

Hold the ketchup!

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When a food processing plant in Kentucky needed to remove and dewater several thousand cubic yards of tomato and other organic waste from nearby ponds and a small lake, it sought an efficient, effective solution. Stockpiled ketchup waste from the plant seeped into a nearby pond, prompting a dredge project to remove four to eight feet of organic sediment from three small ponds and a ten-acre lake (**Photo 1**).

The traditional approach to disposing of fine-grained, organic dredged material is to create a retaining basin to hold the wet dredged material until it dewater. This type of basin usually requires infrastructure, including weirs to decant surface water and high berms to contain the milkshake-like material. Dredged material with high organic content does not dewater efficiently and often forms a desiccated layer that hinders further dewatering. Material can remain in this state for years.



Photo 1: Dredging to remove organic sediment.

When the traditional approach was considered, it was quickly noted that a disposal pit would create a safety hazard because of the adjacent heavily used soccer field. Even if fenced, the disposal area, with its deceptively dry crust, could be hazardous to inquisitive children. Material of this sort can also present an odor problem due to decaying organic matter.

The decision was made to contain and dewater 19,500 cubic yds of dredged material within large geotextile tubes. Several Geotex™ 46T woven polypropylene tubes were used. These tubes provide the strength to withstand pumping pressure and the hydraulic properties required to retain fine-grained solids while allowing water to pass through. The dredged material was pumped into several 200-foot-long geotextile tubes, some of which were 30 ft in circumference and others 45 ft in circumference (**Photos 2, 3**). An IMS cutterhead dredge was used for the process. This dredge has been successfully used in many tube projects with the experienced help of Wickoren and Associates, consultant and manufacturer of dredging equipment. The dredge is optimally sized with a 10-in. diameter discharge and a 177-horsepower engine. It also has a unique pump capable of pumping both sand slurries and sludge.



Photo 2: The dredged material was pumped into several 200-foot-long geotextile tubes.

In this case, nearly a mile of pipe was required to reach the dewatering area. With this distance and a 90-ft elevation change, a 12-in. diameter, 163-horsepower booster pump was required. In addition, a six-in. diameter water pump was added to the system.

Bulk water was efficiently dissipated by the tubes during the pumping operation. Effluent from the tubes exhibited very low concentrations of suspended solids. This attribute has been a major contributor to the successful permitting of tubes in environmentally sensitive dredging projects in other areas of the country. Retention of pollutants and very small particles is a typical result for a wide variety of tube dewatering applications. The geotextile tubes have a Minimum Average Roll Value (MARV) Apparent Opening Size (AOS) of No. 40 U.S. sieve. This fact might lead the designer to question how such efficient retention could occur. The answer lies in the fact that a filter cake forms on the inside of the fabric shell, thus creating the equivalent of a two-stage filter. After bulk dewatering occurs, self-weight consolidation of the dredged material and the confining pressure of the tube fabric itself continue the dewatering process.



Photo 3: Tube being filled with dredged material.

Dean Wickoren of Wickoren and Associates, said, “Dewatering requires a lot of money...or space...or time, and tubes allow you to cross those boundaries.” Within two months, the material in the 30-ft circumference tubes was completely dewatered. **(Photo 4)**. The material within the 45-ft circumference tubes was slightly wet in the center portion of the tube. A great deal of vegetation had taken root on the tubes, indicating the richness of the soil contained within. Local farmers have inquired about obtaining the soil.



Photo 4: Cutaway section of tube showing material once it has been dewatered.

By all accounts, the use of tubes was instrumental in providing a cost-effective and safe solution to the problem of polluted sediments in water bodies. Also, as more people move into areas that were formerly industrial or agricultural, geotextile tubes can provide a “good neighbor” solution to odor problems which are sometimes associated with liquid waste.

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