ENDESCO CLEAN HARBORS

Sediment Decontamination Demonstration Program – Cement-Lock® Technology

Topical Report: Phase II – Equipment Modifications and Confirmation Test with Sediment from the Stratus Petroleum Site

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EXECUTIVE SUMMARY

This topical report on "Phase II – Equipment Modifications and Confirmation Test with Sediment from the Stratus Petroleum Site" describes the work conducted during Phase II of the Sediment Decontamination Demonstration Program – Cement-Lock® Technology. The work was performed for the New Jersey Department of Transportation Office of Maritime Resources (NJ-DOT/OMR) under a modification to an existing contract (NJ Agency Order #9345380) with ENDESCO Clean Harbors, L.L.C. (ECH, Des Plaines, IL). Other funding for the overall Cement-Lock Technology demonstration has been provided by the U.S. Environmental Protection Agency Region 2 and the U.S. Army Corps of Engineers (New York District) with technical and contractual support through Brookhaven National Laboratory (BNL, Contract No. 725043), and the Gas Research Institute (Des Plaines, IL).

Cement-Lock Technology is a thermo-chemical manufacturing process – developed by the Gas Technology Institute (GTI, formerly Institute of Gas Technology, Des Plaines, IL) and Unitel Technologies (Mount Prospect, IL) – that thoroughly decontaminates dredged sediment and converts it into Ecomelt®, a pozzolanic material, which when dried and finely ground can be used as a partial replacement for Portland cement in the manufacture of concrete. As such, Ecomelt can be a marketable product for beneficial use. When Ecomelt and Portland cement are blended together in prescribed proportions, the result is blended cement.

The Cement-Lock Technology can treat all types of contaminants (organic as well as inorganic) at widely varying concentrations. The technology is applicable to a variety of wastes including contaminated soils and sediments, debris from brownfields, industrial, and chemical wastes, sludges, and incinerator residues among others.

The objectives of the work were to: 1) confirm and revise (as necessary) the equipment modification designs developed under Task 6 (Equipment Modification Design Study), 2) procure and install the equipment modifications, and 3) conduct a Confirmation Test of the modifications with sediment dredged from the Stratus Petroleum site in Upper Newark Bay. The overall intent of the equipment modifications was to ensure that the Cement-Lock demo plant

could consistently feed the sediment and modifier mixture to the Ecomelt Generator and operate in slagging mode – producing Ecomelt – over an extended period of time.

The modifications to the feeding system included using a screening bucket to mix the sediment-modifier mixture, installing a covered belt conveyor, and installing a V-Ram feeder with charging hopper. Modifications to the slag discharging equipment (drop-out box) included relocating the Ecomelt granulator to the east under the rotary kiln discharge, angling the north and south walls of the drop-out box straight down, adding an access port, replacing the rotary kiln nose ring refractory, and altering the nose ring refractory configuration.

The Confirmation Test was initiated on November 29 during which time, Stratus Petroleum site sediment-modifier mixture was fed to the demo plant at a rate of about 1,000 pounds per hour. The sediment had been previously mixed with modifiers in the proportions required to make Ecomelt.

Several problems arose during the initial operation of the V-Ram feeder that necessitated removing the "ram" from the system and machining it to facilitate feeding. Also, a power failure occurred and the entire plant was shut down. Inclement weather forced processing to be halted until the weather cleared. After the equipment problems were resolved, feeding the sediment-modifier mixture resumed.

As the Confirmation Test progressed, droplets of slag accumulated on the west wall of the drop-out box and formed a "devil's tongue." On the evening of December 1, the devil's tongue eventually detached itself from the wall and fell into the granulator jamming the drag conveyor. Efforts to clear the jam were unsuccessful and the test was terminated and the system cooled so that the jam could be cleared.

The Confirmation Test was more successful than any of the previous slagging tests conducted in the demo plant. A total of 5.1 tons of sediment-modifier mixture was fed to the system, which yielded an estimated 3.8 tons of Ecomelt. The temperature of the Ecomelt Generator ranged from 2400° to 2580°F and the temperature of the Secondary Combustion Chamber (SCC) ranged from 2220° to 2500°F. Nitrogen oxide (NOx) measurements were taken from the flue gas stack periodically as required by the New Jersey Environmental Improvement Pilot Test. The NOx

concentration in the flue gas ranged from 102 to 171 ppm during testing. Oxygen concentrations measured concurrently were 5.0 and 6.86 mole percent, respectively.

During operations, the natural gas consumption averaged 18.5 to 19.0 million Btu per hour with a maximum of 21.5 million Btu per hour. While the system was "idling" overnight (no feeding) at 1700° or 1800°F, the natural gas consumption was 10 or 11 million Btu per hour, respectively.

As mentioned above, the slag jammed the granulator drag conveyor making it necessary to cool the system so that it could be cleared. It would take a day to cool the system, at least several hours to clear the jam, and a day to heat the system back up to operating temperature. At the same time, the EPA SITE stack and environmental sampling teams had mobilized to the site to take samples during the Extended Duration Test with sediment dredged from the Passaic River. The Extended Duration Test was to follow immediately after the Confirmation Test. Unfortunately, the stack and environmental sampling teams could not accommodate the delay. They needed to complete their sampling work during the week of December 4 and then move on to another scheduled assignment, which could not be postponed. At that point, a decision was made by the sponsors, ECH, and GTI to discontinue the Confirmation Test and initiate the Extended Duration Test with Passaic River sediment so that the EPA SITE stack and environmental sampling teams could collect their samples. The Extended Duration Test was initiated on December 4.

The work described in this report was conducted from June 19 through December 2, 2006.

Two subsequent tests have been conducted in the Cement-Lock demo plant with Passaic River sediment. The complete results of those tests are included in the project final report to be published by Gas Technology Institute.

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I. INTRODUCTION

The New York/New Jersey Harbor has a natural depth of about 19 feet. Because of this, as a major regional shipping hub, the harbor is laced with about 240 miles of navigation shipping channels (see diagram below) that must be periodically dredged to maintain the required depths for ocean-going cargo vessels. Due to unacceptably high levels of contaminants – both organic and inorganic – most of the sediment dredged from the harbor is no longer suitable for ocean disposal and must be treated as necessary and beneficially used or disposed of elsewhere.

Shipping Channels in the NY/NJ Harbor

New Jersey Sediment Decontamination Demonstration Project

In 1998, the State of New Jersey Department of Commerce and Economic Development Office of Maritime Resources issued an RFP (Request for Proposals) for technologies that could effectively and economically decontaminate sediment dredged from the navigation channels in the NY/NJ Harbor. It was also necessary to demonstrate that the decontaminated sediment could be beneficially used and sold in the marketplace. The processing cost (exclusive of dredging costs) of decontaminating the sediment must also be less than $35 cubic yard ($yd^3$) dredged for a large-scale project.

Fifteen proposals were submitted in response to the RFP. The Institute of Gas Technology (predecessor to Gas Technology Institute) and ENDESCO Services, Inc. (wholly owned subsidiary of GTI) submitted a proposal offering the Cement-Lock Technology as a means of accomplishing the stated objectives. After a detailed technical evaluation, the Cement-Lock Technology was one of five technologies selected by the New Jersey Dredging Project Facilitation Task Force (appointed by then New Jersey Governor Christine Todd Whitman) to participate in a two-phased program to evaluate and demonstrate technologies for decontaminating dredged sediment. The sediment for the Phase I Pilot test and the Phase II demonstration test was to be dredged from the navigation channels in the NY/NJ Harbor. Subsequently, a contract was awarded from the New Jersey Department of Transportation Office of Maritime Resources (NJ-DOT/OMR) to ENDESCO Clean Harbors, L.L.C. (ECH) a subsidiary of ENDESCO Services and Gas Research Institute formed to demonstrate and commercialize the Cement-Lock Technology in the NY/NJ Harbor area.

Cement-Lock® Technology

The Cement-Lock®[1] Technology is a thermo-chemical remediation technology that converts contaminated sediment and other wastes into Ecomelt® – a pozzolanic material, which when dried and finely ground can be used as a partial replacement for Portland cement in the manufacture of concrete. As such, Ecomelt is a marketable product for beneficial use. When Ecomelt and Portland cement are blended together in prescribed proportions, the result is blended cement.

Cement-Lock was developed by the Gas Technology Institute (GTI, formerly the Institute of Gas Technology, Des Plaines, IL) and Unitel Technologies (Mount Prospect, IL) in response to the need identified by the U.S. Environmental Protection Agency Region 2 and the U.S. Army Corps of Engineers (New York District) under the federal Water Resources Development Act (WRDA). An objective of the WRDA Sediment Decontamination Program was to foster the development of sediment decontamination technologies and bring them to commercial readiness on a fast track for utilization in the NY/NJ harbor area and to find beneficial uses for these sediments.

[1] Cement-Lock® consulting services for waste treatment available from Volcano Group L.L.C.

Under the WRDA Program, GTI conducted tests in bench-scale as well as continuously operating pilot-scale equipment using Newtown Creek (New York) sediment to prove the concept of the technology. The results of these tests were very encouraging and have been published elsewhere (1, 2). All the organic contaminants present in the sediment were destroyed; the inorganic contaminants were immobilized in the cement matrix; and the compressive strength of the blended cement produced from these tests surpassed the requirements for Portland cement as required by ASTM (American Society for Testing and Materials) standards.

In the Cement-Lock process, the mixture of sediment and modifiers is charged to a rotary kiln melter (Ecomelt® Generator). The Ecomelt Generator is maintained at a temperature in the range of 2400° to 2600°F by combustion of natural gas or other fuels with air. This temperature yields a melt with a manageable viscosity and causes the minerals in the sediment and modifier mixture to react together. During processing, the sediment-modifier mixture is thermo-chemically transformed from the recognizable feed materials to a homogeneous, lava-like melt. All nonvolatile heavy metals originally present in the sediment are incorporated into the melt matrix via an ionic replacement mechanism. The melt flows slowly like lava through the Ecomelt Generator as the kiln rotates. The melt then falls by gravity through a plenum and into water, which immediately quenches and granulates the melt. The quenched and granulated material, called Ecomelt® is removed from the quench granulator by a drag conveyor, which also partially dewaters it.

Flue gas from the Ecomelt Generator flows into the Secondary Combustion Chamber (SCC), which provides an additional 2 seconds of residence time at a minimum temperature of 2200°F to ensure complete destruction of any organic compounds that survive the severe thermal conditions in the Ecomelt Generator. Flue gas exiting the SCC is rapidly cooled via direct water injection to prevent the formation or recombination of dioxin or furan precursors. In the commercial concept, the thermal energy of the flue gas can be used to raise steam in a heat recovery steam generator to generate electric power for plant use or for export.

Powdered lime (CaO) is injected into the cooled gas to capture sulfur oxides and hydrogen chloride from sulfur and chlorine in the sediment as well as sodium and potassium chlorides from seawater. The sulfur/salt/spent lime mixture is removed from the flue gas stream by a

baghouse. The spent lime from the baghouse is containerized and shipped to a landfill. In a commercial Cement-Lock Technology application, a portion of this spent lime may be recycled to the front of the plant for use as a modifier. Volatile heavy metals, such as mercury, are removed from the flue gas as it passes through a fixed bed of activated carbon pellets. Alternatively, in a commercial application, powdered activated carbon could be injected into the flue gas to capture volatile metals, which would be collected in another bag house. Cleaned flue gas is vented to the atmosphere at about 350°F via an induced draft fan.

Cement-Lock Demonstration Plant

ENDESCO Clean Harbors, L.L.C. (ECH) installed a Cement-Lock demonstration plant on a 2-acre parcel of land at the International Matex Tank Terminal (IMTT) in Bayonne, NJ beginning in 2002. Plant construction was completed in July 2003 and shakedown and commissioning was initiated subsequently. The initial testing of the demo plant took place in December 2003.

Shakedown and commissioning activities from July 28, 2003 through December 24, 2003 as well as of the Cement-Lock demo plant Operations from December 2003 through March 2005 are described in separate reports (3, 4).

The demo plant incorporates the major equipment components needed to demonstrate and characterize the process (Figure 1). The final step in producing Cement-Lock construction-grade blended cement – grinding and blending the Ecomelt with Portland cement or another lime source – can be accomplished at an off-site facility. The demo plant has a nominal throughput capacity of 13,000 yd^3 of sediment per year, or about 1 ton per hour. With process enhancements, such as oxygen enrichment, its estimated throughput can be increased to 30,000 yd^3/year.

Equipment Modification Design Study

During the initial start-up and operation of the Cement-Lock demo plant, it became evident that the demo plant had several mechanical inadequacies. It could not be operated in slagging mode for an extended period of time without having slag plug the drop-out box exit. Nor was the sediment feed system able to consistently and uniformly feed the sediment-modifier mixture to the Ecomelt Generator. Further, as testing continued, the monolithic refractory of the kiln nose

ring developed cracks that would eventually cause the nose ring to fail. Although potential solutions were developed and implemented during the course of testing, none were successful in solving the above problems. The existing Cement-Lock demo plant required modification to the feed system, rotary kiln, and Ecomelt discharge/drop-out box systems before it could be operated for an extended period in slagging mode

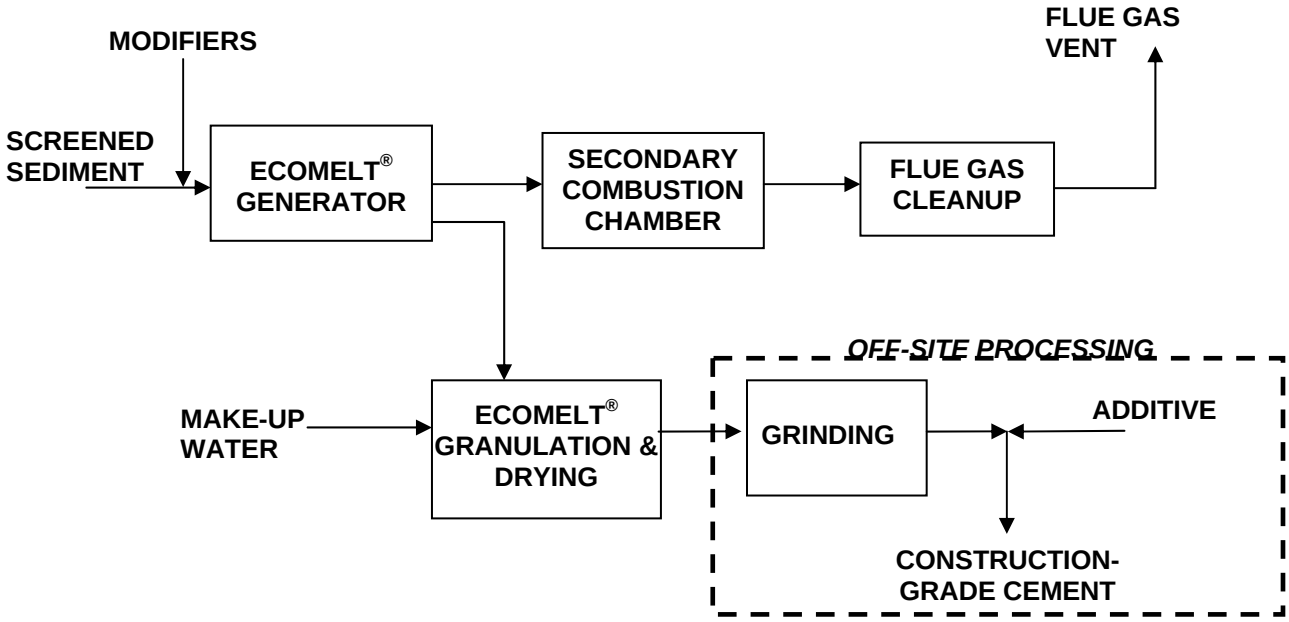

Figure 1. Process Flow Diagram for Cement-Lock Demonstration Plant

ECH proposed to NJ-DOT/OMR to develop solutions to the sediment feeding and slag discharging problems mentioned above. NJ-DOT/OMR approved the proposed work scope and added a sixth task to the existing contract with ECH. The objectives of the Task 6 work were to:

- Assess the Cement-Lock demo plant equipment status (specifically the feed system, rotary kiln, and Ecomelt discharge/drop-out box systems),
- Develop equipment modification designs and drawings for the systems, and
- Estimate costs and establish a schedule to implement the preferred modifications.

