

Case Study –

application: Hazardous Waste Settling Tank, Chemical Plant

location: Southeast Texas Gulf Coast

product: Geotube® “Dewatering & Containment” Containers

Due to the increasing cost that the chemical industry faces on the plant level there is a never ending need to lower operating cost. This goal is difficult to meet but in this instance, due to **Geotube® Dewatering Technology**, a savings of over \$240,000 per year will be realized.

The Challenge

A Major Chemical Company located on the Texas Gulf Coast has a hazardous waste settling tank system that must be cleaned every calendar quarter. When the tank system is opened there is a 30 day window where the solids must be dewatered, removed from the plant property, and placed in a state approved land fill. The effluent water is returned to the tank system. Previously two belt presses were used and the solids carried out in open bed trucks.

The hazardous sludge MSDS showed the challenge. The sludge contained the following:

| | |
|-------------------------------------|----------------|
| Silicon Oxides | Molybdenum |
| Iron | Aluminum |
| Unspecified Polymers | |
| Shell, Dirt, Sand, Etc. | |
| Water | Barium Oxide |
| Sodium Cyanide | Chromium Oxide |
| Lead Oxide | Nickel Oxide |
| Two proprietary hazardous chemicals | |

The company wanted to cut cost, have a cleaner effluent, and transport the hazardous solids in a safer method to the land fill.

The Solution

A representative sample of the sludge was obtained from the tank and “Bench Tested” in the Lab in Houston, TX. In this test it is determined how the solids will dewater using the high strength permeable polypropylene **Geotextile®** used in the construction of **Geotubes®**. These **Geocontainers®** have uniquely designed retention properties and can be filled with fine grain sludge, hazardous contaminated soils, or dredged waste materials. Excess water drains from the **Geotubes®** through the small pores in the **Geotextile®** resulting in effective dewatering and efficient volume reduction of the contained material. This volume reduction allows for the repeated filling of the tubes and in many cases the decanted water is of a quality that can be returned to process water or native waterways.

In the case of this captured hazardous waste sample the “Bench Test” determined that 200 ppm of a Cationic Polyacrylamide Copolymer was required as a flocculation agent to help the solids release their water and promote faster dewatering. The polymer cost is negligible since it enhances rapid dewatering and saves the customer in the linear feet of tube required for the job. It also promotes even moisture content in the dried solids and helps obtain a clearer effluent. However, in this case the effluent still had a slight color due to the hydrocarbon content and its contained soluble solids. This was not a problem since the effluent was returned to the tank system and not to the plants process water. We found that a large amount of the metals in the sludge were captured in the contained solids due to the flocculation. Trace amounts of the metals were still found in the effluent but a much cleaner effluent was noted.

This “Bench Test” was especially important since it was the only test that could be performed for the customer before a decision was made to utilize the **Geocontainment®** process. Due to the closed tank system the usual “Hanging Bag” test could not be performed. This is a test performed on the plant site using the actual sludge designated to be dewatered. It demonstrates how the **Geocontainment®** process works using 40-50 gallons of the sludge. It allows the customer to note how the sludge flocculates and then dewater through a five foot ‘Hanging Bag’. It is an excellent confidence builder for the client.

The plant made it clear that none of the sludge pumped to the tubes or the effluent coming out of the tubes could spill on the ground. This could very well make the spill area declared a toxic ground site and force the customer into an expensive clean up. The plant wanted the complete dewatering and containment system to be closed.

Performance

Due to the threat of a spill and the hazardous nature of the sludge we could not allow the tubes to dewater on a slab containing a berm or on a polypropylene ground cover where an accident or a large rain storm could cause problems. A 22.5 foot circumference, 15 foot **Geotube®** was designed to fit inside a tested leak proof 25 cubic yard roll-off box. These **Geotubes®** have since been redesigned to be 22.5 foot long as well as in circumference. This new design uses more space in the roll-off box, holds another 50% more solids, and cuts transportation cost to the land fill. These roll-off box tubes are also used at locations where space is a problem. When filled they can be taken to another location in the plant to dewater fully and replaced with empty tubes at the small space job site.

Four leak proof roll-off boxes with **Geotubes®** were placed next to the settling tank system. Wood pallets were placed on the floor of the roll-off boxes to keep the **Geotextile®** from directly touching the metal floor of the roll-off boxes. This improves the dewatering process. A manifold system was used to receive the sludge from the tank system, blend the polymer into the system, and route the sludge to the desired tube. It also contains a valve where samples can be taken to check flocculation.

On day one the tank system was opened. Working with a plant maintenance company a six inch vacuum assist pump was used to move the sludge to the manifold system and to the **Geotubes®**. A hydro blast water lance was used to push the settled solids in the tank system

to the pump suction hose. This also adds water to the sludge system improving the flocculation. The tubes were repeatedly filled to the designed height until full of contained solids. The 22.5 foot circumference tubes hold about a cubic yard of solids per foot. A two inch diaphragm pump was used to move the effluent that had dewatered in the roll-off boxes back to the tank system.

When a **Geotube®** was filled with solids the roll-off box and tube was moved to another area in the plant to continue dewatering and a new box and tube replaced it at the tank cleaning site. A vacuum truck was used to retrieve the effluent from the moved roll-off box back to the tank system since the diaphragm pump was no longer available. In the case of this job twelve roll-off boxes and tubes were required to retrieve the sludge and clean the tank system.

Immediately after cleaning, which took three days working eight hours per day, the tank system was completely cleaned and sealed. The **Geotubes®**, now in a safe area, continued to fully dewater. To the plants satisfaction 12-14 days were cut from the time the tank system was opened to the time when resealed. Labor cost was drastically cut. This was accomplished not only by reducing the number of days on site but due the simple operation of the **Geocontainment®** system the number of laborers used was cut by more than 50%.

After a two week period the dewatered **Geotubes®**, pallets, and the roll-off boxes were taken to the land fill. The plant was more than pleased to have the hazardous waste contained in a **Geotube®** while being transferred from the plant to the land fill instead in an open bed truck. Solids at the land fill tested out at 30-40%.

Reward

The customer liked the short set up and tear down time, labor savings, improved environmental methods, safety, and what is projected to be a \$240,000 saving over the coming four quarters of 2004 when compared to mechanical dewatering. The customer has committed to another dewatering job on site at the plants coke unit and is presently engineering the dewatering of a million gallon tank that has been shelved many times due to cost. **Geocontainment®** is also being considered for use at other plant sites owned by this chemical company.

Millions of gallons of sludge have been pumped into **Geotubes®**. Since the introduction of this technology to various industries and programs of sludge residue management, it has yielded tremendous cost savings.

