Cycle 10 Coastal Coordination Council Grant
Port of Houston Authority

"Storm Water BMP Demonstration Using Phytoremediation Techniques"

Project Report
September 2007

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Coastal Coordination Council Phytoremediation Project
Final Report

1.0 Grant Application

The Port of Houston Authority (PHA) applied to the Coastal Coordination Council for a Coastal Management Program grant during the 2006 Cycle 10 grant period. The PHA received approval to conduct a Phytoremediation Storm Water Best Management Practice project at the Turning Basin Terminal. The grant term was schedule to run from March 2006 through March 2007. The Port of Houston Authority requested an extension of six months; the revised project end date was 30 September 2007.

2.0 Project Scope

The Port of Houston Authority's Turning Basin Terminal is located directly on the Houston Ship Channel and has many storm water outfalls that discharge directly to the channel which ultimately reaches Galveston Bay. All segments of the Houston Ship Channel (1005, 1006, and 1007) are on the Texas 303(d) list and Galveston Bay is a critical ecosystem, so all discharges to these waters need to be carefully evaluated. The site selected for the study is a storm water ditch that drains a large area which includes the Central Maintenance compound on PHA property as shown in Figure 1.

The Coastal Coordination Council study included the installation of mulch socks, wetland planting, and storm water sampling events. The baseline sampling work was conducted between March 2006 and July 2006. The installation of berms and plants was conducted between February 2007 and September 2007. The goal of the project was to establish wetland plants in an existing drainage ditch to test, in conjunction with physical and biological filtration provided by mulch socks, in-situ treatment of storm water to improve water quality. Mulch socks were to provide physical barriers to retard storm water flow in the ditch and to pool water for brief periods following rain events to help create and maintain conditions favorable for wetland plants. By retarding flow and establishing wetland vegetation in the ditch, suspended solids would be more apt to settle out instead of continuing downstream and ultimately be discharged into the Houston Ship Channel. In addition to the physical filtration provided by the treatment system, biological and phytoremedial benefits would also be provided by the microbial and wetland plant colonies, respectively, as they became established.

The grant project was divided into five tasks. The first task was conducted beginning in March 2006 with the assistance of Delta Environmental Consultants, Inc. Task 1 was preliminary data collection and development of a sampling plan. The PHA contracted Benchmark Ecological Services, Inc. (BESI) to complete grant tasks 2, 3, and 4. BESI was responsible for the design phase, installation of mulch socks, planting of wetland plants, and monitoring the inflow and outflow storm water quality at the project site. The Port of Houston Authority has primary responsibility for education and outreach to meet the requirements of task 5.

3.0 Task 1: Develop Work and Sampling Plan

The first task required the development of a work and sampling plan. The work plan documented the approach to be taken during the effectiveness study and included previous sampling data from the area, additional sample locations, sample frequency, sampling parameters, analytical methods, data management, precipitation recording, and overall project requirements. The sampling plan was part of the work plan and focused on the specific requirements for sampling and analysis of storm water prior to the selection and installation of vegetation. Field grab samples were collected from several different areas for four (4) storm events. The storm events occurred on 29 March, 31 May, 19 June, and 5 July 2006. All samples were sent to Xenco Laboratories in Houston, Texas for analysis. A copy of the Field and Sampling Plan is available in Appendix A and the associated storm water analytical reports are available in Appendix B.

4.0 Task 2: Evaluate Sampling Data and Design Phytoremedial Area

Task two required evaluation of the samples from the four storm water events conducted at the study site during 2006. In addition, the task required identification of appropriate vegetation to provide improvements to the storm water through filtration or uptake. The final requirement was the development of the berm system design for the drainage ditch. BESI utilized the storm water analytical data to develop the planting plan which includes the berm systems and identified the planting plan and vegetation types, a copy of the plan is available in Appendix C.

5.0 Task 3: Install Plants and Berm System

The third task required the installation of the berm system as designated by the Planting Plan and planting of all vegetation.

5.1 Installation of Mulch Socks

In order to retard storm water flow in the ditch, two sets of mulch socks were installed perpendicular to flow direction on 23 February 2007. The mulch socks were constructed with UV treated polypropylene socks filled with pine bark mulch. Each set consisted of three 10 foot long, 12-inch diameter socks in a pyramid configuration. The mulch sock sets were positioned such that the ditch area was divided into two wetland segments. Existing grade and ditch contours were considered when making determinations for mulch sock placement to maximize the efficiency of the mulch sock barriers for storm water velocity control, wetland plant habitat enhancement, and physical and biological filtration by the socks.

Mulch sock locations are shown in Figure 2, and photographs are presented in Appendix D.

5.2 Planting Study Area

The initial planting of the study area was conducted 1-6 March 2007. Wetland plants were harvested from Katy area donor sites and the PHA Bayport Mitigation Wetland. Wetland plant species were chosen as listed in the Planting Plan provided to the PHA on 22 February 2007.

Wetland plants listed below were planted on 1 foot centers.

- Maidencane (*Panicum hemitomun*)
- Mountain spikerush (*Eleocharis montana*)
- Sand spikerush (*Eleocharis montevidensis*)
- Squarestem spikerush (*Eleocharis quadrangulata)*
- Arrowhead (*Sagittaria sp.*)
- Softrush (*Juncus effusus*)
- Eastern gamagrass (*Tripsacum dactyloides*)
- Rice cutgrass (*Leersia hexandra*)
- Pickerelweed (*Pontederia cordata*)*
- California bulrush (*Schoenoplectus californicus)**

*Planted during the June 2007 event, but not in the March 2007 event

The study area was roped off and signs were installed notifying maintenance personnel not to mow the area during the study. However, on at least two occasions a line trimmer was used to mow wetland plants in the planting area and it is suspected that herbicides were applied directly to or upstream of the study area. Due to poor soil conditions and unauthorized grounds keeping activities, BESI conducted supplemental plantings on 19 June and 29 June 2007. Maximum plant density achieved during the study was ≤40 % cover of planted species.

BESI irrigated the study area with 2,400 gallons of water on 6 March 2007. Study area soils remained saturated due to higher than normal rain events for the remainder of the study.

6.0 Task 4: Post-Installation Site Monitoring

Water samples were collected and analyzed as listed in the Field Sampling and Analysis Plan developed by Delta Environmental Consultants. Sampling was conducted on 12 March, 22 May, and 16 August 2007. Figure 2 shows the sample station locations. Sample stations A3 and A4 were not sampled during the first two events because water was not flowing through these sample locations. Storm water field forms were filled out for each event and copies are included in Appendix E. Samples were analyzed by Xenco Laboratories in Houston, Texas. Listed below is the analyte list for the study.

- Aluminum
- Arsenic

- Barium
- Cadmium
- Chromium
- Copper
- Cyanide
- Iron
- Lead
- Manganese
- Mercury
- Nickel
- Oil & Grease
- Selenium
- Silver
- TSS
- Zinc

6.1 Analytical Results

Analytical results from the study are summarized in the tables presented in Appendix G, and copies of the laboratory reports for the initial analysis are included in Appendix B and for post-installation analysis in Appendix F. Tables 1, 2, 3, and 4 list the results for samples collected in 2006 (samples collected prior to the installation of the mulch socks and wetland planting) and Tables 5, 6, and 7 present the results for the 2007 sampling events listed above.