The overall intent of these modifications was to ensure that the Cement-Lock demo plant could consistently feed the sediment and modifier mixture to the Ecomelt Generator and operate in slagging mode – producing Ecomelt – over an extended period of time. Task 6 was conducted from August through December 2005. The results have been published previously (5).

In addition, the U.S. Environmental Protection Agency Region 2 (U.S. EPA R2) and U.S. EPA Superfund (Superfund) program with technical and contractual support from Brookhaven National Laboratory (BNL) also supported the Phase II project specifically for processing sediment dredged from the Lower Passaic River as part of the Treatability Study Pilot.

II. EQUIPMENT MODIFICATION DESIGN STUDY SUMMARY

This report section summarizes the design modifications to the sediment-modifier feeding system and the slag discharging system that were implemented for the Phase II work.

ECH worked with GTI staff and consultants and approached the equipment modification design task with considerable experience in operating the Cement-Lock demonstration plant in both slagging and non-slagging modes. Based on consultants' recommendations, ECH sought the participation of companies and individuals with specific capabilities and expertise for the equipment modification design.

For the sediment and modifier feeding system, ECH utilized the services of CEntry Constructors and Engineers (CEntry), RPMS Consulting Engineers (RPMS), and GTI. For the drop-out box (slag discharge) system, ECH utilized the services of CEntry, Paul Queneau (P. B. Queneau and Associates), FFE Minerals, and GTI.

Original Sediment and Modifier Feeding System

The Cement-Lock demo plant solids feeding system was originally designed to provide a continuous and consistent feed mixture of sediment and modifier solids to the rotary kiln melter (Ecomelt Generator). The design feed rate was 2,930 lb/hr of wet (60 weight percent water) sediment plus 470 lb/hr of Modifier 1 and 30 lb/hr of Modifier 2. The modifiers are dry, granular solids that must be intimately blended with the sediment before being fed to the rotary kiln melter.

The sediment, dredged from the Stratus Petroleum site in Upper Newark Bay, consists of 97 percent silt and clay and 3 percent sand. It was originally dewatered to about 55 wt % water with a belt press. During storage, the water content decreased to about 45 wt %.

Inconsistent feeding of sediment and modifier solids plagued demo plant operations since startup. The sediment was too wet and sticky to be mixed by the screws in the sediment feed hopper. The sediment also could not be readily conveyed out of the feed hopper via the four metering screws. The sediment stuck in the inclined screw conveyor as well as the weigh screw

conveyor, and the pug mill. Sediment stuck to the surfaces of all rotating sediment handling equipment, which had to be periodically cleared by hand.

Since the sediment stuck and accumulated in the weigh screw conveyor, the modifier feeders did not supply the proper quantities of modifiers to the pug mill. It was concluded that a screw/auger type of conveyor was not suitable for this particular blend of feed materials.

Options for Sediment and Modifier Feeding System

Our consideration of the options for the sediment and modifier feeding systems included the following assumptions regarding the initial processing of the sediment. About 5,000 yd^3 of Passaic River sediment containing about 60 wt % water will be brought to the Bayshore Recycling facility (Keasbey, NJ) in scows. Bayshore will off-load the sediment from the scows by clamshell bucket. Bayshore will then screen the sediment to -¼-inch solids particle size. Bayshore will then store the screened sediment in the hold of the sediment storage vessel (Valgocen) until needed by either BioGenesis Enterprises for their soil washing project, or ECH for Cement-Lock.

For the sediment feed system modification designs, we considered three different methods for feeding and/or preparing the sediment-modifiers mixture so that it could be fed to the Cement-Lock demo plant: 1) Slurry feeding (pumping) from the slurry preparation area, 2) mechanical dewatering and belt conveying to the charging deck, and 3) thermal drying and screw or belt conveying. Mechanical dewatering and conveying the sediment using a belt conveyor was considered the most feasible approach.

ECH considered that in the overall scheme a mixer would be needed to blend the dewatered sediment with modifiers. This would insure intimate mixing of the components in the proper proportions. The sediment-modifiers mixture would then be conveyed via belt conveyor to the charging deck. Next, a ram or piston-type positive displacement feeder would be installed to consistently feed the material into the kiln. Brief discussion of each of these needed equipment items follows.

Mixer/Blender: We considered a batch mixer suitable for blending a total of 10,000 lb/hr or 120 ft^3/hr of sediment and modifiers, which is twice the estimated capacity of the rotary kiln for "dewatered" sediment containing 45 wt % moisture.

The mixer would be equipped with a charging funnel with a large opening to receive sediment and modifiers from a front-end loader. The mixer would be mounted on supporting legs such that the discharged materials could be collected and removed by a front-end loader.

Conveyor: The blended feed materials would be transferred from the sediment storage area to a new charging hopper located next to the kiln by an enclosed belt conveyor. The horizontal distance for the conveyor was about 140 feet, the vertical lift was about 20 feet, and therefore the conveyor length needed was about 141 feet. To convey 5,000 lb/hr or 60 ft^3/hr of feed materials (the estimated capacity of the kiln for dewatered sediment case), a 12-inch wide belt would be sufficient. The capacity of a 12-inch wide belt conveyor is about 900 ft^3/hr at a typical speed of 250 ft/min. From a cost standpoint, ECH decided to rent a conveyor system from Smalis, Inc. (New Stanton, PA) as was done during the non-slagging campaign in March 2005.

Ram Feeder System: The ram feeder system would consist of a charging bin, an air lock (depending upon the supplier), and the ram feeder itself. Blended feed materials would be fed to the charging bin by belt conveyor. The charging bin would be designed to minimize "bridging" of feed solids inside the bin. The feed materials would fall by gravity from the charging bin to a plenum above the feeder. The feed materials would then be pushed by a ram feeder from the horizontal feed pipe into the kiln. The feeder will be placed inside the existing water-cooler feeder pipe to prevent overheating and caking of feed solids prior to entering the rotary kiln. The dimensions and cycle frequency of the air lock (if needed) will be based on the flow rate of feed materials and the volume of the feed pipe in order to provide a more steady feed into the kiln.

The V-Ram Solids (Albert Lea, MN) feeder has the capability to feed a wide variety of materials as evidenced by videos on their website (www.vram.com). The V-Ram feeder is a positive displacement feeder that does not require an air-lock or gate valve above or below to limit air intrusion. The V-Ram Solids Company provided delivery and cost for both an 11 and 16-inch feed system including hopper, feeder, motors, and control system. V-Ram also conducted a test using the sediment-modifiers mixture in a full size V-Ram pump test loop to confirm operability.

Existing Drop-Out Box (Slag Discharging) System

The original configuration of the Ecomelt Generator discharge and drop-out box is shown in Figure 2. The purpose for the water-cooled ceramic tiles located just below the kiln's discharge was to divide the stream of molten slag discharged from the kiln into multiple rivulets to facilitate rapid quenching and granulation with water sprays.

Inspection of the system after the initial start-up test showed that most of the slag buildup was over the ceramic tiles and the vertical wall immediately above the tiles. Excessive air leakage through the air seal assembly at the kiln discharge end was also noted. A heat transfer analysis showed that the thermal input to the drop-out box was insufficient due to various radiation and convective heat losses.

During each of the slagging tests, as the molten slag discharged from the kiln, it solidified, accumulated, and plugged up the drop-out box before it could fall into the water in the granulator, which caused all involuntary shutdowns of the slagging tests. Numerous changes and modifications were implemented, but none were successful in remedying the slag accumulation problem.

Summary of Selected Sediment/Modifier Feeding and Drop-Out Box Modifications

The preferred equipment modifications for the sediment and modifier feeding systems and the slag discharging systems are summarized below.

Feeding System: The preferred feeding system for the sediment and modifiers includes a sediment-modifier mixer/blender in the sediment storage area, a covered belt conveyor to convey blended material to the charging deck, and a V-Ram feeder system with non-flowable charging hopper.

Slag Discharging System: The preferred configuration for the slag discharging (drop-out box) system includes replacing the kiln nose ring refractory, moving the granulator to the east under the rotary kiln discharge, angling the north and south walls of the drop-out box straight down, and adding view ports and access ports.

Figure 2. Original Configuration of the Ecomelt Generator Rotary Kiln Nose and Drop-Out Box

Operating Protocol for Modified Cement-Lock Demo Plant

The operating protocol for the Cement-Lock demo plant with preferred equipment modifications is summarized below.

Screened sediment (-¼-inch) was mechanically dewatered at the facilities of Bayshore Recycling Corporation by BioGenesis Enterprises. The final moisture content of the dewatered sediment was 38.5 wt %. A total of 201.45 tons of dewatered Passaic River sediment was transported to the Cement-Lock demo plant in Bayonne.

The sediment was unloaded from the trucks into the sediment storage area and covered with tarps for rain protection. The sediment will be blended with modifiers using an ALLU-SML screening bucket. The screening bucket will mix the sediment-modifier mixture and then deposit the mixed material directly onto the covered conveyor belt. The quantities of sediment and modifiers being mixed together will be determined using an electronic weigh scale.

The rate of sediment-modifier mixture being fed to the belt conveyor via the ALLU screening bucket will set the overall system feed rate.

Feed materials will be transferred from the belt conveyor and dumped to the pug mill installed just above the charging bin for the V-Ram feeder. The V-Ram feeder will push the sediment-modifier mixture into the kiln.

The sediment-modifier mixture will become a flowing homogeneous molten mass as it traverses the Ecomelt Generator. Upon exiting the Ecomelt Generator, the slag will fall directly into the water in the quench granulator without touching any other surfaces. There are no water sprays and no supplemental burners in the drop-out box. The quenched and granulated material is then known as “Ecomelt.” The Ecomelt granules exit the granulator via a dewatering drag conveyor.

III. IMPLEMENTATION OF EQUIPMENT MODIFICATIONS

Implementation of Task 1 (Equipment Modifications), Task 2 (Passaic River Sediment Handling, Delivery, and On-Site Storage), and Task 3 (Pre-Test Planning and Air Permitting) are described in this section. Within each task, the discussion follows chronologically.

Task 1. Equipment Modifications

In this section, the work to design, procure, fabricate and install the modified slag discharging system, install the refractory work, V-Ram feeder, conveyor belt system, and other miscellaneous activities are described.

Discharging System: During the Task 6 Equipment Modification Design Study, RPMS prepared drop-out box design drawings based on CEntry Constructors and Engineers (CEntry, Sandy, UT) recommendations. CEntry then critiqued the drawings and RPMS followed up with further revisions. To circumvent this time-consuming and cumbersome procedure, for the current work, ECH wanted CEntry to complete both the final design and detailed design work.

ECH prepared the scope of work for the drop-out box final design and sent it to CEntry for a cost estimate in early June 2006. CEntry's estimated was accepted by ECH and ECH issued a P/O to CEntry for the work. CEntry's work on the final design of the drop-out box modifications was essentially completed by the end of June. Further, CEntry had a designer available to do the detailed design work, so ECH executed a change order to CEntry's existing contract and CEntry commenced the detailed design work.

We reviewed the drawings prepared by CEntry for the design of the drop-out box and the detailed designs for the upper and lower discharge chutes. CEntry generated a total of four drawings: two plan drawings and two detailed design drawings. In the review process, CEntry concurred with the reduction in refractory thickness for the Phase II demo project as well as the overall changes in the ceramic and wire refractory anchor specifications.

Refractory Work: For the refractory work in the drop-out box and the rotary kiln nose ring, ECH contacted Duddy Contracting Inc. (DCI, Westfield, NJ) for a quotation. DCI had performed considerable work for ECH during the initial start-up of the plant as well as during

continuing plant operations. DCI's quotation was consistent with the estimate provided for the Task 6 study. DCI works closely with the refractory manufacturer, Harbison-Walker Refractories.

RPMS and Duddy Contracting: A project "kick-off" meeting was held on July 25 at RPMS offices with Mr. Bob Perla and Mr. Steve Stetka (RPMS), Mr. Dan Chiaravallo and Mr. Al Bond (Harbison-Walker Refractories), Mr. Kevin Duddy (DCI), and GTI. The objectives of the meeting were to get the mechanical and refractory work assignments clarified and to discuss the statement of work that had been prepared by GTI. We also discussed the design drawings that CEntry had prepared and made changes to the placement (orientation) of the ceramic and wire refractory anchors around the kiln nose ring.

During the discussion on refractory selection, it was suggested that instead of using 3-inch thick castable insulating refractory, a 1-inch thick insulating board could be used. This would facilitate installation and extend the clearance between the drop-out box walls and the rotating kiln by 2 inches on both sides of the kiln.

Since the mechanical and refractory work scopes are fairly interdependent upon each other, coherent work schedules needed to be established for RPMS and DCI tasks. For example, before DCI could go into the rotary kiln and demolish the drop-out box and nose ring refractory, the granulator (C-205) needed to be disconnected and removed. Before the granulator could be removed, the melt burners, some structural steel, and the electrical connections, natural gas piping, and air ductwork needed to be cleared and removed. Similarly, before FMW Piping could remove the old drop-out box, DCI needed to demolish the drop-out box refractory. The metal fabrication work also needed to be completed before the new refractory could be installed.

