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## Settling Water Dredged from Canal System

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### Objective

The canal system at the town of Southern Shores was in need of dredging. They were built in the 1960's and were becoming too shallow for the homeowners to navigate their boats to the larger bodies of water. The 17,000 cubic yds. and over 100,000,000 gallons of dredge spoils were to be collected and treated in a two stage lagoon system. The objective presented to WaterSolve was to treat the material entering the lagoon system from the dredge and get the solids to settle so the water could be returned to the canal system and meet the regulations set by the State of

North Carolina. The requirements included extensive water toxicology studies, NTU (Nephelometric Turbidity Unit) monitoring to test for clarity, and pH monitoring of the discharge water.

### WaterSolve's Chemical Conditioning

Samples of the material to be dredged from the canal system were sent to the WaterSolve lab for testing. Extensive testing revealed a dual chemistry of a coagulant followed by a flocculant would be needed to settle this canal sediment. WaterSolve specifically formulated the chemistry for this project to settle the solids and

make the water clean enough to return to the canal under the North Carolina guidelines. Pails of the sediment were treated with various doses of the formulated chemistry and the supernatant water was sent to a lab for water toxicology studies. During these studies various mysid shrimp were weighed and placed in the water. The trial tested the survival and weight gain of the species. The test results of this trial were approved by the regulators for the project. WaterSolve then provided the proper documentation and information about the aquatic toxicity and dosing required to get the permit approved by the state.



The dredge water is chemically treated before it enters the primary settling lagoon at the top of this photo then makes its way back and forth through the turbidity curtains before it crosses over at the orange pump to the secondary lagoon.

Products: **Solve 3 Coagulant**  
**Solve 9330 Flocculant**  
Equipment: **WSLP-2400 Polymer**  
**Make-down Unit**

**The Result**

WaterSolve LLC was contracted to treat the dredge water entering the lagoon settling ponds. This included chemistry, the chemical feed systems, and the labor to perform and operate the equipment, and also to perform lab analysis required by the state permit throughout the project. WaterSolve's mission was to inject the proper dose of chemistry to match the solids in the dredge water so the solids would settle to the bottom of the lagoon and the clean water could return to the canal within the guidelines

set by the state of North Carolina. Periodic testing of the water was required and recorded by the WaterSolve personnel throughout the project. The chemical feed systems were assembled in a containment pad so that any spill or leak of the chemistry would be contained and readily cleaned up during the project. The anticipated flow from the dredge was 1700-GPM. However the new 10" pipeline reduced the friction loss to the extent they were pumping 2200 to 3000-GPM throughout the project. A

previous attempt to operate this project a year earlier resulted in the contractor's inability to get the turbidity below the requirement of 25 NTU's. There was some worry about meeting this requirement due to past failures. When Tom Bennett, the Project Manager for the town of Southern Shore's, saw the chemical feed system in place and the NTU's were 22 (below the 25 required) he remarked "This project was 8 years in the making and now it has a real chance for success".



The raw dredge water is on the left, the chemically treated water is in the center, and the settled discharge water is on the right.



The true measure of the success of this project is the muddy dredge material entering the lagoon system on the left and the clean discharge water exiting in compliance of the requirements on the right.

The make up of the dredge material varied a lot as the dredge proceeded through the canals. There were spots of heavy organics that caused high chemical demand and sand bars that reduced the demand for chemicals. One portion of the project was dredging at the marina and between the markers going out into the sound. This passageway had a variety of materials ranging from high organics to

high clays to high sand residual coming to the lagoons to be treated. The dual chemistry formulated by Water-Solve worked great throughout these changes in material and no changes were needed in the chemistry. As the solids collected in the first lagoon, a long reach excavator was used to remove some of the sand and mud to maintain the space so retention time of the water could remain as de-

signed. The 2<sup>nd</sup> lagoon (polishing pond) allowed more settling time prior to discharge. Turbidity curtains in each lagoon helped direct the chemically treatment material side to side to increase the settling time before it was discharged. The dredging portion of the project started at the end of November, 2010 and was successfully completed at the end of February 2011.



The water crosses over to this secondary lagoon and makes its way to be discharged at the gray flash board riser or the white discharged skimmer. If the water does not meet the requirements, it is circulated and retreated using the orange pump in the upper right of the photo.



The dual chemical feed system was plumbed to the mixing manifold in the containment area to assure chemical containment of any spills and easy cleanup. The table in front provided a field lab for jar testing and monitoring of the discharge water. This area was later covered with a tent, providing protection from the elements.



This hydraulic dredge dug through the canals and out into the sound sending the mud and sand to the lagoons at 2200 to 3000 GPM in a 10” pipeline.



The long reach excavator dipped sand and mud out of the lagoon to maintain settling space for the water. It was then hauled and stockpiled for distribution at the end of the project.



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