6.2 Grant Project Discussion

Although possible positive trends may be indicated, insufficient data were collected to conclude whether the treatment system contributed to storm water quality enhancement. Two primary reasons are cited for the lack of conclusive results;

- Insufficient time for wetland plants to fully populate the study area prior to sampling resulted in less than optimal filtration and biological treatment potential. Unauthorized grounds keeping activities and poor soil conditions slowed the development of wetland plant communities within the treatment area. The maximum plant coverage for a sampling event was approximately 40% at the time of the final (16 August) sampling event. It will take at least 1 full growing season (undisturbed) for plants to provide the cover needed prior to conducting the sampling events.
- Insufficient sample population. Additional sampling events will be required to provide the sufficient data to determine the effectiveness of the treatment system. Listed below are some of the study variables noted that resulted in condition inconsistencies between sampling events.
  - Saturation of the soils in the watershed,
  - Amount of rainfall prior to sampling,
  - Plant coverage,

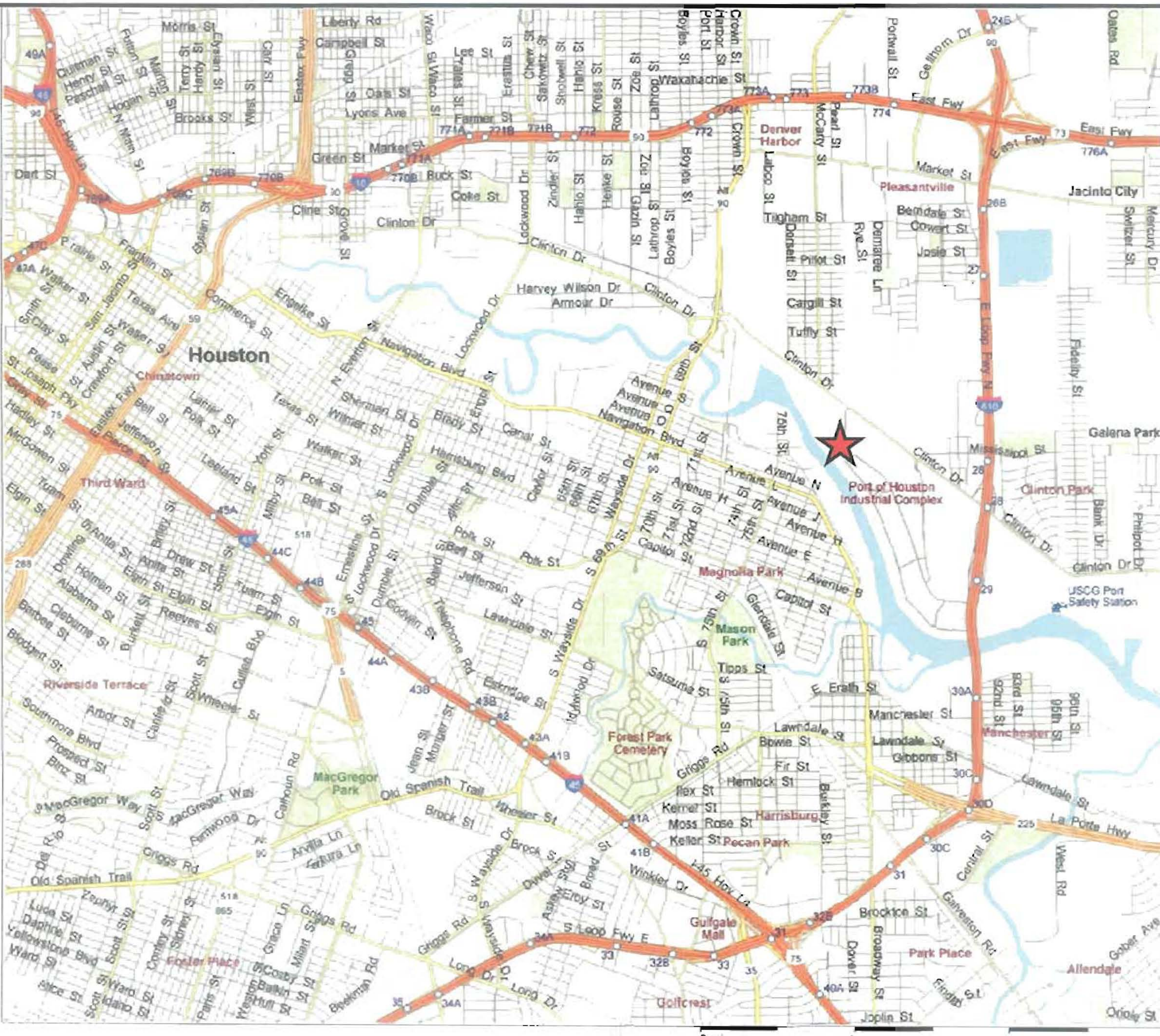
- Biological activity in the mulch socks and the planting area,
- Activities conducted within the watershed, and
- Temperature

Although the data were generally inconclusive, they suggest some constituent concentrations were reduced somewhat as a result of the treatment. It is recommended that at a minimum, 3 additional sampling events be conducted once the wetland plants fully colonize the treatment area in order to adequately test the system's water quality enhancement potential.

7.0 Task 5: Public Outreach

The fifth task requires public outreach regarding the results of this grant project. The Port of Houston Authority will make this report available on the Port of Houston Authority website, located at www.portofhouston.com. In addition, information will be presented to interested groups in the area or upon request.

8.0 Figures



N

★ Phytoremediation Site

Notes

Microsoft Streets and Trips ®

Study Area

Port of Houston Authority

Coastal Coordination Council

BESI Benchmark Ecological Services Inc

Project: Site_map_2

Date: 09/12/07

Figure 1

N

0 50 100 Feet

Planting Area

Mulch Socks

A1 Sample Stations

Notes

HGAC 2004 Aerial

Phytoremediation Storm Water Sampling Stations

Port of Houston Authority

Coastal Coordination Council

BESI Benchmark Ecological Services, Inc.

Project: planting_area.mxd

Date: 09/12/07

Figure 2

M:\20001\038\arc\planting_area.mxd

9.0 Appendix A

9.1 Field Sampling and Analysis Plan

By: Delta Environmental Consultants, Inc.

Field Sampling and Analysis Plan
for the

PORT OF HOUSTON AUTHORITY

Houston, TX

Prepared by

Delta Environmental Consultants, Inc.

November 2005

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APPENDICES

1.0 INTRODUCTION

This field sampling and analysis plan (FSAP) provides guidance by defining in detail the sampling and analysis methods to be used for all field work to be performed during the CCC Grant Project studying the effectiveness of specific best management practices (BMP's) as outlined in CMP grant program cycle #10 application.

The FSAP is a guide for all field and laboratory procedures to be used during the monitoring activities. The contents of the FSAP include methods and procedures that will be implemented in the field for such activities as: stormwater sampling and handling, chain-of-custody procedures and requirements, various field observations and accurate documentation of all operations conducted.

The FSAP is designed as a flexible guidance document for each task in order to achieve the stated objectives. The FSAP may be modified to reflect changes in objectives, procedures, or scope of work based on successful field activities, adequate rainfall during the project term, and project management changes. Modifications will be made as revisions to sections within the document. Revisions and the date will be denoted in the upper right-hand margin of each page.

1.1 Site Background

Port of Houston Authority's (PHA) Turning Basin facility is located directly on the Houston Ship Channel and has many stormwater outfalls that discharge directly in the channel which ultimately reaches Galveston Bay. All segments of the Houston Ship Channel (1005, 1006, and 1007) are on the Texas 303(d) List and Galveston Bay is a critical ecosystem, so all discharges to these waters need to be carefully evaluated. The current list of parameters of concern at the Port of Houston include: total suspended solids, oil/grease, aluminum, iron, lead, zinc, and ten other metals.

As is typical of coastal industrial operations, the Port of Houston facilities tend to be relatively narrow in width but extend great distances along the shoreline. Due to this configuration, the Turning Basin facility is comprised of many stormwater outfalls fed by small independent drainage sub-systems. Therefore, pollutants do not have far to travel before entering the Houston Ship Channel. Additionally, implementing source and treatment control best management practices (BMPs) to abate stormwater pollution can be cost intensive since implementing BMPs in each drainage system can lead to a very large number of BMPs. A better understanding of the pollution sources and low-cost source and treatment control BMPs will allow for a more targeted, cost effective stormwater pollutant load reduction program at the Port of Houston facilities and coastal industries statewide.