RPMS disconnected the electrical connections leading to the granulator (C-205) and cleared other utilities as required. FMW Piping (mechanical contractor) removed the melt burners from around the drop-out box including the Tempest and Hot Spots as well as the burners directed at the kiln nose. They also removed the structural steel around the drop-out box. FMW removed the granulator (C-205) from the system below the drop-out box so that DCI could begin demolition of the drop-out box refractory. DCI then demolished some 220 ft^3 of refractory from the drop-out box.

Next, FMW completed cutting the lower part of the drop-out box away. The nose ring gussets and nose ring shelf metal were also cut away. The kiln was rotated slowly to bring the parts to be cut away into reach. Figure 3 shows the kiln nose after the cracked refractory was removed. Also the lower part of the drop-out box has been cut away in this view.

FMW also removed the front-end equipment in anticipation of receiving and installing the new V-Ram feeder. The front-end equipment removed includes the water-cooled screw auger (C-151), the pug mill mixer (M-131), and the weigh conveyor (C-112). Some interfering structural steel was also removed at the front end. The back end of the water-cooled housing that connects to the rotary kiln burner face plate was also cut back to accommodate the new V-Ram feeder.

Figure 3. Lower Part of Drop-Out Box Cut Away. Old Refractory Anchors Visible in the Nose Ring and Drop-Out Box Wall

Using the detailed design drawings that had been prepared by CEntry, Casale Industries (Garwood, NJ) fabricated the main drop-out box section as well as the upper refractory-lined discharge chute and the lower stainless steel discharge chute. Fabrication was completed on October 13 and representatives from RPMS and GTI visited Casale to approve the fabrication and confirm key measurements. Threaded studs had been installed on a diamond-shaped pattern

across the main drop-out box section as specified. All of the fabricated parts were delivered to the plant site on October 16.

FMW installed the main drop-out box section and welded the existing upper and new lower sections together (Figure 4). The upper discharge chute (without refractory) and the stainless steel lower discharge chute are also shown in Figures 5 and 6 awaiting installation.

The anchors needed to support the wire anchors as well as the ceramic anchors around the nose of the kiln were also installed. The refractory anchors are positioned around the kiln nose ring alternating 45° up and 45° down. A ceramic refractory anchor is shown in place in the nose ring (Figure 7).

Figure 4. New Drop-Out Box Installed and Welded in Place

DCI installed the new refractory in the drop-out box and the kiln nose ring using a process called "guniting." In this process, a mixture of the refractory material and water is "gunited" onto the target surface using a high-pressure hose. The castable refractory (Harbison-Walker Refractories Versaflow 60) was also installed in the upper discharge chute.

Figure 5. Upper Discharge Chute (without refractory)

Figure 6. Stainless Steel Lower Discharge Chute

Figure 7. Ceramic Refractory Anchor in Place on the Nose Ring. Wire Anchors Shown Welded in Place

V-Ram Feeder: Based on the results of the Task 6 study, we contacted V-Ram Solids (Albert Lea, MN) to supply an appropriate feeder for the sediment-modifier mixture. To determine the proper size of the equipment, V-Ram requested that we send a bulk sample (three 55-gallon drums of sediment) for testing in their equipment. To simulate the addition of modifiers to the sediment, V-Ram suggested that the appropriate amount of sand be blended with the sediment. To that end, three 55-gallon drums loaded with Passaic River sediment (from the sediment storage area) were shipped to V-Ram Solids facilities.

GTI visited V-Ram Solids facilities on July 6 to witness the testing of the V-Ram solids feeder with Passaic River sediment. The V-Ram test equipment consisted of an 11-inch ram with flowable hopper (Figure 8). At the outlet of the V-Ram feeder, lengths of 8-inch diameter pipe were connected to provide a suitable pumping distance for the feeder. Pressure transducers were located along the piping course to provide information on pressures generated during the pumping cycle. Data acquisition was by personal computer.

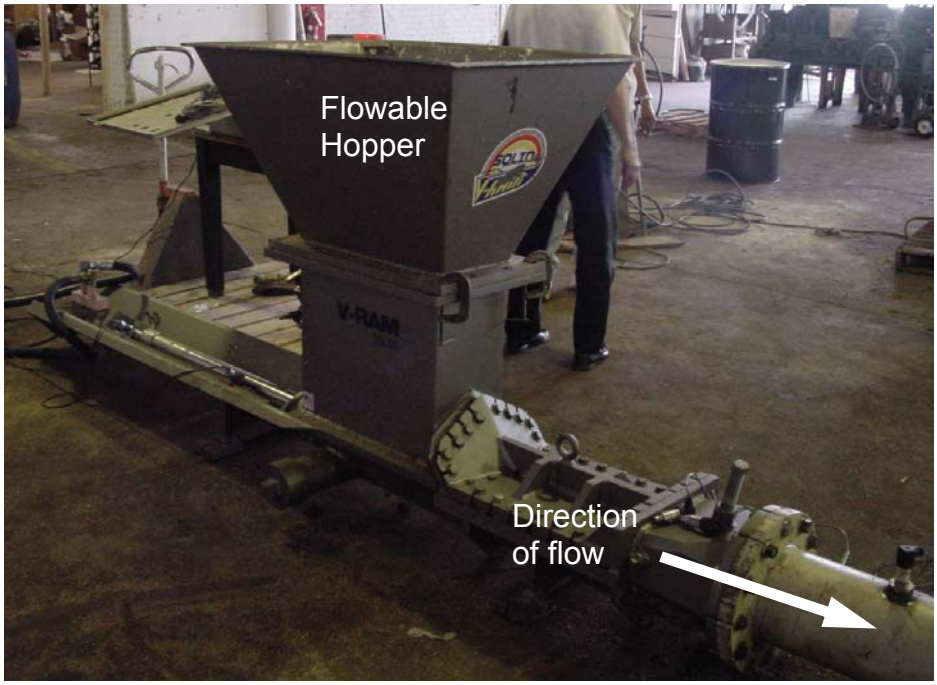

Figure 8. V-Ram 11-inch Pump with Flowable Hopper
Connected to 8-inch Diameter Pipe

The first test of the V-Ram pump was with as-shipped Passaic River sediment. The sediment was shoveled into the flowable hopper and the pump was activated at a rate of about 18 strokes per minute. The V-Ram readily pumped the material through the pipe (Figure 9).

Figure 9. Passaic River Sediment Being Discharged through Straight 8-inch Diameter Pipe from V-Ram 11-inch Pump

The second test of the system was with Passaic River sediment blended with about 20 weight percent dry, fine silica sand. For this test, two 90° bends were also included in the piping (Figure 10). The addition of sand was to simulate the addition of modifiers to the sediment. The sand and sediment were loaded into a mixer for blending and then into the feed hopper for the test. The V-Ram also readily pumped this mixture. The tests were recorded using a digital video camera. The data collected during the tests was recorded and transmitted to ECH on a CD.

Based on the test results, V-Ram prepared several proposals for ECH with different options of pump motor horsepower and materials of construction. For our application, V-Ram recommended the 16-inch V-Ram feeder. It was also noted that the sediment tended to stick on the sloped wall of the flowable hopper. Therefore, V-Ram Solids recommended a "non-flowable" hopper, which has vertical sides.

ECH evaluated the proposals and selected the 16-inch carbon steel system with non-flowable hopper. The purchase order was prepared and submitted to V-Ram in early August. The complete V-Ram feeder system including control panel and hydraulic unit were delivered to the plant site on September 26 (Figure 11). It was subsequently mechanically installed at the charging deck by FMW. SM Electric made the electrical connections. An end view of the V-Ram feeder installed is shown in Figure 12. The high-pressure hydraulic lines are shown at lower right.

Figure 10. Test Configuration for V-Ram Test with Passaic River Sediment Blended with Sand

Figure 11. V-Ram Hydraulic Module Being Off-Loaded at the Cement-Lock Demo Plant Site (September 26, 2006)

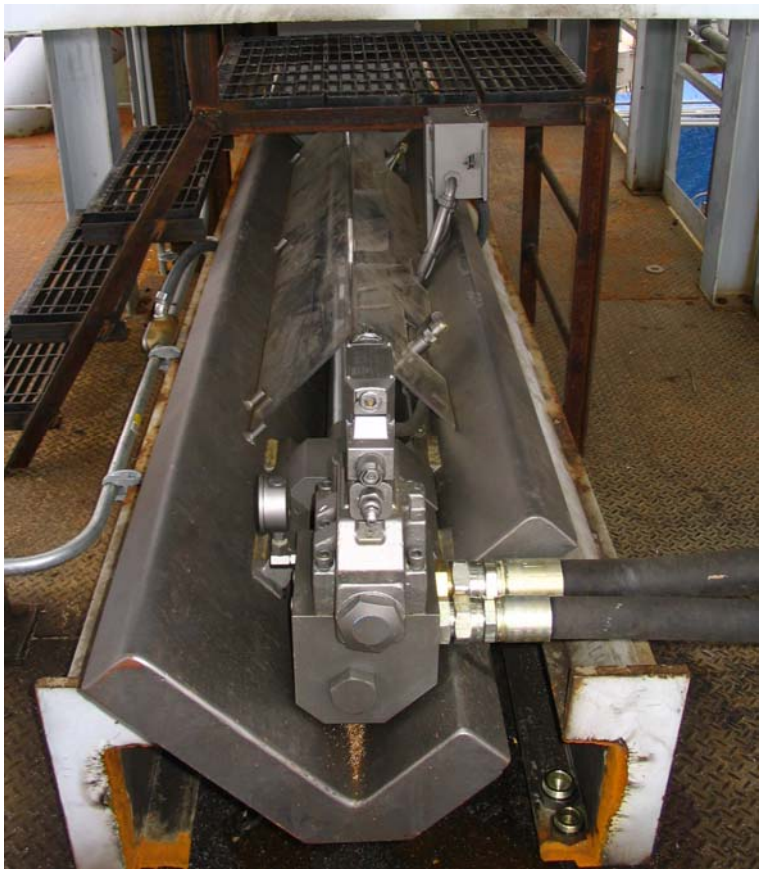

Figure 12. End-View of V-Ram and Hydraulic Connections

Conveyor Belt system: The belt conveyor system would bring sediment-modifier mixture from the sediment storage area to the feed hopper of the V-Ram feeder on the charging deck. For this application, we contacted Smalis Inc. (New Stanton, PA). Smalis had provided the belt conveyor for the March 2005 non-slagging campaign.

RPMS developed detailed specifications for the belt conveyor system to feed the V-Ram feeder on the charging deck. The belt conveyor system included a 140-foot length of belt conveyor running from the sediment storage area parallel to the rotary kiln but at a shallow incline. Another 40-foot section of belt conveyor would run perpendicularly from the end of the 140-foot conveyor and be inclined up to the charging deck above the pug mill.

The existing pug mill (M-131, Figure 13) was relocated and positioned just below the discharge of the inclined belt conveyor (Figure 14).

Figure 13. Pug Mill (M-131) to be Installed
Above the V-Ram Feeder

The conveyor system was originally scheduled for delivery in early November. The conveyor parts were shipped to the plant site on November 13 and 15, which was later than scheduled and as a result, delayed plant start-up. FMW installed the parts of the conveyors and lifted them up

Figure 14. Pug Mill (M-131) Relocated to the Charging Deck
Above the V-Ram Feeder (V-Ram hopper shown at bottom)

onto the stanchions. SM Electric Company connected power to the two conveyor motors and ran conduit and wire so that the long conveyor could be started or stopped at the inlet at the sediment storage area. The two-section belt conveyor system is shown in Figure 15.

Figure 15. Covered Belt Conveyors Running from the Sediment Storage Area to the Charging Deck (left: looking west from the sediment storage area; right: looking east from the SCC platform)

Once the V-Ram feeder was installed, the pug mill (M-131) was relocated and positioned above the V-Ram hopper (Figure 16). The hydraulic connections between the V-Ram feeder and the hydraulic unit (at ground level) were connected.

Figure 16. V-Ram Feeder Pump Installed at the Charging Deck. The Water-Cooled Screw Auger (C-151) Removed. Relocated Pug Mill (M-131) Above.

On November 6, the V-Ram service technician visited the plant to conduct shakedown testing and operator training. During initial shakedown testing, the V-Ram service technician determined that one of the valves on the hydraulic system was closed even though its actuator indicated it was open. This installation error was readily fixed. Also, the temperature sensor for the hydraulic oil reservoir was determined to be inoperative. V-Ram sent a replacement by overnight express, which was also installed.

Refractory Dryout: According to Harbison-Walker Refractories (HWR), the newly installed refractory needed to be carefully dried out to prevent cracking during subsequent operation. HWR specified a dryout schedule in which the refractory would be heated to specific temperatures and "soaked" at these temperatures for specific times. The refractory dryout was estimated to take about 67 hours and reach a maximum temperature of 1100°F.

Team Industrial Services (TEAM, Aston, PA) was selected to perform the refractory dryout. They had been highly recommended by DCI based on cost and experience. TEAM arrived at the demo plant site on November 3 (Friday) for IMTT Safety Orientation. On November 6 (Monday) they set up the equipment required for refractory drying. The equipment included a 10-million Btu/hour natural gas burner, blower, insulation, thermocouples for sensing temperature, and data acquisition equipment. The lower part of the drop-out box was closed off from the ambient using insulating blanket as shown below in Figure 17.

The burner was inserted into the access hatchway on the north side of the drop-out box and insulated as shown in Figure 18.

To limit the volume of air inside the rotary kiln and drop-out box that must be heated, bulkheads were installed by FMW in the kiln and the duct leading to the secondary combustion chamber (SCC). FMW also constructed a steel box-like structure to protect the data acquisition equipment from weather. The structure was covered with a tarp for rain protection.

TEAM began the prescribed heating schedule late Monday and completed the dryout on Thursday at which time they began dismantling and demobilizing their equipment. Overall, the decision to use a professional dryout company to cure the refractory was a good one even though it had not been included in the original work scope. The alternative was to have RPMS and GTI personnel attempt to maintain the prescribed dryout schedule using the primary (30-million

Btu/hour) kiln burner at low-fire initially, which would have required heating the entire kiln volume.

