread on the bank or hauled away.



IMS 4010

Dewatering Sewage Sludge With Geotextile Tubes

GEOTEC Associates: Jack Fowler, Ph.D., PE

Abstract:

Municipal sewage sludge was placed in geo-textile bags for the purpose of evaluating the dewatering and consolidation capabilities of large geo-textile tubes and effluent water quality. A proposed ASTM test method for determining the flow rate of suspended solids from a geo-textile containment system for dredged material was used to conduct tests to determine the efficiency of different combinations of geo-textile filters. Prior to filling the large geo-textile tube, two small geo-textile bags 48 inches in circumference and 70 inches long were supported vertically in a wooden frame and filled to a depth of about 60 inches or about 48 gallons of sewage sludge from the primary sludge digester. As water passed through the geo-textile bag, samples were collected during, immediately after, and for several days to determine the total percent suspended solids (TSS), heavy metals, and bacterial count. The test results indicated significant consolidation or reduction in the form of the sludge volume in the bag. There was also a significant reduction in the TSS, heavy metals, and bacterial count in the effluent water. These test results led to filling a large geo-textile tube 15 ft. wide, 30 ft. long and filled to a height of 5 ft. with sewage sludge.

The quality of pore water or effluent passing through the geo-textile container systems proved to be environmentally acceptable for subsequent discharge into the Mississippi River and/or return to the treatment plant.

This new and innovative technology has been successfully used to dewater fine-grained, contaminated dredged material that contains dioxins, PCB's, PAH's, pesticides and heavy metals for Miami River and the Port of Oakland, CA. This is the first successful use of geo-textile tubes for dewatering sewage sludge for beneficial uses in the United States. Research using this process for dewatering port and dairy farming waste, paper mill waste, fly ash, mining waste, chemical sludge lagoons and several other waste streams are being conducted.

This concept of containing sewage sludge has proven to be construction-practical, technically and economically feasible and environmentally acceptable.

IMS Versi-Dredges can work easily with geo-textile tubes.