The stormwater BMP chosen for this demonstration is a combination of biofiltering and phytoremediation techniques. Phytoremediation is a concept involving the use of plants to remove contaminants in a bio matrix, sometimes referred to as a biofilter. The design of a biofilter may include multiple tiers using different types of grasses and other plants

to encourage or enhance nutrient uptakes, to accelerate evapotranspiration, and/or to provide oxygen to the subsurface in order to provide biodegradation of contaminants. In addition, the plants and filter berms provide a hydraulic barrier to slow the velocity of the stormwater flow, therefore allowing time for the sediment to settle to the bottom of the project area rather than flow out the stormwater discharge point, in this case the Houston Ship Channel. One of the materials that will be evaluated is the use of a mulch sock. This sock is filled with recycled mulch from a major construction site and allows for a cost effective and easily installed/maintainable biofilter, in lieu of an earthened check dam. This material allows for vegetation over the dam and water flow through the dam while achieving all the benefits of reducing the stormwater runoff velocity.

1.2 Sampling Objectives

The primary objectives of this plan are to:

1. designate nine new stormwater monitoring points;
2. collect stormwater samples prior implementation of the BMP; and
3. collect samples of stormwater from these nine new stormwater monitoring points and from the existing stormwater outfall (TBT012) during the monitoring periods.

Meeting these objectives will allow for the proper evaluation of the effectiveness of the BMPs implemented.

2.0 SAMPLE TYPES, LOCATION, AND FREQUENCY

Field grab samples will be collected from 10 different locations within the study area for at least 4 qualifying storm events. These points are illustrated in Figure 1. These samples will be obtained manually or with the use of an Isco Autosampler (further described in section 4.0). The qualifying storm event will be defined as a storm event with at least 0.1 inch of measured precipitation in the study area within a two hour period, that occurs with a minimum interval from the preceding storm event of at least 72hrs, and that the event produces a discharge that is sufficient for obtaining a sample at the TBT012 (study area end point) location.

Samples from these stormwater events will be collected within the time period of November 28, 2005 to January 28, 2006. The results of the four sampling events will be compiled in a report and submitted to the PHA project manager within 15 days of receiving the final analytical results from the analytical laboratory.

All stormwater samples will be analyzed for TSS, Oil & Grease and for the fourteen (14) metals which are tracked in current PHA stormwater permits (both MSGP and MS4). The results will be documented in Table 1.

It is the intention of this program to meet the schedule set by the original grant application. However, it is understood that the program will be flexible enough to adjust to limited rainfall, inclimate weather, and equipment failures. Auto samplers will be utilized in an attempt to capture the "first flush" from each storm event. For the purposes of this project, the "first flush" will be defined as the first hour, after having met the definition of qualifying event (0.1inches of precipitation, adequate discharge to obtain a sample, and no sampled event within 72 previous hours), of discharge from sample location TBT012.

3.0 SAMPLE DESIGNATION

Samples will be identified by a unique sample number or other appropriate identification. These samples will be collected and transported from the sample location to a PHA approved laboratory (Xenco Laboratories) for analysis. Before removal, however, a sample is often separated into portions depending upon the analyses to be performed. Each portion is preserved in accordance with applicable procedures and the sample container is identified by a sample label. The information recorded on the sample label includes:

- Project Name and Number
- Sample Number
- Sample Location
- Time/Date
- Name of Sampler
- Sample Matrix (soil, groundwater)
- Preservative
- Analyses Requested
- Chain-of-Custody Number

An indelible, water-proof marker/pen will be used to fill out all sample labels.

After collection, identification, and preservation, the sample will be maintained under Chain-of-Custody procedures, as outlined in Section 5.1 of this document.

4.0 SAMPLING EQUIPMENT AND PROCEDURES

4.1 General

All onsite field activities will be conducted in accordance with the Site Safety Plan, Samples will be collected in accordance with the procedures described in Section 4.2.

4.2 Stormwater Sample Collection

4.2.1 General Approach

This Sampling and Analysis Plan may include the collection of samples to be analyzed for Oil and Grease by EPA Method 1664. Oil and Grease samples must be collected by manual methods, and the samples must be placed directly into the container supplied by the laboratory (i.e., ISCO® or other automated sampling devices will not result in the collection of a legitimate sample for Oil and Grease). Thus, overall sampling design may be controlled by this single analyte.

In some instances, it is not possible to collect samples manually, because of outfall configuration or other physical limitations or safety hazards. In those cases, ISCO® samplers may represent the only practicable alternative for obtaining runoff samples. Thus, this section of the sample plan also includes instruction on how to use these automated devices.

4.2.2 Preparing to Sample

The general sequence of activities leading up to the collection of storm water samples is as follows:

1. This Sample Plan must first be reviewed in its entirety.
2. The Site Specific Health and Safety Plan must be reviewed for applicability to this project.
3. Laboratory supplies are pre-ordered and then received from the approved laboratory (see Section 5.0 for description).
4. All sample bottles need to be pre-labeled with all relevant outfall and analytical parameters because, with multiple outfalls to sample, there will not be sufficient time for the sampler(s) to do the labeling under real-time field conditions. Similarly, the Chain of Custody needs to be filled out with as much information as possible prior to the sampling event. Usually, with a predefined sample plan, all information and except date and time of sampling can be entered onto the form.

5. Field supplies are assembled for ease of access (see Section 4.2.3 for list).
6. A qualifying storm event is chosen for sampling (see Section 2.0 for description of how to choose and how to ensure proper record-keeping to document the validity of the choice).
7. Prior to the commencement of rain, the sampler must check the on-site rain gauge to ensure that it is in good working order.
8. As soon as rainfall commences (or even in immediately beforehand), the sampler transports the laboratory supplies and the field supplies to the location of the first outfall to be sampled.
9. The sampler commences recording data pertaining to this sampling event on a blank copy of the Storm Water Sampling Event Data Form (Appendix A). Backup documentation (e.g., on-site historical rainfall record keeping, in the form of an annotated calendar or other means) must be provided as indicated on this form.

It is strongly recommended that the sampler perform a "dry run" of all sample collection procedures prior to the first attempt at sampling an actual rain event. Time is of the essence during storm water sampling, and "dry runs" can often be used to troubleshoot potential procedural bottlenecks that could otherwise invalidate some or all of an initial sampling event.

4.2.3 Field Supplies

Field supplies for this project consists of the following:

1. Laboratory supplies as described above.
2. Powder free latex or nitrile sampling gloves. Note that most sample containers as provided by the laboratory include liquid acid preservatives. Appropriate hand protective PPE must be worn at all times in order to safeguard the skin from acid burns, as well as safeguarding the sample from contamination. Safety glasses or a face shield should also be used to mitigate the potential for acid splashing. Additional PPE may be dictated by the applicable site specific health and safety plan.
3. Rain gear.
4. Wristwatch or other timepiece.
5. Sampling poles, "boat hooks", or other extensional devices per the sampler's individual comfort level, and per the requirements of the outfall configurations. The extensional device may be outfitted with a receptacle for holding the laboratory sample bottles. If it is not, duct tape or fiber tape may be used to attach the bottles to the devices. However, it should be noted that attaching successive bottles using tape may take an unacceptably long period of time. These are the types of issues that need to be evaluated during a sampling "dry run" that is conducted prior to the first actual sampling event.

6. Water-resistant clipboard containing paperwork including, but not necessarily limited to, blank copies of the StormWater Sampling Event Data Form, Chain of Custody, and copy of this Sample Plan.

4.2.4 Filling Sample Bottles

All samples to be collected during this study will be "grab" samples. Collection of a crab sample is straightforward and can be as simple as holding the bottles under the storm water falling from the discharge point. However, the following practices must be followed during this procedure:

1. Fill bottles directly. Do not transfer to an intermediate container, or use any type of pumping apparatus with plastic tubing. The use of such devices will invalidate all samples collected for Oil and Grease analysis.
2. Keep hands away from the opening of the bottle in order to minimize the chances of contaminating the sample.
3. Always hold the bottle with its opening facing upstream (into the flow of water) so that the water enters directly into the bottle and does not first flow over the bottle or your hands.
4. Sample where the water has moderate flow and, if possible, some turbulence, so that the storm water discharge will be well mixed and the sample will be representative. Sampling of stillwater should be avoided. Make notes on the Storm Water Sampling Event Data Form about how the sample was collected in these regards.
5. Sample from a central portion of the stormwater flow. Avoid touching the bottom of channels or pipes so as to not stir up solid particles. This is particularly important because this Sampling Plan includes analyses for Total Suspended Solids (TSS), which are easily influenced by improper sampling procedure.
6. Do not rinse or overfill the bottles. The bottles contain liquid preservatives in most cases and the analyses will not be valid if preservative is lost due to overfilling or rinsing. In the event of accidental overfilling of any container, discard the original sample container, and fill an extra, being sure to label it properly.
7. As soon as the sample is collected, cap the bottle and ensure that the correct label is applied. Container caps must be placed in a secure location while the bottles are being filled, to ensure that contamination of the caps does not occur.