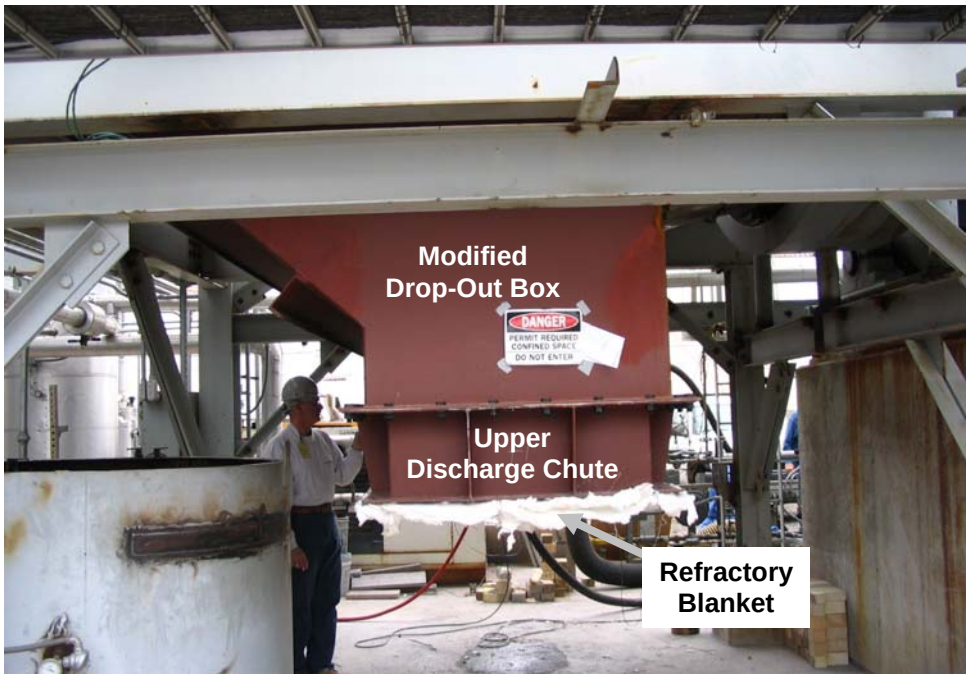

Figure 17. New Drop-Out Box and Upper Discharge Chute in Place with Refractory Blanket Shown at Bottom

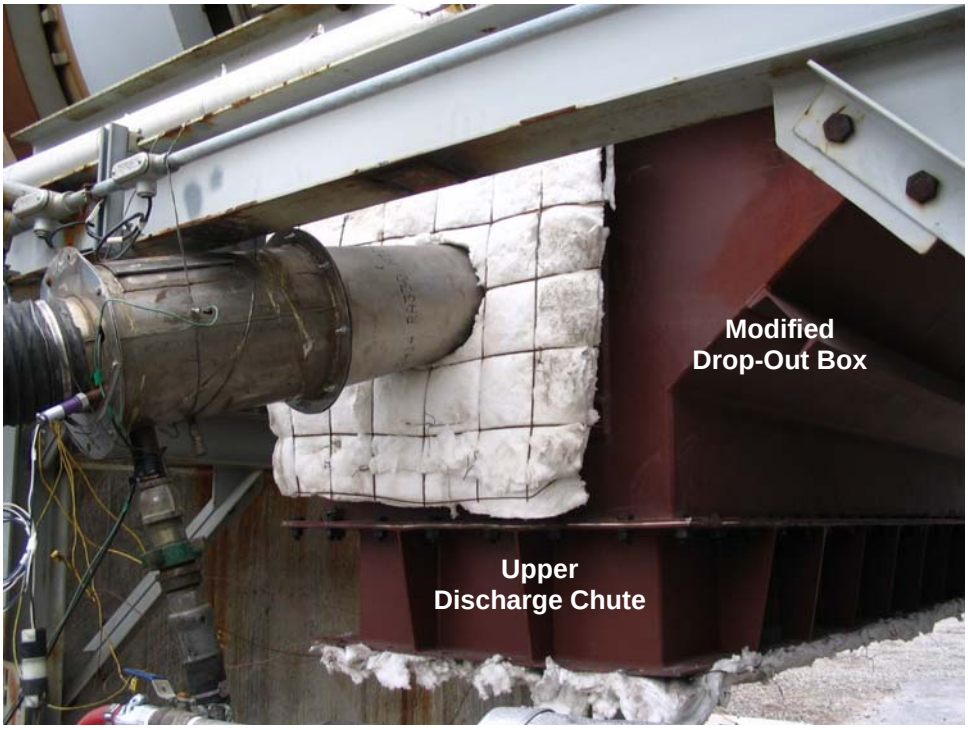

Figure 18. TEAM's 10-Million Btu/hour Burner Installed and Insulated in North Drop-Out Box Access Hatchway

Stack Cap: The stack cap was removed from its position on top of the emergency stack and placed on the ground (Figure 19) in an inverted position. During previous tests, the overheated steel had warped the stack cap such that the cap did not close completely. Steel that had been damaged due to overheating was removed. The burned metal was removed from the stack cap. According to DCI, the refractory appeared to be sound. The stack cap was reinstalled and tested for proper function.

Figure 19. Stack Cap (Removed From Emergency Stack) Showing Overheated Metal

Haz-Op Session: RPMS and GTI project personnel convened a Haz-Op session to discuss "hazards and operability" issues that could arise because of the new equipment installed in the demo plant. The discussion focused on the new two-section conveyor system and the V-Ram feeder. As a result of these discussions, new emergency stop switches were located near both the long conveyor inlet and the V-Ram feeder. The modified drop-out box was discussed, but did not elicit any Haz-Op suggestions.

Scaffolding: Safety Scaffolds (Branchville, NJ) visited the plant to assess the scaffolding needs at four locations: 1) the west end kiln view ports, 2) the north side drop-out box view port, 3) the

activated carbon bed inlet, and 4) the main stack. Safety Scaffolds has provided scaffolding for the Cement-Lock demo plant in previous campaigns.

The scaffolding for the west end kiln view ports and the north side drop-out box view port are needed for proper operation of the plant. The scaffolding for the stack and activated carbon bed are required for the EPA SITE stack and environmental sampling teams.

Natural Gas Service: Natural gas service to the plant was resumed by the local utility (PSE&G) on November 1. Two gas meters are located about 450 feet to the east of the plant.

Miscellaneous Repairs: FMW corrected a leaking gasket in the main flue gas duct leading from the flue gas quencher to the bag house. The leak was detected during the refractory dryout operation when water was observed dripping from the duct connection. It turns out that the flue gas quencher water spray valve was inadvertently left on, which enabled the leaking gasket to be discovered.

Task 2. Passaic River Sediment Handling, Delivery, and On-Site Storage

During March 2006, BioGenesis mechanically dewatered some 619 cubic yards of Passaic River sediment using a plate-and-frame filter press. The sediment had been in storage in the former Great Lakes ore carrier Valgocen at Bayshore Recycling Corporation (Keasbey, NJ). By mechanical dewatering, the water content of the sediment was reduced from 81.6 to 38.5 weight percent (the solids content was increased from 18.4 to 61.5 wt %). The resulting mechanically dewatered sediment had a volume of about 170 cubic yards and weighed 201.45 tons as delivered to the sediment storage area at the Cement-Lock demo plant. The mechanically dewatered sediment was covered by tarps waiting to be processed through the Cement-Lock demo plant.

The sediment storage area at the Cement-Lock demo plant site at IMTT had experienced some damage during the previous processing campaigns. Therefore, before the mechanically dewatered Passaic River sediment could be brought to the site, repairs were made to the sediment storage area. RPMS moved the existing Stratus Petroleum sediment away from the Jersey barrier walls and installed clay-based liner over the Jersey barriers. The mostly premixed Stratus Petroleum sediment was combined and relocated to the southeastern area of the sediment storage

area. The mechanically dewatered Passaic River sediment was located to the northwestern area of the sediment storage area (Figure 20).

Figure 20. Mechanically Dewatered Passaic River Sediment in Storage at the Cement-Lock Demo Plant

Task 3. Pre-Test Planning and Air Permitting

In preparation for preparing and submitting a modified Environmental Improvement Pilot Test (EIPT) permit application to NJ-DEP, a meeting was held at the NJ-DEP on May 19 with Mr. Patrick Sanders (NJ-DEP Enforcement), Mr. Joel Leon and Dr. Negib Harfouche (Air Quality Permitting), Mr. Scott Douglas (NJ-DOT/OMR), and GTI to discuss the requirements for the Phase II project permitting activities. NJ-DEP suggested that new Operating Scenarios be incorporated into the existing EIPT permit that would include the Confirmation Test with Stratus Petroleum sediment and the Extended Duration Test with Passaic River sediment. This suggestion was followed in the preparation of the EIPT application.

The analytical requirements for the Confirmation Test were to include measurement of nitrogen oxide (NOx) emissions during the test. Other analytical requirements for the Confirmation Test include using the continuous emission monitoring system (CEMS) in the stack for oxygen (must be greater than 2 volume percent, dry basis), carbon monoxide (must be less than 50 ppm, dry volume basis corrected to 7 volume percent O_2), and opacity (must be less than 5 percent).

NJ-DEP also suggested that ECH analyze a sample of the mechanically dewatered Passaic River sediment that was in storage for trace elements, PCBs, dioxins and furans, semi-volatile organic contaminants, and pesticides. Thereafter, RPMS took a grab sample of the Passaic River sediment. The sample was submitted to SGS Environmental Services (SGS) for major and minor oxides, trace elements, PCBs, dioxins and furans, semi-volatile organic contaminants, pesticides, calorific value, proximate and ultimate analyses. The analysis of this sample of Passaic River sediment is presented in Table 1.

Table 1. Analysis of Grab Sample of Mechanically Dewatered Passaic River Sediment (May 3, 2006)

Contaminant	Quantity
Dioxins - Furans	-- pg/g --
1,2,3,4,6,7,8-HpCDD	370
HpCDDs (total)	890
1,2,3,4,7,8,9-HpCDF	18
1,2,3,4,6,7,8-HpCDF	600
HpCDFs (total)	790
1,2,3,4,7,8-HxCDD	3.6
1,2,3,6,7,8-HxCDD	20
1,2,3,7,8,9-HxCDD	11
HxCDDs (total)	210
1,2,3,4,7,8-HxCDF	150
1,2,3,6,7,8-HxCDF	35
1,2,3,7,8,9-HxCDF	5.6
2,3,4,6,7,8-HxCDF	19
HxCDFs (total)	480
1,2,3,7,8-PeCDD	5.1
PeCDDs (total)	61
1,2,3,7,8-PeCDF	14
2,3,4,7,8-PeCDF	32
PeCDFs (total)	420
2,3,7,8-TCDD	270
TCDDs (total)	340
2,3,7,8-TCDF	14
TCDFs (total)	430
OCDD	3700
OCDF	870
Proximate Analysis (as received)	-- wt % --
Moisture Content	27.50
Ash	66.70
Volatile Matter	5.51
Fixed Carbon	0.29
Total	100.00

Ultimate Analysis (dry basis)	-- wt % --
Carbon	4.16
Hydrogen	0.16
Nitrogen	0.05
Sulfur	0.83
Oxygen (by difference)	2.80
Ash	92.00
Total	100.00
	-- wt % --
Chlorine content (dry basis)	0.01
Calorific Value, Btu/lb (dry basis)	448

SVOCs	-- µg/kg --
Acenaphthene	< 540
Acenaphthylene	< 540
Anthracene	< 540
Benzo (a) anthracene	< 540
Benzo (a) pyrene	680
Benzo (b) fluoranthene	570
Benzo (g,h,i) perylene	< 540
Benzo (k) fluoranthene	< 540
Chrysene	< 540
Dibenzo (a,h) anthracene	< 540
Fluoranthene	< 540
Fluorene	< 540
Indeno (1,2,3-c,d) pyrene	< 540
1-Methylnaphthalene	< 540
2-Methylnaphthalene	< 540
Naphthalene	< 540
Phenanthrene	< 540
Pyrene	< 540

Pesticides	-- ug/kg --
alpha-BHC	< 17
beta-BHC	< 17
delta-BHC	< 17
gamma-BHC (Lindane)	< 17
Heptachlor	< 17
Aldrin	< 17
Heptachlor epoxide	< 17
Endosulfan I	< 17
Dieldrin	< 17
4,4'-DDE (p,p'-DDX)	< 17
Endrin	< 17
4,4'-DDD (p,p'-TDE)	< 17
Endosulfan II	< 17
Endosulfan sulfate	< 17
4,4'-DDT	54
Methoxychlor	< 17
Toxaphene	< 17

alpha-Chlordane	< 17
gamma-Chlordane	< 17
Chlordane, total	< 17
Endrin aldehyde	17
Endrin ketone	< 17
PCB/Aroclors	--- mg/kg ---
Aroclor 1016	< 0.054
Aroclor 1221	< 0.054
Aroclor 1232	< 0.054
Aroclor 1242	< 0.054
Aroclor 1248	< 0.054
Aroclor 1254	< 0.054
Aroclor 1260	0.092
Metals	-- mg/kg --
Arsenic	13
Barium	89
Cadmium	< 1.6
Chromium	110
Cobalt	14
Copper	140
Lead	220
Manganese	1100
Mercury	0.4
Nickel	28
Selenium	< 3.1
Silver	< 1.6
Zinc	180

"<" Below quantitation limit
* Practical Quantitation Limit

The Potential to Emit (PTE) calculations for each of the Operating Scenarios in the EIPT permit application utilized the analysis of the mechanically dewatered Passaic River sediment on site as well as the air emission data in the report prepared by TRC Environmental from the March 2005 non-slagging campaign.

The major and minor oxides analyses were also used by GTI to establish the modifier recipe for the target Ecomelt composition. Not unexpectedly, the recipe was not significantly different from that for the Stratus Petroleum sediment.

GTI submitted the EIPT permit application along with necessary additional support documentation to NJ-DEP on September 26. Upon consideration of the Operating Scenario with

Stratus Petroleum sediment-modifier mixture, another separate Operating Scenario was added as described below. Therefore, a total of three new Operating Scenarios were included in the EIPT permit application.

1. The first Operating Scenario is for the Confirmation Test in which the Stratus Petroleum sediment-modifier mixture will be fed to the system at 1,000 lb/hour for up to 12 hours.
2. The second Operating Scenario is for the Confirmation Test in which the Stratus Petroleum sediment-modifier mixture will be fed to the system at 4,000 lb/hour for up to 60 hours (the total of these two Operating Scenarios is 72 hours or 3 days).
3. The third Operating Scenario is for the Extended Duration Test in which the Passaic River sediment-modifier mixture will be fed to the system at 4,000 lb/hour for 200 to 450 hours.

On October 19, NJ-DEP forwarded a draft EIPT Compliance Plan to GTI for review and comment. NJ-DEP had combined the first two Operating Scenarios suggested by GTI into one Operating Scenario. GTI had completed its review of the draft EIPT and forwarded comments to NJ-DEP on November 1.

