application **Phosphate Mine Tailings**
location **Florida**
products **Geotube® GT500 and GT1000**

THE CHALLENGE

A typical phosphate mining operation can produce between 180,000 and 225,000 gallons per minute of fine phosphatic clay tailings. This material has a solids concentration of between 2% and 7% on a dry-solids basis. Currently, ponds and lagoons are used for settling and clarification of these materials. Many of these polishing ponds are approximately 200 to 300 acres in size, and daily maintenance is a large capital investment. The state of Florida, certain counties of Florida, and the Florida Phosphate Institute are interested in evaluating economical methods of filtration and volume-reduction that would reduce this present large land-use method.

Miratech was contacted by the institute to present information on its Geotube® dewatering processes. Miratech was given a quantity of tailings for bench-scale testing. Both Ciba and Hychem, Inc. provided the polymers.

OBJECTIVES

The objectives of the tests were to determine if this fine phosphatic clay material could be flocculated, captured, and filtered with the Geotube® industrial fabric system. In addition, the other objectives were to achieve the highest cake dry solids as possible and to produce essentially clear filtrate.

TESTING

Samples of phosphate mining tailings are normally tested for:

- Gradation of Solids
- Water Content
- Percent Solids
- Density
- pH

Several jar tests were conducted with various types of polymers and dosages. Numerous filter fabrics were tested in order to determine capture and filtrate quality. The phosphatic clay residue was conditioned utilizing Ciba Product No. 336 and Hychem product No. 2700.

It was decided to conduct separate tests with the Geotube® GT500 polypropylene and the Geotube® GT1000 polyester materials. The Geotube® GT500 polypropylene material (see Table 1) is a more open woven fabric with an AOS of 40 (0.425mm). The Geotube® GT 1000 polyester woven fabric has an AOS of 100 (0.150mm). Normally you would expect the fine particles of the clay to pass through a material, which has an AOS or sieve of 40. However this was not the case in our tests.

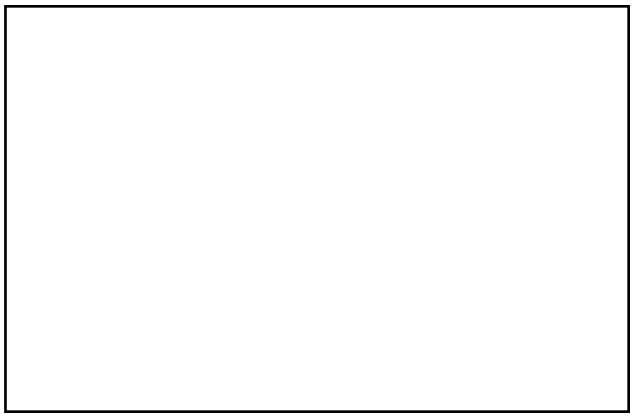

image caption

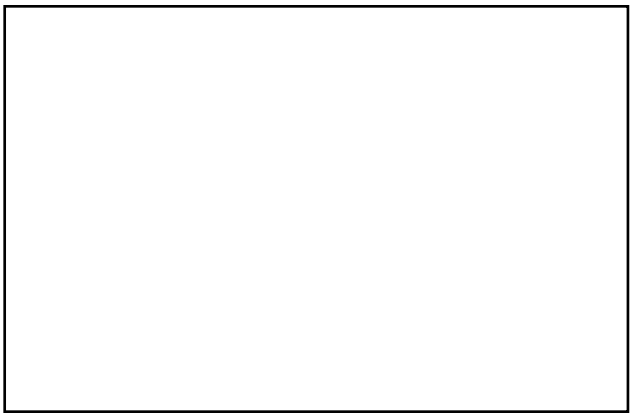

image caption

CONCLUSIONS

The tests provided adequate information on the ability of the geosynthetic fabric to be used as a filtration material. It provided high volume solids reduction, good capture of fines, and extremely high cake dry solids. This was a combination of phosphate, sand, clay, and very fine particle-size material. Particle size average was 425 sieve. Based on this testing, we can estimate that the material will dewater extremely well with volume reductions of 80% to 90% in either the Geotube® GT500 or the Geotube® GT1000 materials. Application rates would be approximately 5.5 cubic yards per lineal foot of 60 ft. circumference Geotube®.

Normally, after bench-scale testing is completed, a hanging bag test is recommended. This could be followed by a full-scale test of the recommended size, which vary from 30, 45, 60, 75, 90, or 120-foot circumference Geotube®.

	Test No. 1-GT 1000	Test No. 2-GT 500
Approximate opening size (AOS/Sieve size)	40/40	100/100
Sample size	One liter	One liter
Polymer type	Ciba	Ciba
Sample particle size-Sieve	425	425
Polymer dilution	0.5%	0.5%
Polymer dosage	82 ml	55 ml
Filtrate after 5 min	250 mils	300 mils
Filtrate after 105 min	761 mils	770 mils
Filtrate quality PPM (estimated)	< 500 ppm	< 500 ppm
Initial feed solids	4.5%	6.86%
Cake dry solids after 24 hrs	21.85%	29.31%
Cake dry solids after five (5) days	50.52%	51.11%
Cake dry solids after eight (8) days	82.00%	83.93%

Table 1: Physical Properties of the Phosphate Tailings

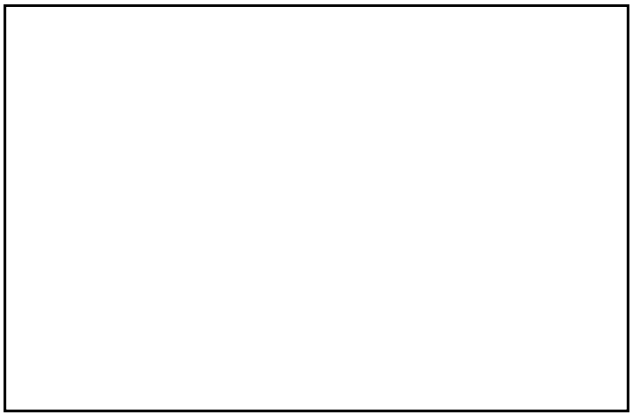

image caption

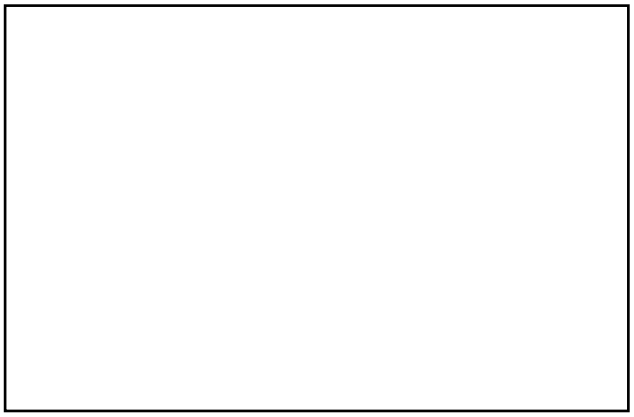

image caption

3680 Mount Olive Road
Commerce, GA 30529
(888) 795-0808
Fax (706) 335-3405
www.geotubes.com