4.2.5 Completing the Sampling

1. Immediately place collected samples and the laboratory supply sample cooler on ice, and follow the additional procedures for maintaining proper custody as outlined in Section 5.0.
2. Complete the entry of all remaining data on the Storm Water Sampling Event Data Form. Be sure to record the total rainfall from the on-site rain gauge as soon as the rain event ends. In the event that the rain event that has just been sampled does not meet the criteria for amount of rainfall (at least 0.1 inches), the sampling event is invalid, and the samples collected must be discarded. New sample kits must be obtained from the contract laboratory, and the process recommenced.
3. File all completed documentation according to the facility's Environmental Management System (EMS).

4.2.6 ISCO Sampling Procedure

The following general procedure should be referenced when using these automated sampling devices.

1. Press the red STOP button on the instrument. This puts the instrument in a PAUSE mode, without stopping the program that is running. The manual pause screen will give you the following options:

   STOP PROGRAM
   RESUME PROGRAM
   VIEW DATA
   GRAB SAMPLE

2. Use arrow keys to scroll through the choices on each screen. Arrow to the GRAB SAMPLE and press ← ENTER

IF you have to stop the program and you get to the main screen, then arrow up to STOP PROGRAM and press ← ENTER. The first screen will give you the following list:

- Run Program
- View Report
- Other Functions ← ENTER

Choose MANUAL FUNCTIONS then press ← ENTER

Choose "Grab Sample" at the top of the list ← ENTER

3. Using the key pad, enter a sample volume greater than your sample container ← ENTER
   The last screen will say PRESS ← ENTER WHEN READY

4. Note 2 sample lines. One comes in from the sample area, into the pump. The other leaves the pump and is connected to a quick disconnect on the center section of the unit and continues down into the sample bottles at the bottom of the unit. This is the one to disconnect. It is the closer of the 2 lines if facing the readout. Follow it from the top and disconnect it from the bottom and collect your sample from there. Press ← ENTER.

5. You will hear the unit purge the sample line, then reverse the pump and begin to pull a sample. Once the volume (you entered) has been met, it will automatically stop, then purge the excess sample back out the sample line.

If an error occurs, the sampling stops and it begins to purge too early, then there was not sufficient water in the sample line to create the suction necessary. You will either have to manually grab a sample, or you will have to "dam-up" the water at the end of the sample line in order to submerge the strainer located on the end of the sample line.

6. When you have completed the sampling, return to the main screen and arrow up to the RUN choice and press ← ENTER.

For more detailed information on good storm water sampling practice, please refer to Washington State Department of Ecology Publication # 02-10-071 (December 2002) titled "How to Do Storm Water Sampling: A Guide for Industrial Facilities". This guidance document references some procedures that are unique to the state of Washington, but the vast majority of principles are universal.

5.0 SAMPLE HANDLING AND ANALYSIS

Appropriate sample containers and preservatives will be provided. The method of analysis, container type and preservation methods required in Table 2.

5.1 Chain-Of-Custody

An essential part of any sampling/analytical scheme is ensuring the integrity of the sample from collection to data reporting. The possession and handling of samples should be traceable from the time of collection through analysis and final disposition. The method selected for this project is Chain-Of-Custody and is required to assure that the final results will be legally defensible. An example of the Chain-Of-Custody form to be utilized on this project, can be found in Appendix B.

Chain-Of-Custody (COC) documentation is essential for every sample collected. A sample is considered to be under a person's custody if it is:

- Collected by that person;
- In a person's physical possession;
- In view of the person after taking possession;
- Secured by that person so that no one can tamper with it; or
- Secured by that person in an area that is restricted to authorized personnel.

A COC record will accompany each group of samples which are collected for laboratory analysis. This COC form will be provided by the laboratory doing the analysis. An example of that form is on the following page.

The purpose of the COC form is to document the transfer of samples from the sampling location to the laboratory and thereby assure that no samples are lost or mislabeled. One person will be responsible for maintaining the samples at any given time. During shipment, both the person relinquishing the samples to the shipper and the person receiving the samples from the shipper will sign the COC form and enter the time and date of transfer. Responsibility for the samples will then pass to the receiver.

The COC form is filled out in black or blue ink, any changes or errors should be corrected with a single straight line through the mistake, initialed and dated. The record should contain the following information.

1. Project Number, site name and address.
2. Date and time of collection.
3. Sample identification number.
4. Type of sample submitted.
5. Type of preservation.
6. Analysis to be performed.
7. Date, time and signature for each transferal.
8. Any special comments or instructions to the lab.

9. Name of samplers.
10. Number of samples.
11. Identification of common carrier, if used.

Any unused area of the COC form shall be crossed out with a single straight line. If a common carrier is required for sample transport, the relinquished COC form should be placed inside a waterproof bag and sealed in the transport container with samples. A completed custody seal will be placed across the container access.

5.2 Shipping of Samples

There will be no shipping of samples for this project. All analysis will be done by Xenco Laboratories in Houston, Texas. All samples will remain in the custody of representatives from either PHA, Delta, or Xenco Laboratories in Houston.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

In order to insure that the data quality obtained from stormwater sampling is accurate, precise and valid, all sampling and analysis activities will be performed in accordance with the instructions outlined in this sampling plan.

Based on the volume of samples and the analysis to be performed, the QA/QC will consist of duplicate samples only. No field blanks, trip blanks, or equipment blanks will be required.

For all sampling events, duplicate samples will be collected from a minimum of one (1) sampling location, representing ten percent (10%) of the sampling locations. The duplicates will be submitted to the laboratory as "blind samples," without designation to the laboratory as to the sample location.

7.0 SCHEDULE

Samples from these stormwater events will be collected within the time period of November 28, 2005 to January 28, 2006. The results of the four sampling events will be compiled in a report and submitted to the PHA project manager within 15 days of receiving the final analytical results from the analytical laboratory.