As part of the overall EIPT process, ECH was required to obtain a general permit for the rental diesel-powered Emergency Generator (EmGen). The general permit for the EmGen was granted by NJ-DEP. The general permit allows for the EmGen to be operated for a period not-to-exceed 50 hours at a thermal input of no more than 3 million Btu/hr. According to Foley Power (rental company), the actual thermal input to the EmGen is about 1.4 million Btu/hr. In the event that there is a power outage at the plant, the EmGen automatically energizes. The EmGen allows the rotary kiln to continue to be rotated while it cools from elevated temperature to prevent going "out-of-round."

When operated for the 50-hour maximum duration, the estimated emissions from the EmGen represent a significant fraction of the total plant emissions for CO, SO_2, VOCs (volatile organic compounds), and particulates. The EmGen emissions are not included in the EIPT.

The EIPT permit was issued by NJ-DEP to ECH for a 90-day operating window. The EIPT including the potential to emit and the specific permit requirements are included in Appendix A.

Project Planning: In August, ECH held a meeting with IMTT and RPMS at IMTT offices to discuss the overall project scope and to keep communications with IMTT up to date. Another

objective of this meeting was to discuss IMTT site rules and safety requirements so that expectations on both sides are fully understood by all. IMTT specifically noted that ECH was to have fire extinguishers certified and in place in case of fire. Also, in the interest of fire safety, ECH was to have the overgrowth of weeds and volunteer plants eradicated. IMTT averred that no “hot work” permits would be issued unless the weeds were eliminated.

In September, GTI updated and revised the Health and Safety Plant (HASP) for the Phase II project based on the conditions extant for the project. Copies of the revised HASP were distributed to the project sponsors.

GTI arranged for Trace Environmental Systems to come to the demo plant site and evaluate the condition of the CEMS.

Representatives from the EPA SITE Program visited the demo plant on November 29 (Wednesday) to assess the stack and activated carbon bed inlet scaffolding, available equipment and operations in anticipation of the Passaic River sediment testing scheduled to begin during the first week of December. In preparation for the EPA SITE program arrival at the plant, a second trailer was ordered for the EPA SITE staff, operating labor, supplies, and preparation area.

Also, since we were planning to operate around the clock and were expecting 8 to 12 sampling staff on-site during the day, sanitary tanks were ordered to be installed on the two trailers (instead of one portable toilet).

IV. CONFIRMATION TEST OPERATIONS

Task 4. Confirmation Test Operations

This report section describes the operation of the Cement-Lock demo plant for the Confirmation Test with sediment dredged from the Stratus Petroleum site in Upper Newark Bay.

In preparation for Confirmation Test operations, a 10,000-lb capacity scale was ordered and delivered from Industrial Scales (Linden, NJ). The scale was capable of weighing a skidsteer with and without a bucket-full of sediment-modifier mixture. Using the scale, we were able to monitor how much sediment/modifier mixture was being fed to the conveyor belt system and thus to the rotary kiln system.

Nine tons of pulverized (-100 mesh) lime (CaO) were ordered and delivered from Graymont (PA) and pneumatically loaded into the lime hopper (T-302). The lime was to be used for air pollution control during operations with both Stratus Petroleum sediment and Passaic River sediment (in the Extended Duration Test).

The emergency generator (EmGen) was delivered by Foley Power Systems on November 13. SM Electric connected the EmGen to the emergency grid by running appropriate cables from the EmGen to the MCC. The EmGen was tested for proper function.

Also, ECH rented a NOx meter (Testo 350XL Combustion Efficiency kit) from CleanAir Rentals (Palatine, IL) for monitoring NOx in the flue gas as required by the Environmental Improvement Pilot Test permit. NOx samples were taken periodically during the Confirmation Test and are discussed later in this report section.

Calibration gases for the continuous emission monitoring system (CEMS) were ordered and delivered from Spectra Gases (Branchburg, NJ). Calibration gases include 160 ppm CO in nitrogen, 2400 ppm CO in nitrogen, and nitrogen zero gas.

The natural gas supply to the demo plant was restored by the local utility PSE&G on November 1. According to PSE&G, the residual gas pressure in the main was 12 psig, indicating

that the natural gas supply piping had not lost any significant pressure since the previous plant operation in March 2005.

RPMS operated the five major equipment blowers from the HMI (human machine interface, i.e., the computer) and found that they were working satisfactorily. Scales Compressor Company visited the plant and checked out and evaluated the air compressor and the natural gas booster pump. Scales conducted maintenance repairs on both units as required.

The bag house reverse pulse cleaning system was checked out. Means of reducing the severity of the pressure drop fluctuations during the reverse pulsing activity were implemented during the Confirmation Test.

Modifier Feeder Calibration: For the Extended Duration Test, the Passaic River sediment needed to be blended with modifiers prior to feeding. The Stratus Petroleum site sediment had been mixed with modifiers during previous campaigns. In preparation for feeding the Passaic River sediment, both limestone and alumina feeders were recalibrated. The limestone feeder was calibrated successfully. However, the results of the alumina feeder calibration were inconsistent. While troubleshooting the alumina feeder, the cover to the small belt conveyor (C-103) was opened and it was observed that the discharge chute from the hopper (T-104) had been installed backwards severely restricting flow. After, the necessary corrections were made and the feeder was reassembled, the alumina feeder was successfully calibrated.

Chronological Discussion of Confirmation Test Operations

We started up the demo plant equipment and readied it for operation on November 27 (Monday). Mr. Louis Ringger, CEntry Constructors and Engineers, was on-site during the Confirmation Test as a consultant.

Initially, we had difficulty lighting the primary burner to the rotary kiln. It would spontaneously shut down after reaching a temperature of about 450°-475°F. One of the RPMS staff suggested that electrical connections in the primary burner control panel may have become corroded and needed cleaning. After the connections were cleaned, the burner was restarted at about 9:30 a.m. on November 28 (Tuesday). The system was heated at the prescribed rate of 100°F per hour to about 1800°F and held at that temperature overnight.

The next morning November 29 (Wednesday), we began heating the system to the target temperature of 2400°F. After a few hours when the rotary kiln temperature reached about 2200°F, we noticed slag dripping on the west wall opposite the kiln nose. The source of this slag was apparently fly slag from the March 2005 non-slagging campaign that had accumulated in the Secondary Combustion Chamber. The fly slag was melting and flowing to the drop-out box. As time progressed, this slag accumulation grew into a "pancake" (like a toadstool on a tree) about 1 foot in diameter and about 1 foot above the water level in the granulator. We monitored the growth of this pancake closely.

At about noon, the temperature in the rotary kiln reached 2400°F and we began feeding the sediment-modifier mixture to the system via the skidsteer bucket. To start, we fed one bucket of sediment-modifier mixture (about 1000 lb) per hour. Also during this time, the damper control on the I.D. (induced draft) fan jammed and needed to be freed up, which was done.

About 2,000 pounds of sediment-modifier mixture were fed to the system and some chunks of slag material came out of the granulator. Some granules of Ecomelt were also produced. The slag pancake on the west wall continued to grow in width and height and threatened the continuation of the test. It extended from the west wall eastward almost connecting with the east wall under the kiln becoming what is commonly known as a “devil’s tongue.” In the north-south direction, it covered about 1/3 of the drop-out box opening. At about 4:15 p.m., GTI staff went up to the north side view port to photograph the slag accretion. However, in the interim, the pancake of slag had detached itself from the west wall and dropped into the granulator. From the upper view port the drop-out box discharge was clear. The control room was alerted that the granulator would probably jam due to this large mass of slag, which it subsequently did. Efforts to clear the jam at that time were unsuccessful.

A short time earlier (about 3:30 p.m.), the cylinder packing around the V-Ram feeder piston had forced its way out of the cylindrical constrains and the V-Ram piston became jammed. We contacted V-Ram Technical Support immediately to discuss options. They sent replacement packing and parts by overnight courier and said that it may be necessary to modify the ram head to loosen up the equipment tolerances.

Overnight we cooled the kiln to an “idling” temperature of 1800°F to conserve fuel. The jam in the granulator was cleared by the night shift operators. In the morning (November 30, Thursday), the drag conveyor was operated in forward and reverse direction to get the chain moving. The broken chunks of slag were readily removed and the granulator was put back into operation at about 7:30 a.m.

That day, the V-Ram field technician said that we needed to get some measurements on the main body of the ram and the two floating wedges. V-Ram technical staff were concerned that there was not enough clearance for these parts to move freely. We opened the cover on the V-Ram feeder and accessed the ram, took measurements, and relayed them to V-Ram. V-Ram said that the main body of the ram needed more clearance and that 0.1 inch of steel needed to be removed from the top edge of the ram. The floating wedges also needed to be machined down about 1/32 inch. V-Ram also said that the grooves in the main body were not appropriate for our application and should be filled with weldment. As a result, we removed the ram from the piston shaft and sent it to a local machine shop for machining as above (V-Ram paid for the machining). Also, the packing gland parts V-Ram sent by UPS arrived.

We reduced the temperature of the system to 1700°F and maintained it overnight pending receipt of the machined parts.

The next morning (December 1, Friday) we heated the system back up to operating temperature of 2450°F. The V-Ram piston was reassembled with the machined ram and put back into operation. At about 1:45 pm, we began feeding the sediment-modifier to the system via 5-gallon buckets to test the V-Ram, which operated well. We then fed the system from the skidsteer bucket from the sediment storage area. The nominal feed rate was 2 buckets (about 2,000 lb) per hour of sediment-modifier mixture.

Sediment-modifier mixture was fed consistently all afternoon. Ecomelt was generated and we deposited two 1-yd^3 hoppers full of Ecomelt (Figure 21) and other slag material in a lined pile in the western part of the demo plant site. At that time, we did not have direct means of weighing the Ecomelt that had been collected.

Figure 21. Ecomelt Accumulating in the Skip Hopper

In the meantime, another devil's tongue was forming on the west wall of the drop-out box. It should be mentioned that some slag remained on the west wall after the "devil's tongue" dropped off on Wednesday evening. As time progressed, the devil's tongue grew and covered much of the space between the kiln nose and the west wall. Anticipating that the devil’s tongue would again drop off the west wall, we stopped sediment feeding at about 6:00 p.m. to allow material in the kiln to exit to minimize the load on the granulator drag conveyor.

At 8:15 p.m., the slag mass detached itself from the west wall and fell into the granulator. There was a sharp drop in rotary kiln temperature (a drop of about 90°F) and a spike in the system pressure due to the flash of steam generated. As expected, the granulator drag chain jammed due to the slag chunk.

We attempted to clear the jam until about 12:00 midnight when we decided that the system needed to be cooled to remove the slag. Cooling was initiated at that point at the prescribed rate of 100°F/hour.

Overall, the December 1 (Friday) campaign achieved much improved and consistent feeding via the V-Ram feeder and significant production of Ecomelt. This test was more successful than any

other previous slagging campaign in the demo plant. The temperature of the Ecomelt Generator ranged from 2400° to 2580°F and the temperature of the Secondary Combustion Chamber ranged from 2220° to 2500°F. The major operating conditions of the Confirmation Test are summarized in Table 2. The time-temperature history of the Confirmation Test with Stratus Petroleum sediment-modifier mixture is presented in Figure 22.

Natural gas consumption averaged 18.5 to 19.0 million Btu per hour with a maximum of 21.5 million Btu per hour. When the system was "idling" overnight (no feeding) at 1700° or 1800°F, the natural gas consumption was 10 or 11 million Btu per hour, respectively.

About 5.1 tons of sediment-modifier mixture were fed to the system, which yielded an estimated 3.8 tons of Ecomelt. The natural gas consumption recorded during the Confirmation Test is presented in Figure 23. The Ecomelt Generator temperature is x10 to facilitate comparison.

Table 2. Summary of Operating Conditions for Cement-Lock Demo Plant Confirmation Test

Test No.	**7**
Test Dates	11/27 – 12/2/06
Ecomelt Generator (rotary kiln)	
Temperature, °F	2400 – 2580
Pressure, inches w.g.	-0.3
Kiln Speed, rpm	0.25 – 0.3
Solids Residence Time, min.	129 - 107
Secondary Combustion Chamber	
SCC Burner	Low fire
Temperature, °F	2220 – 2500
Process Temperatures, °F	
Granulator	195
Quencher Outlet, average (min – max)	325 (289 – 375)
Bag House Outlet, average (min – max)	295 (275 – 314)
Activated Carbon Bed Outlet, average (min – max)	245 (225 – 268)
Stack Gas, average (min – max)	280 (257 – 296)
Flue Gas Components	
O_2, vol % (dry basis)	5.0 – 6.86
NOx, ppm (dry basis)	102 – 171

* N/A = Not measured.

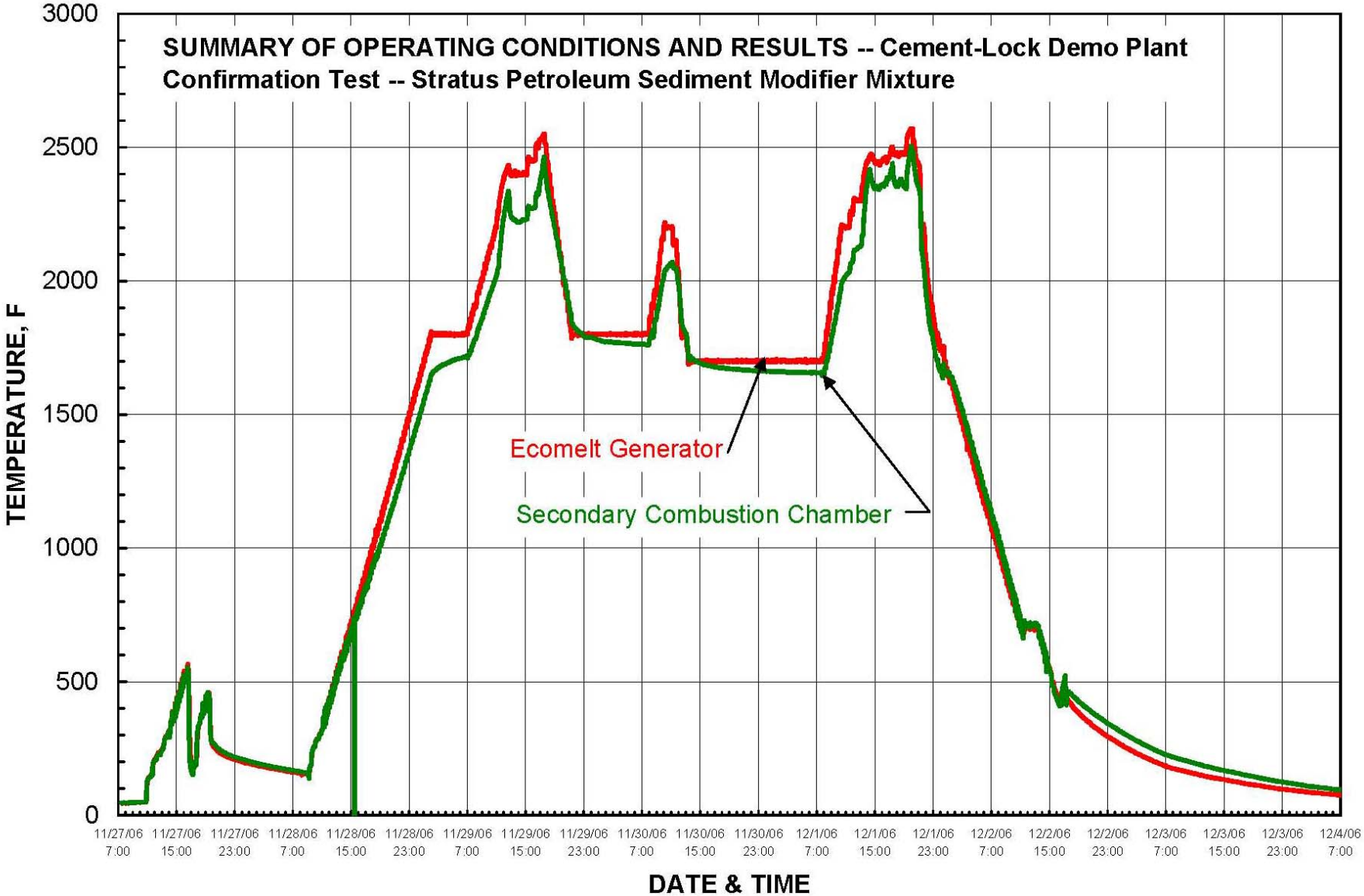

Figure 22. Time Temperature History of the Confirmation Test with Sediment Dredged from the Stratus Petroleum Site (sediment-modifier mixture)