Tables

Table 1
Analytical Summary Table

Sample ID	Sample Date	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Oil & Grease (mg/L)	Selenium (mg/L)	Silver (mg/L)	TSS (mg/L)	Zinc (mg/L)
Benchmark Value		0.75	---	---	---	---	---	---	1	0.0816	—	---	---	---	---	---	---	0.117
Pitts Study Averages		---	0.0057	---	0.01589	0.01135	0.03069	0.01625	4.07654	0.0386	—	0.00033	0.01478	31.77	---	---	123.05	0.2348
Pitts Study Medians		---	0.003	---	0.001	0.007	0.016	0.005	1.955	0.016	---	0.0002	0.008	4	---	---	58	0.1163
A1																		
A2																		
A3																		
A4																		
B1																		
B2																		
C1																		
C2																		
D1																		
D2																		
A1																		
A2																		
A3																		
A4																		
B1																		
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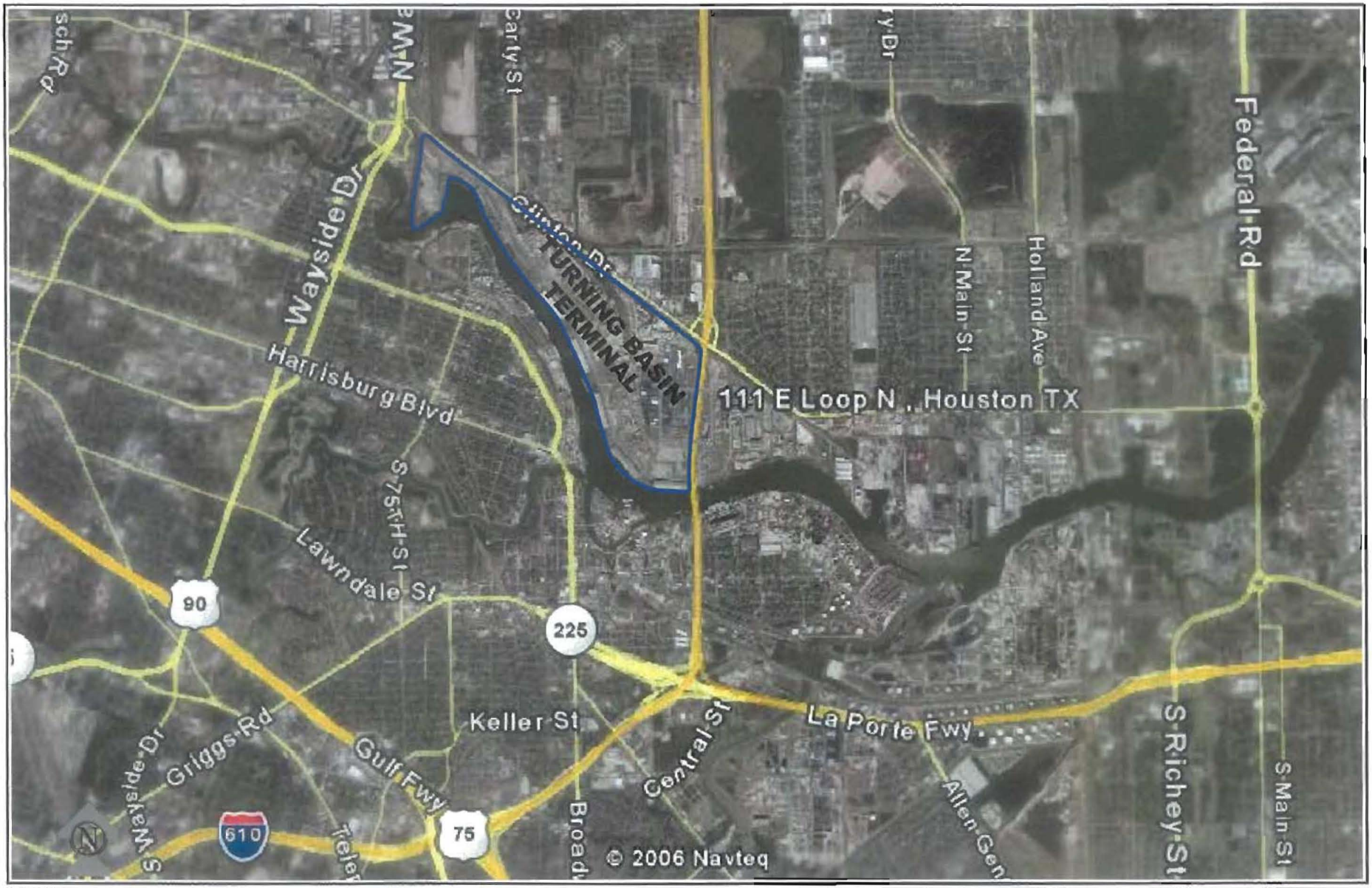
Table 1
Analytical Summary Table

Sample ID	Sample Date	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Oil & Grease (mg/L)	Selenium (mg/L)	Silver (mg/L)	TSS (mg/L)	Zinc (mg/L)
Benchmark Value		0.75	---	---	---	---	---	---	1	0.0816	---	---	---	---	---	---	---	0.117
Pitts Study Averages		---	0.0057	---	0.01589	0.01135	0.03069	0.01625	4.07654	0.0386	---	0.00033	0.01478	31.77	---	---	123.05	0.2348
Pitts Study Medians		---	0.003	---	0.001	0.007	0.016	0.005	1.955	0.016	---	0.0002	0.008	4	---	---	58	0.1163
A4																		
B1																		
B2																		
C1																		
C2																		
D1																		
D2																		
A1																		
A2																		
A3																		
A4																		
B1																		
B2																		
C1																		
C2																		
D1																		
D2																		
A1																		
A2																		
A3																		
A4																		
B1																		
B2																		
C1																		
C2																		
D1																		
D2																		

Table 2
Analytical Specifications

Analyte	*Method*	*Volume*	*Container*	*Preservative*	*Hold Time*
O&G	EPA 1664	1L	Amber Bottle	HCL or H2SO4	28 Days
TSS	EPA 160.2	100ml	HDPE	None	7 Days
Arsenic	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Barium	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Cadmium	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Chromium	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Copper	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Cyanide	EPA 335.2	200ml	HDPE	HNO3	6 Months
Iron	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Lead	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Manganese	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Mercury	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Nickel	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Selenium	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Silver	200.8 / 6020	200ml	HDPE	HNO3	6 Months
Zinc	200.8 / 6020	200ml	HDPE	HNO3	6 Months

Figures



Delta Environmental Consultants, Inc.	19700-0070-1 FILE: 19007-SLM PHASE: 0600 DEPT: PEA0 DATE: 02-27-2006 D-BY: O.F. R-BY: K.B.	PORT OF HOUSTON AUTHORITY Houston, Texas	Site Location Map	FIGURE 1

Delta Environmental Consultants, Inc.

19700-0070-1	
FILE	19007-SL
OFFICE	HOUSTON
DATE	02-27-2006
PHASE	0600
DEPT	PEA0
C-BY	O.F.
R-BY	K.B.

PORT OF HOUSTON AUTHORITY

Houston, Texas

Project Area

FIGURE 2

Delta Environmental Consultants, Inc.	19700-0070-1	PORT OF HOUSTON AUTHORITY	FIGURE
	PROJECT FILE: 19007-SPL		
	OFFICE: HOUSTON	DATE: 02-27-2006	
	JOB: 0600 DEPT: PEAO D-BY: O.F. DR-BY: K.B.	Houston, Texas	3
		Sample Locations	

PORT OF HOUSTON AUTHORITY
PHA
HOUSTON, TEXAS

Legend

Wharf

Port Properties - outline

- Port of Houston Authority Property
- Dredged Material Placement Areas
- PHA Galveston Container Terminal

N
W E
S

This map was compiled from various sources and efforts have been taken to ensure accuracy.
The Port of Houston Authority assumes no liability for errors or omissions contained in this map.

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

0 25 50 100 150 200 Feet

Port of Houston Authority

Appendices

Appendix A

Stormwater Sampling Event Data Form

STORMWATER SAMPLING EVENT DATA FORM

Event Description:

_____

Fill this out when sampling is conducted. This is an internal record of your laboratory submission and it shows how your sample collection is compliant with the storm water rules.

Time since the last measurable rainfall event (i.e., the most recent one that occurred before the one being sampled now - must be greater than 72 hours – attach a copy of your calendar or other recordkeeping data))	_____ hours
Name of sampler:	
Date of sampling:	
Time at which rainfall began:	
Time at which discharge began:	
Time at which sample was taken: Must be within thirty minutes of when the discharge started, OR, it can be up to 1 hr., but you must provide a written explanation as to why you couldn't do it earlier	_____
Total amount of rainfall for this event: (note that you must remember to check your rain gauge after the rain event is concluded)	
Describe condition of sampling site:	
• Is there visual evidence of contamination, such as sheen, debris, or muddiness?	Yes / No
• Are odors present?	Yes / No

Other notes and observations (it is important to record all outfall conditions as they may influence your sample results! Continue on reverse side of this sheet if necessary)

Laboratory where samples delivered	Xenco Laboratories, 11381 Meadowglen, Houston, Texas 77082 / 281-589-0692 phone / 281-589-0695 fax
Date Delivered (or picked up by lab): NOTE: Samples must be delivered to lab promptly, or else a new storm must be sampled.	_____
Copy of Chain of Custody attached to this sheet? (circle)	Yes / No

Appendix B

Example Cain-of-Custody Form

XENCO Laboratories

☑ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104. San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