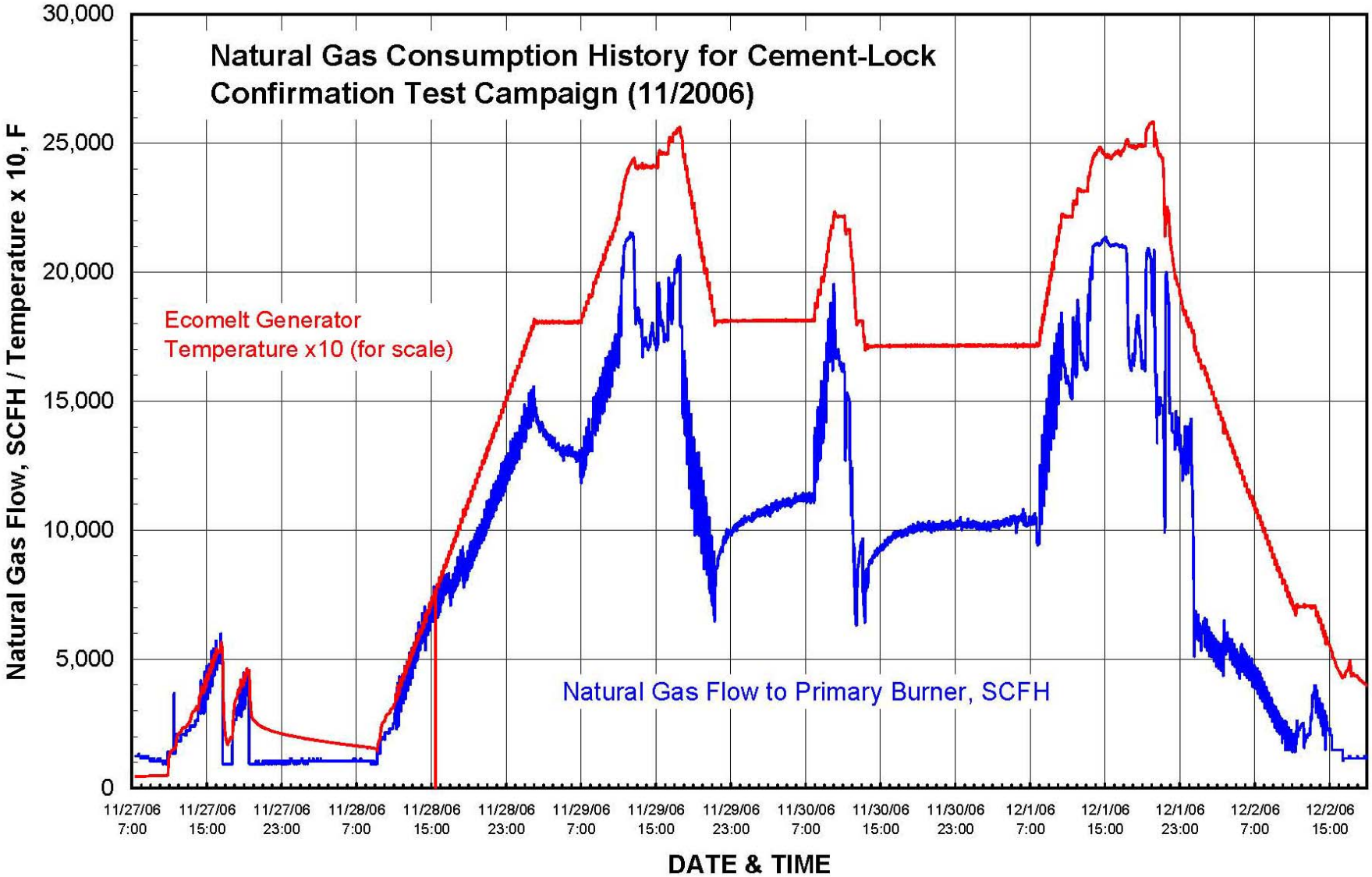

Figure 23. Natural Gas Consumption During the Confirmation Test (November 27 – December 2, 2006)

The quantities of sediment-modifier mixture fed to the system during the several days of the Confirmation Test are included in Table 3.

As mentioned above, the slag jammed the granulator drag conveyor making it necessary to cool the system so that it could be cleared. It would take a day to cool the system, at least several hours to clear the jam, and a day to heat the system up to operating temperature. At the same time, the EPA SITE stack and environmental sampling teams had mobilized to the site to take samples during the Extended Duration Test with sediment dredged from the Passaic River. The Extended Duration Test was to follow immediately after the Confirmation Test. Unfortunately, the stack and environmental sampling teams could not accommodate the delay. They needed to complete their work and move on to another assignment, which could not be postponed. Therefore, it was agreed by the sponsors, ECH and GTI to discontinue the Confirmation Test (with Stratus Petroleum sediment) and begin the Extended Duration Test (with Passaic River sediment). This was done so that the EPA SITE stack and environmental sampling teams could collect their samples. The Extended Duration Test was initiated on December 4.

NOx Analysis

Nitrogen oxides (NOx) analysis of the flue gases in the stack during the Confirmation Test are summarized in Table 4. The NOx analysis ranged from 102 to 171 ppm (dry basis) during the Confirmation Test. The corresponding oxygen concentrations were 5.00 and 6.86 mole percent, respectively. Sediment was fed to the system on November 29 and December 1. A NOx sample was taken on November 30, but no sediment was fed on that day. NOx can be formed from nitrogen in the sediment (nitrogen content of Stratus sediment is about 0.33 wt %) and from nitrogen in the natural gas. Depending upon the scale of operation, it may be necessary to incorporate NOx reduction equipment into a Cement-Lock commercial-scale facility.

Table 3. Chronology of Sediment-Modifier Mixture Feeding Episodes During the Cement-Lock Confirmation Test (November 29 – December 1, 2006)

STRATUS PETROLEUM SEDIMENT								CUMULATIVE		
		-- Feeding Time --		---- Weights, lb ----				- Sed/mod Fed -		DAILY
Batch No.	Date / Time	Start	End	Gross	Tare	Net	Tons	Total, lb	Tons	
1	11/29/06 1:30 PM	1:30 PM	--	--	--	1156	0.58	1,156	0.58	
2	11/29/06 2:15 PM	2:15 PM	--	--	--	958	0.48	2,114	1.06	
3	11/29/06 3:00 PM	3:00 PM	--	--	--	481	0.24	2,595	1.30	1.30
		3:30 PM	V-Ram jammed, stopped feeding							
1	12/1/06 1:45 PM	1:45 PM		6 5-gal pails		240	0.12	2,835	1.42	
2	12/1/06 2:15 PM	2:15 PM	2:56 PM	9054	7888	1166	0.58	4,001	2.00	
3	12/1/06 3:15 PM	3:15 PM	3:40 PM	8672	7932	740	0.37	4,741	2.37	
4	12/1/06 3:46 PM			8810	7846	964	0.48	5,705	2.85	
5	12/1/06 4:17 PM	4:17 PM		8816	7814	1002	0.50	6,707	3.35	
6	12/1/06 4:45 PM	4:45 PM		8166	7460	706	0.35	7,413	3.71	
7	12/1/06 5:30 PM	5:30 PM	5:41 PM	8690	7810	880	0.44	8,293	4.15	
8	12/1/06 6:11 PM	6:11 PM	6:13 PM	9194	7846	1348	0.67	9,641	4.82	
9	12/1/06 6:25 PM	6:25 PM		9598	8498	550 (½ load)	0.28	10,191	5.10	3.80
		Feeding stopped in anticipation of large slag chunk dropping								
		8:15 PM	Granulator jammed -- large slag chunk dropped					Total Stratus sediment-modifiers fed		5.10

Table 4. Summary of NOx Measurements Taken During the Confirmation Test (November 29 – December 1, 2006)

Date and time	O_2 content mol %	NO Content ppm	NO_2 Content ppm	NOx Content ppm (NO + NO_2)
11/29/06, 10:32 am	7.48	118.6	0.0	118.6
11/29/06, 11:35 am	4.65	91.3	0.2	91.5
11/29/06, 1:42 pm	6.86	170.7	0.6	171.3
11/29/06, 3:11 pm	6.92	154.8	0.2	155.1
11/29/06, 3:13 pm	5.00	102.1	0.0	102.1
11/30/06, 9:35 am	8.05	110.5	0.0	110.5
12/1/06, 2:44 pm	2.37	35.5	0.0	35.5

On December 2 (Saturday) at about 5:00 p.m., the kiln had cooled sufficiently so that we could open the access hatchway on the north side of the drop-out box. We observed the slag mass to be irregularly shaped about 2½ ft long, 1½ ft wide and 2 ft tall. It was resting on the upper drag conveyor slats. Due to safety concerns we only reached into the hatchway with a sledge hammer to see how brittle/friable the mass was. After a few impacts with the hammer, a few large chunks (½ to 1 foot in size) were fractured and removed from the mass. The slag was observed to be porous and relatively low in density.

The Extended Duration Test was initiated on December 4 (Monday). On that day, the RPMS operating crew began breaking up the remaining slag mass and chipped slag from the rotary kiln nose as well as the west and south walls as needed. Essentially no slag was observed on the south wall (a concerned had been raised about slag dripping on the south wall due to the small clearance from the nose).

The complete operating data and results of the Cement-Lock demo plant Extended Duration Test campaign with Passaic River sediment are included in the Final Report to be published by Gas Technology Institute.

V. DISCUSSION OF RESULTS

Significant operational milestones were achieved during this phase of the Cement-Lock demonstration project. The equipment modifications implemented during the project improved sediment feeding and extended the slagging mode operating time. The Confirmation Test conducted with Stratus Petroleum sediment was more successful than any other previous slagging campaign in the demo plant.

Overall, the modified feeding system performed well. The ALLU screening bucket performed as advertised and enabled measured feeding of the sediment-modifier mixture to the conveyor belt. The conveyor belt system effectively conveyed the material from the sediment storage area to the pug mill mixer on the charging deck. The pug mill mixer and V-Ram feeder also performed as intended after shakedown and commissioning.

The modifications to the drop-out box (slag discharge system) were constrained by the existing kiln support structure. The width of the drop-out box (perpendicular to the rotary kiln) was extended as far as possible given that the structural steel supporting the rotary kiln Ecomelt Generator and Secondary Combustion Chamber were limiting. The width of the Ecomelt quencher granulator (in the east west direction) was also constrained by the geometry of existing equipment.

From an operationally standpoint, we observed that the accumulation of slag on the south wall was significantly reduced compared with previous slagging tests. Concurrent with the extended operating time, we also witnessed the growth of devil's tongues on the west wall of the granulator. Devil's tongues are the result of droplets of slag being carried over from the rotary kiln and accumulating on the opposite wall. The droplets may be entrained with the flue gas or fall like rain from the "ceiling" of the kiln. A devil's tongue has the potential to completely bridge from the opposite wall to the rotary kiln.

We also noted the formation of pancake-shaped (toad stool) slag on the opposite wall. The first instance arose from fly slag from previous tests that melted and flowed from the Secondary Combustion Chamber. Once the pancake or devil's tongue grew to sufficient size, we noted that they would detach from the west wall, essentially clearing the wall of slag accumulation. The

chunks of slag – which are not considered to be Ecomelt – were either conveyed out of the quencher granulator by the drag conveyor or jammed it.

Slag accumulation in the drop-out box was slowed, but as the results showed, was not stopped.

NOx measurements of the flue gas in the stack ranged from 102 to 171 ppm (dry basis). The corresponding oxygen concentrations were 5.00 and 6.86 mole percent, respectively. As mentioned above, NOx can be formed from nitrogen in the sediment and from nitrogen in the natural gas. Depending upon the scale of operation, it may be necessary to incorporate NOx reduction equipment into a Cement-Lock commercial-scale facility.

The modified Cement-Lock demo plant system processed about 5.1 tons of feed material, which was converted into approximately 3.8 tons of Ecomelt. The sediment processing rate ranged from ½ to 1 ton per hour in continuous operation.

The Ecomelt appeared to be glassy and amorphous. It was granular rather than stringy. Since Ecomelt from Stratus Petroleum sediment had been tested previously, no analytical tests were conducted on this batch of product.

VI. CONCLUSIONS AND RECOMMENDATIONS

The modifications to the Cement-Lock demo plant were made with the objective of enabling it to operate for an extended period of time without feeding problems or without slag plugging the drop-out box.

Based on the results of the Confirmation Test, it can be concluded that

- The feeding system modifications enabled fairly consistent feeding of the premixed sediment-modifier mixture from the sediment storage area.
- The sediment-modifier mixture could be metered using a 10,000-pound capacity scale to weigh the screening bucket and skidsteer before and after feeding.
- The modifications to the system enabled the demo plant to operate for a longer period than any previous slagging test in the demo plant.