LAB ONLY:

Serial #: Page of

Company-City Port of Houston Authority	**Phone** 713-670-2440
Project Name ☐Previously performed at XENCO Grant Project BMP Study	**Site**
Proj. Manager (PM) Nicole Cass ncass@poha.com	
Fax Results to ☐ PM or **e-mail Fax No:** **to:** PM and rsteinberg@deltaenv.com	
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O Bill to: Roxana Herrera	
Quote No: P.O No: ☐ Call for a P.O.	
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name Signature	

TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project ID

	Sample ID	Sampling Date	Time	Depth ft' In" m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	TSS	O&G	Metals (Al, As, Ba, Cd, Cu, Fe, Pb, Mn, Hg, Ni, K, Se, Ag, Zn)	TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks
1							X				NA	X			X				1
2							X				H		X		X				2
3							X				N			X	X				3
4															X				4
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1				
2				
3			Lab:	

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____ Na2S2O3
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

SDBE Committed to Excellence in Service and Quality since 1990 www.xenco.com

10.0 Appendix B

10.1 Pre-installation Analytical Results

Analytical Report 264371

for

Port of Houston Authority

Project Manager: Nicole Cass

CCC Grant Project

18-APR-06

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E87603 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

18-APR-06

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **264371**
CCC Grant Project
Project Address:

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Chain of Custody Numbered 264371. All results being reported under this Chain of Custody apply to the samples analyzed and properly identified with a Laboratory ID number.

The results for the quality control samples were reviewed. All parameters for data reduction and validation were reviewed. Estimation of Data uncertainty for this report is found in the quality control section of this report unless otherwise noted. In view of this, we are able to release the analytical data for this report within acceptance criteria for accuracy, precision, completeness or properly flagged. Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 264371 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location:

Date Received in Lab: Mar-30-06 09:30 am
Report Date: 18-APR-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	264371-001		264371-002		264371-003		264371-004	
	Field Id:	A1		A1		A1		A2	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Mar-29-06 15:00		Mar-29-06 15:00		Mar-29-06 15:00		Mar-29-06 15:15	
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Mar-31-06 11:25						Mar-31-06 11:30	
	Units/RL:	mg/L	RL					mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00					BRL	5.00
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Mar-31-06 19:09					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				23.0	5.00				
Total Metals by SW6020A	*Extracted:*					Mar-31-06 10:55			
	Analyzed:					Apr-03-06 15:48			
	Units/RL:					mg/L	RL		
Aluminum						1.01	0.010		
Arsenic						BRL	0.002		
Barium						0.022	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						0.687	0.200		
Lead						0.009	0.002		
Manganese						0.080	0.010		
Mercury						BRL	0.0004		
Nickel						BRL	0.010		
Potassium						1.48	0.500		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						0.050	0.010		

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location:

Date Received in Lab: Mar-30-06 09:30 am
Report Date: 18-APR-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	264371-005		264371-006		264371-007		264371-008	
	Field Id:	A2		A2		A3		A3	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Mar-29-06 15:15		Mar-29-06 15:15		Mar-29-06 15:10		Mar-29-06 15:10	
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:					Mar-31-06 11:35			
	Units/RL:					mg/L	RL		
Oil & Grease, Total Recovered						BRL	5.00		
TSS by EPA 160.2	*Extracted:*								
	Analyzed:	Mar-31-06 19:11						Mar-31-06 19:13	
	Units/RL:	mg/L	RL					mg/L	RL
TSS by EPA 160.2		14.0	5.00					218	5.00
Total Metals by SW6020A	*Extracted:*			Mar-31-06 10:55					
	Analyzed:			Apr-03-06 15:52					
	Units/RL:			mg/L	RL				
Aluminum				0.897	0.010				
Arsenic				BRL	0.002				
Barium				0.023	0.010				
Cadmium				BRL	0.001				
Chromium				BRL	0.010				
Copper				BRL	0.010				
Iron				0.624	0.200				
Lead				0.008	0.002				
Manganese				0.057	0.010				
Mercury				BRL	0.0004				
Nickel				BRL	0.010				
Potassium				2.02	0.500				
Selenium				BRL	0.010				
Silver				BRL	0.010				
Zinc				0.038	0.010				

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location:

Date Received in Lab: Mar-30-06 09:30 am
Report Date: 18-APR-06
Project Manager: Debbie Simmons

Analysis Requested					
	Lab Id:	264371-009	264371-010	264371-011	264371-012
	Field Id:	A3	A4	A4	A4
	Depth:				
	Matrix:	WATER	WATER	WATER	WATER
	Sampled:	Mar-29-06 15:10	Mar-29-06 15:20	Mar-29-06 15:20	Mar-29-06 15:20
Oil and Grease by EPA 1664	*Extracted:*				
	Analyzed:		Mar-31-06 11:40		
	Units/RL:		mg/L RL		
Oil & Grease, Total Recovered			BRL 5.00		
TSS by EPA 160.2	*Extracted:*				
	Analyzed:			Mar-31-06 19:15	
	Units/RL:			mg/L RL	
TSS by EPA 160.2				45.0 5.00	
Total Metals by SW6020A	*Extracted:*	Mar-31-06 10:55			Mar-31-06 10:55
	Analyzed:	Apr-03-06 16:29			Apr-03-06 16:33
	Units/RL:	mg/L RL			mg/L RL
Aluminum		6.83 0.010			0.786 0.010
Arsenic		0.002 0.002			0.011 0.002
Barium		0.238 0.010			0.049 0.010
Cadmium		0.001 0.001			BRL 0.001
Chromium		0.031 0.010			BRL 0.010
Copper		0.034 0.010			0.010 0.010
Iron		5.83 0.200			0.997 0.200
Lead		0.057 0.002			0.005 0.002
Manganese		0.414 0.010			0.062 0.010
Mercury		BRL 0.0004			BRL 0.0004
Nickel		0.028 0.010			BRL 0.010
Potassium		8.12 0.500			4.22 0.500
Selenium		BRL 0.010			BRL 0.010
Silver		BRL 0.010			BRL 0.010
Zinc		0.252 0.010			0.036 0.010

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location:

Date Received in Lab: Mar-30-06 09:30 am
Report Date: 18-APR-06
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	264371-013		264371-014		264371-015		264371-016	
	Field Id:	A5		A5		A5		TBT12	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Mar-29-06 15:25		Mar-29-06 15:25		Mar-29-06 15:25		Mar-29-06 15:35	
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Mar-31-06 11:45							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Mar-31-06 19:17					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				34.0	5.00				
Total Metals by SW6020A	*Extracted:*					Mar-31-06 10:55		Mar-31-06 10:55	
	Analyzed:					Apr-03-06 16:37		Apr-03-06 16:40	
	Units/RL:					mg/L	RL	mg/L	RL
Aluminum						0.730	0.010	0.645	0.010
Arsenic						BRL	0.002	BRL	0.002
Barium						0.035	0.010	0.038	0.010
Cadmium						BRL	0.001	BRL	0.001
Chromium						BRL	0.010	0.020	0.010
Copper						BRL	0.010	0.011	0.010
Iron						1.07	0.200	1.02	0.200
Lead						0.009	0.002	0.008	0.002
Manganese						0.091	0.010	0.090	0.010
Mercury						BRL	0.0004	BRL	0.0004
Nickel						BRL	0.010	0.078	0.010
Potassium						1.44	0.500	2.10	0.500
Selenium						BRL	0.010	BRL	0.010
Silver						BRL	0.010	BRL	0.010
Zinc						0.046	0.010	0.041	0.010

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location:

Date Received in Lab: Mar-30-06 09:30 am
Report Date: 18-APR-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	264371-017		264371-018					
	Field Id:	TBT12		TBT12					
	Depth:								
	Matrix:	WATER		WATER					
	Sampled:	Mar-29-06 15:35		Mar-29-06 15:35					
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Mar-31-06 11:50							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Mar-31-06 19:19					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				36.0	5.00				

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: CCC Grant Project

Work Order #: 264371 **Project ID:**

Lab Batch #: 676817 **Sample:** 483395-1-BKS **Matrix:** Water

Date Analyzed: 04/03/2006 **Date Prepared:** 03/31/2006 **Analyst:** HAT

Reporting Units: mg/L **Batch #:** 1

Total Metals by SW6020A Analytes	Blank Result [A]	BLANK /BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Aluminum	0.010	0.200	0.212	106	75-125	
Arsenic	<0.002	0.050	0.044	88	75-125	
Barium	<0.010	0.050	0.047	94	75-125	
Cadmium	<0.001	0.020	0.020	100	75-125	
Chromium	<0.010	0.050	0.049	98	75-125	
Copper	<0.010	0.050	0.051	102	75-125	
Iron	<0.200	0.200	0.225	113	75-125	
Lead	<0.002	0.050	0.048	96	75-125	
Manganese	<0.010	0.050	0.048	96	75-125	
Mercury	<0.0004	0.0010	0.0009	90	75-125	
Nickel	<0.010	0.050	0.049	98	75-125	
Potassium	<0.500	2.00	1.72	86	75-125	
Selenium	<0.010	0.050	0.045	90	75-125	
Silver	<0.010	0.020	0.019	95	75-125	
Zinc	<0.010	0.050	0.062	124	75-125	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: CCC Grant Project

Work Order #: 264371 **Project ID:**

Analyst: MAB **Date Prepared:** 03/31/2006 **Date Analyzed:** 03/31/2006

Lab Batch ID: 676650 **Sample:** 676650-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	10.0	10.5	105	10.0	10.9	109	4	70-130	20	

Analyst: MCH **Date Prepared:** 03/31/2006 **Date Analyzed:** 03/31/2006

Lab Batch ID: 676616 **Sample:** 676616-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

TSS by EPA 160.2	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	987	99	1000.0	990	99	0	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

XENCO Laboratories

Form 3 - MS / MSD Recoveries

Project Name: CCC Grant Project

Work Order # : 264371

Project ID:

Lab Batch ID: 676817 QC- Sample ID: 264338-001 S Batch #: 1 Matrix: Water

Date Analyzed: 04/03/2006 Date Prepared: 03/31/2006 Analyst: HAT

Reporting Units: mg/L

Total Metals by SW6020A Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.576	0.200	1.12	272	0.200	1.18	302	10	85-115	25	X
Arsenic	<0.002	0.050	0.052	104	0.050	0.055	110	6	85-115	20	
Barium	0.212	0.050	0.276	128	0.050	0.283	142	10	85-115	20	X
Cadmium	<0.001	0.020	0.020	100	0.020	0.021	105	5	85-115	20	
Chromium	<0.010	0.050	0.064	128	0.050	0.069	138	8	85-115	20	X
Copper	<0.010	0.050	0.062	124	0.050	0.065	130	5	85-115	20	X
Iron	0.916	0.200	1.12	102	0.200	1.15	117	14	85-115	20	X
Lead	<0.002	0.050	0.063	126	0.050	0.067	134	6	85-115	20	X
Manganese	0.048	0.050	0.107	118	0.050	0.112	128	8	85-115	20	X
Mercury	<0.0004	0.0010	0.0011	110	0.0010	0.0011	110	0	85-115	20	
Nickel	0.010	0.050	0.065	110	0.050	0.070	120	9	85-115	20	X
Potassium	14.8	2.00	18.1	165	2.00	18.6	190	14	85-115	20	X
Selenium	<0.005	0.050	0.048	96	0.050	0.050	100	4	85-115	25	
Silver	<0.010	0.020	0.019	95	0.020	0.020	100	5	85-115	20	
Zinc	0.030	0.050	0.077	94	0 050	0.080	100	6	85-115	25	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*(D-G)/(D+G)

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: CCC Grant Project

Work Order #: 264371

Lab Batch #: 676616 **Project ID:**
Date Analyzed: 03/31/2006 **Date Prepared:** 03/31/2006 **Analyst:** MCH
QC- Sample ID: 264357-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	7.00	8.00	13	20	

Lab Batch #: 676616
Date Analyzed: 03/31/2006 **Date Prepared:** 03/31/2006 **Analyst:** MCH
QC- Sample ID: 264382-002 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	44.0	46.0	4	20	

Lab Batch #: 676817
Date Analyzed: 04/03/2006 **Date Prepared:** 03/31/2006 **Analyst:** HAT
QC- Sample ID: 264338-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Metals by SW6020A	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.576	0.616	7	25	
Arsenic	<0.002	<0.002	NC	20	
Barium	0.212	0.220	4	20	
Cadmium	<0.001	<0.001	NC	20	
Chromium	<0.010	<0.010	NC	20	
Copper	<0.010	<0.010	NC	20	
Iron	0.916	0.948	3	20	
Lead	<0.002	<0.002	NC	20	
Manganese	0.048	0.049	2	20	
Mercury	<0.0004	<0.0004	NC	20	
Nickel	0.010	0.011	10	20	
Potassium	14.8	15.6	5	20	
Selenium	<0.005	<0.005	NC	25	
Silver	<0.010	<0.010	NC	20	
Zinc	0.030	0.031	3	25	

Spike Relative Difference RPD 200 * |(B-A)/(B+A)|
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 26437-H

Serial #: 195653 Page 1 of 2

Company-City: Port of Houston — Phone: 713-670-2440

TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCC Grant Project ☐ Previously performed at XENCO — Site — Project ID

Proj. Manager (PM): Nicol Cass

Fax Results to ☐ PM or — Fax No:

e-mail to: NCass@POHA.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O

Bill to: Roxanna Herrera

Quote No: — P.O No: — ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: R. STEINBERG — Signature:

	Sample ID	Sampling Date	Time	Depth ft in	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PD 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prelburn - Revised: Virgin Non-Virgin	TSS	TDS	TAT 5h 12h 24h 48h 3c 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks
1	A1	3-29-06	1500		W		X	1	1	C	N									X		4				
2	A1	3-29-06	1500		W		X	1	5	P	HNO3									X		4				
3	A1	3-29-06	1500		W		X	1	5	P	ICE					X						4				
4	A1	3-29-06					X	1																		
5	A2	3-29-06	1515		W		X	1	1	C	N										X	4				
6	A2	3-29-06	1515		W		X	1	5	P	HNO3									X		4				
7	A2	3-29-06	1515		W		X	1	5	P	ICE					X						4				
8	A3 KB	3-29-06	1510		W		X	1	1	C	N										X	4				
9	A3	3-29-06	1510		W		X	1	5	P	HNO3									X		4				
10	A3	3-29-06	1510		W		X	1	5	P	ICE					X						4				

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	3/29/06 1800	Kelly Steinberg	3/29/06 1800
2			
3 Kelly Steinberg	3/30/06 9:30am	Lab:	3/30/06 0430

Rush Charges are Pre-Approved upon requesting them.

Instructions:

All XENCO Standard Terms and Conditions Apply

Containers Received: 18 Cooler Temperature: 4.0°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool.<4C) (C), None (NA), See Label (L), Other (O) _____

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

26437-H

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 26437-A

Serial #: 195651 Page 2 of 2

Company-City: Port of Houston — Phone: 7136702440

TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCC Grant Project — ☐Previously performed at XENCO — Site — Project ID

Prof. Manager (PM): Nicole Cuss

Fax Results to ☐ PM or — Fax No:

e-mail to: NCuss@PDHA.com KD

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O

Bill to: Roxanna Herrera

Quote No: — P.O No: — ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: RICH STEINBERG — Signature:

	Sample ID	Sampling Date	Time	Depth ft/in/m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	TSS	TOC	TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks
1	A4	3-29-06	1520		W		X	1	1	C	N										X	X				
2	A4	3-29-06	1520		W		X	1	5	P	N									X		X				
3	A4	3-29-06	1520		W		X	1	5	P	N					X						X				
4	A5	3-29-06	1525		W		X	1	1	C	N										X	X				
5	A5	3-29-06	1525		W		X	1	5	P	N									X		X				
6	A5	3-29-06	1525		W		X	1	5	P	N					X						X				
7	TBT12	3-29-06	1535		W		X	1	5	P	N					X						X				
8	TBT12	3-29-06	1535		W		X	1	1	C	N										X	X				
9	TBT12	3-29-06	1535		W		X	1	5	P	C									X		X				
10																										