It is recommended that during subsequent operations, the formation of devil's tongues on the west wall of the drop-out box be addressed with flame management techniques. Flame management involves the active manipulation of operating conditions in the rotary kiln to ameliorate or prevent problems. Flame management includes:

- Changing the temperature in the rotary kiln to increase or decrease slag fluidity (reduce or increase viscosity),
- Changing the length of the flame in the rotary kiln to concentrate heat at different areas to reduce formation of circumferential rings,
- Reducing the rotation rate of the rotary kiln to reduce the incidence of "rain", which can increase slag carryover to the opposite wall.
- Reducing the amount of excess air to the rotary kiln to reduce the flue gas velocity and therefore reduce the carryover of fly slag to the other side of the drop-out box,
- Including a fluxing agent, such as fluorspar to increase slag fluidity, and
- Implementing combinations of the above procedures, as warranted.

It is further recommended that these procedures be used during the Extended Duration Test with Passaic River.

VII. REFERENCES

1. Cement-Lock™ Technology for Decontaminating Dredged Estuarine Sediments. Phase I: Bench-Scale Studies, Final Report, Institute of Gas Technology, for Brookhaven National Laboratory under Contract No. 725043, December 29, 1995.

2. Cement-Lock™ Technology for Decontaminating Dredged Estuarine Sediments. Phase II: Pilot-Scale Studies, Final Report, Institute of Gas Technology, ENDESCO Services, Inc., for Brookhaven National Laboratory under Contract No. 725043, March 24, 1999.

3. Cement-Lock® Technology for Decontaminating Dredged Estuarine Sediments, Plant Shakedown Report from July 28, 2003 – December 24, 2005, Report prepared by Gas Technology Institute for Brookhaven National Laboratory under Contract No. 725043, February 2004.

4. Cement-Lock® Technology for Decontaminating Dredged Estuarine Sediments, Plant Operations Report from December 2003 – March 2005, Topical Report prepared by Gas Technology Institute for Brookhaven National Laboratory under Contract No. 725043, July 2005.

5. Sediment Decontamination Demonstration Program – Cement-Lock® Technology**,** Report on Task 6 – Equipment Modification Design Study, Prepared by Gas Technology Institute on behalf of ENDESCO Clean Harbors for New Jersey Department of Transportation Office of Maritime Resources (AO No. 9345380), July 2006

APPENDIX A.

ENVIRONMENT IMPROVEMENT PILOT TEST PERMIT ISSUED TO ECH BY NJ-DEP

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Environmental Regulation
Division of Air Quality
Air Quality Permitting Element
P.O. Box 027
Trenton, New Jersey 08625-0027

Environmental Improvement Pilot Test Approval

Permit Activity ID Number: EIP060001 **Facility ID Number:** 12454
Approval Date: November 14, 2006 **Expiration Date:** February 13, 2007

Mailing Address	Plant Location
Attention: Mr. David M. Smith President Endesco Clean Harbors LLC 1700 South Mount Prospect Rd. Des Plaines, IL 60018-1804	**ENDESCO CLEAN HARBORS** **CEMENT LOCK DEMO PLNT** **250 E 22nd St** **Bayonne City** **Hudson County, NJ**

Dear Mr. Smith:

On September 27, 2006, the New Jersey Department of Environmental Protection (Department) received your Application for an environmental improvement pilot test.

In accordance with the provisions for an environmental improvement pilot test specified in N.J.A.C. 7:27-8.9(e), the Department hereby approves this permit application with an effective start date of November 14, 2006 and an effective end date (expiration date) of February 13, 2007, no longer than 90 days from the effective start date.

Pursuant to N.J.A.C. 7:27-8.9(e) this approval may be renewed by application to the Department. The Department shall renew the environmental improvement pilot test approval only if the applicant demonstrates that continued testing of the equipment or process is needed, and that the proposed activities remain within the definition of an environmental improvement pilot test at N.J.A.C. 7:27-8.1.

The Department hereby issues this permit under the authority of chapter 106, P.L. 1967 (N.J.S.A. 26:2C-9.2). The referenced equipment and/or control apparatus shall be operated in accordance with the Facility Specific Requirements (attached). To avoid conflicting of subject items in NJEMS, the equipment, control device, emission point and emission units have been re-numbered as indicated in this permit.

In addition to the facility specific requirements listed in this permit, the facility must comply with all applicable rules and requirements as well as the information contained in the approved application. The facility must also comply with any applicable requirements of the NJAC 7:27-8.1 et.seq. and other state rules summarized in **The General Provisions for Pre-Construction Permits.** The general provisions for pre-construction permits can be found at www.state.nj.us/dep/aqpp/applying.html. The facility should take note, however, that this website may not always contain the most up-to-date version of these provisions. It remains the facility's responsibility to keep apprised of and comply with all applicable regulations and

changes thereto. A copy of current regulations can be obtained from the Department's Website at www.state.nj.us/dep/aqm/, BNA Library, or by calling or writing to your Regional Enforcement Office.

In accordance with the provisions for an environmental improvement pilot test specified in N.J.A.C. 7:27-8.9(h), upon completion of the environmental pilot test, the equipment involved shall cease operating, or shall return to operating under conditions of the existing permit, if any.

If, in your judgement, the Department is imposing any unreasonable condition of approval, you may contest the Department's decision and request an adjudicatory hearing pursuant to the Administrative Code at N.J.A.C. 52:14b-1 et seq. All requests for an adjudicatory hearing must be received in writing by the Department within twenty (20) calendar days of the date you receive this permit approval. The request must contain the information requested in N.J.A.C. 7:27- 1.32 and the information on the enclosed Administrative Hearing Request Checklist and tracking Form.

If you have any questions on this matter, please call Dr. Negib Harfouche of the Bureau of Pre-Construction Permits at (609) 292-2137.

Approved by:

_____

Lou Mikolajczyk, Chief
Bureau of Preconstruction Permits

C: file
Northern Regional Enforcement Office

Cement-Lock Demonstration Plant (12454) Date: 10/4/2007

New Jersey Department of Environmental Protection
Emission Unit/Batch Process Inventory

U 1000 MOD CMT-LK 300 Tons Cement-Lock Demo Plant, Bayonne, NJ

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours Min.	Annual Oper. Hours Max.	VOC Range	Flow (acfm) Min.	Flow (acfm) Max.	Temp. (deg F) Min.	Temp. (deg F) Max.
OS1	R-201 SP-lo	Ecomelt Generator	Normal - Steady State	E2000	CD2000 (P) CD3000 (P) CD5000 (P)	PT1000		0.0	12.0	A	13,830.0	20,375.0	2,400.0	2,600.0
OS2	T-103	Modifier Hopper 1	Normal - Steady State	E1000	CD1000 (P)	PT2000		5.0	10.0	H	0.0	400.0	15.0	150.0
OS3	T-302	Lime Hopper	Normal - Steady State	E3000	CD4000 (P)	PT3000		1.0	3.0	H	0.0	400.0	15.0	150.0
OS4	R-201 StrtUp	Start-Up (Ecomelt Generator)	Startup	E2000	CD2000 (P) CD3000 (P) CD5000 (P)	PT1000		0.0	50.0	A	0.0	20,375.0	100.0	2,600.0
OS5	R-201 Shutdn	Shutdown (Ecomelt Generator)	Shutdown	E2000	CD2000 (P) CD3000 (P) CD5000 (P)	PT1000		0.0	50.0	A	0.0	20,375.0	100.0	2,600.0
OS6	R-201 SP-hi	Ecomelt Generator (Stratus Petroleum Sediment)	Normal - Steady State	E2000	CD2000 (P) CD3000 (P) CD5000 (P)	PT1000		12.0	60.0	B	13,830.0	20,375.0	2,400.0	2,600.0
OS7	R-201 PR	Ecomelt Generator (Passaic River Sediment)	Normal - Steady State	E2000	CD2000 (P) CD3000 (P) CD5000 (P)	PT1000		200.0	450.0	A	13,830.0	20,375.0	2,400.0	2,600.0

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: FC

Operating Scenario:

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.03378000	0.03378000	tons/yr	No
HAPs (Total)			0.00000792	0.00000792	tons/yr	No
Hydrogen chloride		3.84720000	0.57708000	0.57708000	tons/yr	No
Mercury compounds		0.00030664	0.00000307	0.00000307	tons/yr	No
NOx (Total)			2.58417000	2.58417000	tons/yr	No
Pb			0.00124800	0.00124800	tons/yr	No
PM-10 (Total)			0.00008357	0.00008357	tons/yr	No
SO2		0.25650000	0.03847500	0.03847500	tons/yr	No
TSP			0.08357000	0.08357000	tons/yr	No
VOC (Total)			0.00774000	0.00774000	tons/yr	No

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS0 Summary

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.03378000	0.03378000	tons/yr	No
HAPs (Total)			0.00000792	0.00000792	tons/yr	No
Hydrogen chloride		3.84720000	0.57708000	0.57708000	tons/yr	No
Mercury compounds		0.00030664	0.00000307	0.00000307	tons/yr	No
NOx (Total)			2.58417000	2.58417000	tons/yr	No
Pb			0.00124800	0.00124800	tons/yr	No
PM-10 (Total)			0.00008357	0.00008357	tons/yr	No
SO2		0.25650000	0.03847000	0.03847000	tons/yr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS0 Summary

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TSP			0.08357000	0.08357000	tons/yr	No
VOC (Total)			0.00774000	0.00774000	tons/yr	No

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS1

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.03000000	0.03000000	lb/hr	No
HAPs (Total)			0.00000213	0.00000213	lb/hr	No
Hydrogen chloride		3.73330000	0.56000000	0.56000000	lb/hr	No
Mercury compounds		0.00084200	0.00000842	0.00000842	lb/hr	No
NOx (Total)			2.30000000	2.30000000	lb/hr	No
Pb			0.00036900	0.00036900	lb/hr	No
PM-10 (Total)			0.00000000	0.00000000	lb/hr	No
SO2		0.25333300	0.03800000	0.03800000	lb/hr	No
TSP			0.00000000	0.00000000	lb/hr	No
VOC (Total)			0.01500000	0.01500000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS2

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.00000000	0.00000000	lb/hr	No
HAPs (Total)			0.00000000	0.00000000	lb/hr	No
NOx (Total)			0.00000000	0.00000000	lb/hr	No
Pb			0.00000000	0.00000000	lb/hr	No
PM-10 (Total)		1.28571400	0.01285714	0.01285714	lb/hr	No
SO2			0.00000000	0.00000000	lb/hr	No
TSP		12.85714000	0.12857140	0.12857140	lb/hr	No
VOC (Total)			0.00000000	0.00000000	lb/hr	No

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS3

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.00000000	0.00000000	lb/hr	No
HAPs (Total)			0.00000000	0.00000000	lb/hr	No
NOx (Total)			0.00000000	0.00000000	lb/hr	No
Pb			0.00000000	0.00000000	lb/hr	No
PM-10 (Total)		1.28570000	0.01285714	0.01285714	lb/hr	No
SO2			0.00000000	0.00000000	lb/hr	No
TSP		12.85714000	0.12857140	0.12857140	lb/hr	No
VOC (Total)			0.00000000	0.00000000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS4

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.06000000	0.06000000	lb/hr	No
HAPs (Total)			0.00000000	0.00000000	lb/hr	No
Mercury compounds			0.00000000	0.00000000	lb/hr	No
NOx (Total)			4.59000000	4.59000000	lb/hr	No
Pb			0.00000000	0.00000000	lb/hr	No
PM-10 (Total)			0.00000000	0.00000000	lb/hr	No
SO2			0.00000000	0.00000000	lb/hr	No
TSP			0.00000000	0.00000000	lb/hr	No
VOC (Total)			0.00000000	0.00000000	lb/hr	No

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS5

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.06000000	0.06000000	lb/hr	No
HAPs (Total)			0.00000000	0.00000000	lb/hr	No
Mercury compounds			0.00000000	0.00000000	lb/hr	No
NOx (Total)			4.59000000	4.59000000	lb/hr	No
Pb			0.00000000	0.00000000	lb/hr	No
PM-10 (Total)			0.00000000	0.00000000	lb/hr	No
SO2			0.00000000	0.00000000	lb/hr	No
TSP			0.00000000	0.00000000	lb/hr	No
VOC (Total)			0.00000000	0.00000000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS6

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.12000000	0.12000000	lb/hr	No
HAPs (Total)			0.00000854	0.00000854	lb/hr	No
Hydrogen chloride		15.00000000	2.25000000	2.25000000	lb/hr	No
Mercury compounds		0.00336600	0.00003366	0.00003366	lb/hr	No
NOx (Total)			9.18000000	9.18000000	lb/hr	No
Pb			0.00147600	0.00147600	lb/hr	No
PM-10 (Total)			0.00000000	0.00000000	lb/hr	No
SO2		1.00000000	0.15000000	0.15000000	lb/hr	No
TSP			0.00000000	0.00000000	lb/hr	No
VOC (Total)			0.03000000	0.03000000	lb/hr	No

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS7

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
CO			0.12000000	0.12000000	lb/hr	No
HAPs (Total)			0.00003400	0.00003400	lb/hr	No
Hydrogen chloride		15.00000000	2.25000000	2.25000000	lb/hr	No
Mercury compounds		0.00089160	0.00000892	0.00000892	lb/hr	No
NOx (Total)			9.18000000	9.18000000	lb/hr	No
Pb			0.00534000	0.00534000	lb/hr	No
PM-10 (Total)			0.00000000	0.00000000	lb/hr	No
SO2		1.00000000	0.15000000	0.15000000	lb/hr	No

New Jersey Department of Environmental Protection
Potential to Emit

Subject Item: U1000 MOD CMT-LK

Operating Scenario: OS7

Step:

Air Contaminant Category (HAPS)	Fugitive Emissions	Emissions Before Controls	Emissions After Controls	Total Emissions	Units	Alt. Em. Limit
TSP			0.00000000	0.00000000	lb/hr	No
VOC (Total)			0.03000000	0.03000000	lb/hr	No

New Jersey Department of Environmental Protection

Emission Unit: U1000 300 Tons Cement-Lock Demo Plant, Bayonne, NJ

Operating Scenario: OS Summary

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
1	This EIPT Permit is for two (2) primary separate dredge sediment treatment tests to be processed through the Cement-Lock Demonstration-Scale Facility, as described below: 1. Confirmation Test: Sediment dredged from Stratus Petroleum Site is processed at up to 4,000 pounds per hour (lbs/hr) . The objective of this test is to confirm the operability of the equipment modifications under slagging conditions. 2. Extended Duration Test: Passaic River sediment dredged from the Harrison Reach is processed at a maximum of 4,000 lbs/hr. The objective of this test, in addition to being identical to the Confirmation Test, also includes detailed environmental sampling (i.e., stack emissions testing as well as feed and products characterization). [N.J.A.C. 7:27- 8]			
2	Hours of Operation <= 72 hours for the entire Confirmation Test. This test shall include the operation of all equipment included in the Cement-Lock Demonstration Scale Facility, as covered by this Permit. An hour of test run time shall be any hour, or part of an hour, during which the EIPT is conducted. [N.J.A.C. 7:27- 8.13(a)]	Hours of Operation: Monitored by hour/time monitor daily, based on one calendar day. The permittee shall monitor the daily operating hours of the EIPT. [N.J.A.C. 7:27-8.13(d)]	Hours of Operation: Recordkeeping by manual logging of parameter or storing data in a computer data system daily during operation. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)]	
3	Hours of Operation <= 340 hours for the entire Extended Duration Test. This test shall include the operation of all equipment included in the Cement-Lock Demonstration Scale Facility, as covered by this Permit. An hour of test run time shall be any hour, or part of an hour, during which the EIPT is conducted. [N.J.A.C. 7:27- 8.13(a)]	Hours of Operation: Monitored by hour/time monitor daily, based on one calendar day. The permittee shall monitor the daily operating hours of the EIPT. [N.J.A.C. 7:27-8.13(d)]	Hours of Operation: Recordkeeping by manual logging of parameter or storing data in a computer data system daily during operation. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)]	

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
4	Hours of Operation <= 450 hours for the entire EIPT, not including startup/shutdown of the Ecomelt Generator (E2000). This covers the Confirmation Test and the Extended Duration Test. This shall include the operation of all equipment used in the Cement-Lock Demonstration Scale Facility, as covered by this Permit. Both tests will be performed separately. An hour of test run time shall be any hour, or part of an hour, during which the EIPT is conducted. [N.J.A.C. 7:27- 8.13(a)]	Hours of Operation: Monitored by hour/time monitor daily, based on one calendar day. The permittee shall monitor the daily operating hours of the EIPT. [N.J.A.C. 7:27-8.13(d)]	Hours of Operation: Recordkeeping by manual logging of parameter or storing data in a computer data system daily during operation. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)]	
5	Confirmation Test: There shall be no more than 100 tons (wet basis) of Stratus Petroleum dredge sediment processed through the Cement-Lock Demonstration Scale Facility, under slagging conditions, for the entire Confirmation Test. [N.J.A.C. 7:27- 8]	Monitored by material feed/flow monitoring daily, based on an instantaneous determination. The permittee shall monitor the total amount of "raw" (feed material) dredge sediment processed daily through the Cement-Lock Demonstration Scale facility, using common feed/flow monitoring tools or standard engineering practice. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system daily. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
6	Extended Duration Test: There shall be no more than 200 tons (wet basis) of Passaic River sediment dredged from the Harrison Reach processed through the Cement-Lock Demonstration Scale Facility, under slagging conditions, for the entire Extended Duration Test. [N.J.A.C. 7:27- 8]	Monitored by material feed/flow monitoring daily, based on an instantaneous determination. The permittee shall monitor the total amount of "raw" (feed material) dredge sediment processed daily at the facility, using common feed/flow monitoring tools or standard engineering practice. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system daily. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
7	The period for which the Environmental Improvement Pilot Test (EIPT) may be performed is from November 14, 2006 until February 13, 2007. During this period of time, the permittee shall conduct the EIPT in compliance with the conditions described in this permit. [N.J.A.C. 7:27- 8.13(a)]	Monitored by hour/time monitor at the approved frequency, based on an instantaneous determination. The permittee shall monitor the initial start-up and shutdown dates and hours of operation of all equipment included in the Cement-Lock Demonstration Scale Facility, as specified in the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)]	Recordkeeping by manual logging of parameter or storing data in a computer data system upon occurrence of event during operation. The permittee shall maintain records of the initial start-up and shutdown dates and hours of operation of all equipment included in the Cement-Lock Demonstration-Scale Facility upon occurrence of event. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)3]	None.

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
8	Total "Raw" (feed material) Dredge Sediment Processed Hourly <= 4,000 pounds per hour (lbs/hr) (wet basis). [N.J.A.C. 7:27- 8.13(a)]	Monitored by material feed/flow monitoring daily, based on an instantaneous determination. The permittee shall monitor the hourly "raw" dredge sediment processed through the Cement-Lock Demonstration-Scale Facility, using common feed/flow monitoring tools and standard engineering practice, once per day, based on hours of operation per day. [N.J.A.C. 7:27- 8.13(d)]	Recordkeeping by manual logging of parameter or storing data in a computer data system daily. The permittee shall maintain records of the hourly dredge sediment feedrate through the Cement-Lock Demonstration-Scale Facility, at least once per day. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8.13(d)3]	
9	During the EIPT, the permittee shall confirm that the dredge sediment is moist enough not to result in visible emissions, and that there are no visible emissions from the handling and mixing operations, throughout the Cement-Lock Demonstration-Scale Facility, at any time. The permittee shall use water sprays or other wetting agents if visible emissions are sustained after continuing or resuming the processing of dredge sediment, in a manner to prevent and avoid visible emissions, as necessary. [N.J.A.C. 7:27- 8]	Monitored by visual determination daily, based on an instantaneous determination during operation. All employees shall be trained to notify the on-site supervisor, if they see any visible emissions. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system upon occurrence of event. The permittee shall record the date and time and corrective measures taken to prevent and avoid visible emissions when they occur. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
10	The Cement-Lock Demonstration-Scale Facility shall incorporate the following major equipment and control devices: 1. A pugmill (E4000) for mixing dredge sediment and modifier 2. Ecomelt generator (E2000) or rotary kiln firing natural gas only and operating at less than or equal to 2,600 degrees Fahrenheit. 3. A secondary combustion chamber (CD5000) for burning-off volatile organic compounds in exhaust gas before they reach the stack (PT1000). 4. A baghouse (CD2000), 5. An activated carbon bed (CD3000), and 6. An Emergency Generator (E5000) [General Permit GEN#06-0001). The transfer or drop points between conveying and processing equipment shall be covered with metal sheeting or heavy tarp to form a chute that minimizes the potential for particulate emissions from the transfer of screened material into the processing equipment. [N.J.A.C. 7:27- 8]	Monitored by documentation of construction once initially, based on an instantaneous determination. Documentation of construction shall consist of, but not limited to, Operation and Maintenance manuals (O&M), as-built equipment inventory, equipment specifications and operator's logbook. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially. All documentation of construction records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
11	There shall be water available on-site to be immediately used within the Cement-Lock Demonstration-Scale Facility in order to prevent dust formation. [N.J.A.C. 7:27- 8]	Monitored by visual determination daily, based on an instantaneous determination. The permittee shall check on a daily basis, that there is water available on-site and that the water sprays are operative and can be used immediately, within the facility, when needed. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system upon occurrence of event. The permittee shall record the date, time and the location within the Cement-Lock Demonstration-Scale Facility where water sprays are used. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
12	The permittee shall notify the Department and the NJDEP Northern Regional Office at least five (5) days prior to the startup, and after the completion of the EIPT. [N.J.A.C. 7:27- 8]			Submit notification: As per the approved schedule. The permittee shall notify the NJDEP Northern Regional Office five (5) days prior to the startup, and after the completion of the EIPT. [N.J.A.C. 7:27- 8]

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
13	The Bin Vent Filters (CD1000) and (CD4000) shall be installed as an integrated part of the Modifier Hopper 1 (E1000) and Lime Hopper (E3000), respectively, and shall be operated at all times during the loading and unloading of E1000 and E3000, respectively. [N.J.A.C. 7:27- 8]	Monitored by visual determination daily, based on an instantaneous determination. The permittee shall monitor the operation of CD1000 and CD4000 at least once daily, during the loading and unloading of E1000 and E3000, respectively. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system upon occurrence of event. The permittee shall record the date and time when CD1000 and CD4000 are not operative, at least once daily, upon occurrence. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
14	Confirmation Test: Only dredge sediment from the Stratus Petroleum Site will be processed through the Cement-Lock Demonstration-Scale Facility, located at IMTT 250 East 22nd Street in Bayonne, Hudson County, New Jersey. The permittee shall obtain written approvals from the Department for processing "raw" (feed material) dredge sediment other than from the Stratus Petroleum Site. [N.J.A.C. 7:27-8]	Monitored by sludge sampling once initially and per change of material, based on an instantaneous determination [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment. The permittee shall monitor the source, characteristics and amount of "raw" (feed material) dredge sediment processed through the Cement-Lock Demonstration-Scale Facility, once initially and upon change of material. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially and per change of material [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment. The permittee shall record the source, characteristics and amount of "raw" (feed material) dredge sediment processed at the facility, once initially and upon change of material. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
15	Extended Duration Test: "Raw" (feed material) sediment from the Passaic River, dredged from the Harrison Reach Site will be processed through the Cement-Lock Demonstration-Scale Facility, located at IMTT 250 East 22nd Street in Bayonne, Hudson County, New Jersey. The permittee shall obtain written approvals from the Department for processing "raw" (feed material) dredge sediment other than from the Harrison Reach Site. [N.J.A.C. 7:27- 8]	Monitored by sludge sampling once initially and per change of material, based on an instantaneous determination [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment. The permittee shall monitor the source, characteristics and amount of "raw" (feed material) dredge sediment processed through the Cement-Lock Demonstration-Scale Facility, once initially and upon change of material. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially and per change of material [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment. The permittee shall record the source, characteristics and amount of "raw" (feed material) dredge sediment processed at the facility, once initially and upon change of material. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
16	Emergency Generator (E5000) Hours of Operation <= 50 hr/yr. [N.J.A.C. 7:27- 8]	Hours of Operation: Monitored by hour/time monitor daily, based on an instantaneous determination. The permittee shall monitor the daily operating hours of the Emergency Generator (E5000). [N.J.A.C. 7:27- 8]	Hours of Operation: Recordkeeping by manual logging of parameter or storing data in a computer data system daily during operation. All monitoring records shall be kept on-site or at the permittee's main office, as specified in Ref. No. 18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	
17	During the EIPT, the permittee shall monitor the following air parameters: 1. Confirmation Test: a) NOx 2. Extended Duration Test (the sampling for the air parameters below shall be performed at the carbon bed inlet and at the stack): a). Particulates, i.e., TSP and PM-10 b) Semi-Volatile Organic Compounds (SVOCs), c) Volatile Organic Compounds (VOC) or Total Hydrocarbons (THC). d) Polychlorinated Biphenyls (PCBs) e) Dioxins/Furans (D/F) f) Metals g) HCl/Cl2 and h) Mercury Compounds (total). The permittee shall also continuously monitor for NOx, SO2, CO, THC, CO2 and O2 at the stack. [N.J.A.C. 7:27- 8]	Monitored by other method (provide description) at the approved frequency, based on the averaging period as per Department approved test method. The permittee shall monitor for the required applicable air parameters using USEPA approved analytical laboratory air sampling and testing methodologies, during an operating period which represents the highest potential emissions, such as, but not limited to, when the Ecomelt Generator (E2000) is operating at full capacity, and through continuous emission monitoring, where applicable. [N.J.A.C. 7:27- 8]	Recordkeeping by other recordkeeping method (provide description) upon occurrence of event. All monitoring records, including analytical laboratory air sampling and testing results as well as continuous emission monitoring data, as applicable, shall be kept as specified in Ref. No.18 of U1000 OS Summary of the conditions of this permit. [N.J.A.C. 7:27- 8]	

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
18	The following records shall be maintained on-site or at the permittee's main office for a minimum of five (5) years after collection, readily made available to the Department, upon request: 1. The start and end dates of the Environmental Improvement Pilot Test (EIPT. 2. Continuous emissions monitoring data (where applicable). 3. Analytical air sampling and monitoring data collected during the EIPT. 3. Any operating restrictions or contingencies, and corrective measures (if any) which were implemented during the EIPT. 4. "Raw" (feed material) dredge sediment and filtrate water flow rates, dredge sediment/modifier percent mixtures and other process flow parameters that were determined during the EIPT. 5. Relevant emissions calculations and emission factors determined during the EIPT 6. Hours of operation of the Confirmation Test, Extended Duration Test and overall hours of operation of the Cement-Lock Demonstration-Scale Facility. 7. Hours of operation of the Emergency Generator (E5000). 8. Specifications of any air monitoring equipment, instrumentation or device as well as analytical laboratory sampling and testing methodologies (as applicable) that were used during the EIPT. [N.J.A.C. 7:27-8.13(a)]		Recordkeeping by manual logging of parameter upon occurrence of event. The permittee shall keep all records in a separate bound logbook, or in an electronic storage filing system, i.e. computer, on-site or at the permittee's main office, for at least five (5) years, readily made available to the Department upon request. [N.J.A.C. 7:27-8.13(d)3]	Submit a report: Upon occurrence of event. This information shall be summarized in a report which shall be submitted to the Chief, NJDEP, Bureau of Preconstruction Permits, P.O. Box 027, Trenton, NJ 08625-0027, upon request by the Department. [N.J.A.C. 7:27- 8.13(d)3]

New Jersey Department of Environmental Protection

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
19	The permittee shall not cause or use the equipment and control devices specified in this permit in a manner that will result in the emission of any air contaminant in excess of below listed yearly emissions; CO <= 0.104 ton/year Dioxins/Furans <= 2.24E-05 lb/year PCBs <= 1.60E-02 lb/year HCl <= 0.60 ton/year Mercury Compounds <= 6.13E-03 NOx <= 2.90 ton/year Lead <= 2.50 lb/year PM-10 <= 2.00E-02 ton/year SO2 <= 0.060 ton/year TSP <= 2.10E-02 ton/year VOC (total) <= 3.80E-02 ton/year HAPs (total) <= 0.60 ton/year [N.J.A.C. 7:27- 8.4(k)1]	Monitored by calculations once initially and per change of material, based on an instantaneous determination [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment]. [N.J.A.C. 7:27- 8]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially and per change of material [change of material herein refers to change in source or characteristics of "raw" (feed material) dredge sediment]. The permittee shall keep all documentation on-site or at the permittee's offices, for at least five (5) years, readily made available to the department upon request. [N.J.A.C. 7:27- 8]	Submit notification: Upon occurrence of event. The permittee shall comply with all air contaminant emissions limits as specified in the conditions of this permit at all times during operation. The NJDEP Northern Regional Enforcement Office must be notified no later than seven (7) calendar days following the completion of air emissions calculations or monitoring, if any of the air contaminants would be emitted at a rate higher than the applicable reporting, and SOTA threshold levels as set forth in N.J.A.C. 7:27-8 Appendix I, Table A or B. [N.J.A.C. 7:27- 8.4(k)1]
20	All conditions and restrictions specified in this EIPT Permit shall apply and are enforceable. After the EIPT has been completed, the permittee shall dismantle and remove all equipment included in the Cement-Lock Demonstration-Scale Dredge Sediment Facility, and refrain from performing any site operations or activities without obtaining the necessary approvals from the Department. [N.J.A.C. 7:27- 8]			