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	3/29/06 1800	Kelly Steinberg	3/29/06 1800
2			
3	Kelly Steinberg 3/30/06 9:30am	Lab:	3/30/06 0430

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

26437-A

Debbie Simmons

From: Richard Steinberg [RSteinberg@deltaenv.com]
Sent: Thursday, March 30, 2006 1:28 PM
To: kelly.steinberg@xenco.com; debbie.simmons@xenco.com
Cc: Kindra Brock; Nicole Cass
Subject: Metals requirements

Debbie and Kelly,

I submitted 6 sets of samples yesterday for analysis on behalf of the PHA. I need to clarify which metals we need run and reported on these samples. Please do not just run the PP13 as listed on the chain of custody, rather, please analyze for the following:

Metals (Al, As, Ba, Cd, Cu, Fe, Pb, Mn, Hg, Ni, K, Se, Ag, Zn)

Of course, we still need the TSS and O&G. The intent of this email is to clarrify which metals to run/report.

Thanks.

Richard Steinberg
Delta Environmental Consultants, Inc
10255 Richmond Ave, Suite 200
Houston, Texas 77042
☎ Direct: (832) 200-1460
☎ Toll free: (800) 477-7411
☎ Fax: (713) 981-8821
rsteinberg@deltaenv.com

REQUEST FOR ADDITIONS / CORRECTIONS FORM

No: _____

X 11381 Meadowglen, Suite L, Houston, TX 77082 (281) 589-0692
2025 McKenzie Rd., Suite 160,Carrollton, TX 75006 (972) 620-7966
5309 Wurzbach Rd., Suite 104, San Antonio, TX 78238 (210) 509-3334
5757 N.W. 158th St., Miami Lakes, FL 33014 (305) 823-8555
2618 South Falkenburg Rd., Riverview, FL 33569 (813) 620-2000

This form is a supplement to

COC No: 264371

This information should be taken from the original COC.

Contractor: *Port of Houston*	Phone:
Address:	
Project Name: *CCC Grant Project*	Project Manager: *Nicole Cass*
Project Location:	
Project No.:	Project Director:

- [X] Addition
- [ ] Correction
- [ ] Hold
- [ ] Cancellation
- [ ] No Addition

Requested By: Kindra Brock D/T: 4/17/2006 10:00

TAT
- ___ 24 HOURS
- ___ 48 HOURS
- ___ 3 DAYS
- ___ 5 DAYS
- ___ 7-days

Lab ID	Field ID	Date/Time	Depth	Matrix	Sample Description	Chromium	Hold Time Expires:		Hold Time Expires:		Hold Time Expires:		Hold Time Expires:		Hold Time Expires:	Remarks
264371-003						X										
264371-006						X										
264371-009						X										
264371-015						X										
264371-016						X										

Comments: Chromium left off list of required metals, please provide.

Samples Received in Lab by: Alirio Sanchez
X:\Forms\264371_Additions&Corrections.XLS
Date/Time: 3/30/2006 9:30

Matrix Legend
S = Solid P = Product
L = Liquid Sl = Sludge
A = Air O =

Add Received By: Debbie Simmons D/T: 4/17/2006 10:00
Add Assigned By: D/T:
Add Processed By: D/T:

Analytical Report 266898

for

Port of Houston Authority

Project Manager: Nicole Cass

CCC Grant Project

13-JUN-06

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E87603 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

13-JUN-06

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **266898**
CCC Grant Project
Project Address: Houston

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Chain of Custody Numbered 266898. All results being reported under this Chain of Custody apply to the samples analyzed and properly identified with a Laboratory ID number.

The results for the quality control samples were reviewed. All parameters for data reduction and validation were reviewed. Estimation of Data uncertainity for this report is found in the quality control section of this report unless otherwise noted. In view of this, we are able to release the analytical data for this report within acceptance criteria for accuracy, precision, completeness or properly flagged. Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 266898 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Castro P

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	266898-001	266898-002	266898-003	266898-004
	Field Id:	A1	A1	A1	A1
	Depth:				
	Matrix:	WATER	WATER	WATER	WATER
	Sampled:	May-31-06 15:45	May-31-06 15:45	May-31-06 15:45	May-31-06 15:45
Metals by EPA 200.8	*Extracted:*			Jun-13-06 09:08	
	Analyzed:			Jun-13-06 12:10	
	Units/RL:			mg/L RL	
Aluminum				0.113 0.010	
Arsenic				0.005 0.002	
Barium				0.043 0.010	
Cadmium				BRL 0.001	
Chromium				0.013 0.010	
Copper				BRL 0.010	
Iron				0.220 0.200	
Lead				BRL 0.002	
Manganese				0.017 0.010	
Mercury				BRL 0.0004	
Nickel				BRL 0.010	
Selenium				BRL 0.010	
Silver				BRL 0.010	
Zinc				0.019 0.010	
Oil and Grease by EPA 1664	*Extracted:*				
	Analyzed:		Jun-05-06 15:42		
	Units/RL:		mg/L RL		
Oil & Grease, Total Recovered			BRL 5.00		
TSS by EPA 160.2	*Extracted:*				
	Analyzed:	Jun-06-06 19:30			
	Units/RL:	mg/L RL			
TSS by EPA 160.2		13.0 5.00			
Total Cyanide by EPA 335.4	*Extracted:*				
	Analyzed:				Jun-07-06 10:26
	Units/RL:				mg/L RL
Cyanide, Total					BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	266898-005	266898-006	266898-007	266898-008
		Field Id:	A2	A2	A2	A2
		Depth:				
		Matrix:	WATER	WATER	WATER	WATER
		Sampled:	May-31-06 16:10	May-31-06 16:10	May-31-06 16:10	May-31-06 16:10
Metals by EPA 200.8		*Extracted:*			Jun-13-06 09:08	
		Analyzed:			Jun-13-06 12:26	
		Units/RL:			mg/L RL	
Aluminum					0.076 0.010	
Arsenic					0.023 0.002	
Barium					0.083 0.010	
Cadmium					BRL 0.001	
Chromium					BRL 0.010	
Copper					BRL 0.010	
Iron					BRL 0.200	
Lead					BRL 0.002	
Manganese					BRL 0.010	
Mercury					BRL 0.0004	
Nickel					BRL 0.010	
Selenium					BRL 0.010	
Silver					BRL 0.010	
Zinc					BRL 0.010	
Oil and Grease by EPA 1664		*Extracted:*				
		Analyzed:		Jun-05-06 15:44		
		Units/RL:		mg/L RL		
Oil & Grease, Total Recovered				BRL 5.00		
TSS by EPA 160.2		*Extracted:*				
		Analyzed:	Jun-06-06 19:30			
		Units/RL:	mg/L RL			
TSS by EPA 160.2			BRL 5.00			
Total Cyanide by EPA 335.4		*Extracted:*				
		Analyzed:				Jun-07-06 10:28
		Units/RL:				mg/L RL
Cyanide, Total						BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	266898-009	266898-010	266898-011		266898-012
		Field Id:	A3	A3	A3		A3
		Depth:					
		Matrix:	WATER	WATER	WATER		WATER
		Sampled:	May-31-06 16:00	May-31-06 16:00	May-31-06 16:10		May-31-06 16:10
Metals by EPA 200.8	*Extracted:*				Jun-13-06 09:08		
	Analyzed:				Jun-13-06 12:30		
	Units/RL:				mg/L	RL	
Aluminum					0.025	0.010	
Arsenic					0.005	0.002	
Barium					0.066	0.010	
Cadmium					BRL	0.001	
Chromium					BRL	0.010	
Copper					BRL	0.010	
Iron					BRL	0.200	
Lead					BRL	0.002	
Manganese					BRL	0.010	
Mercury					BRL	0.0004	
Nickel					BRL	0.010	
Selenium					BRL	0.010	
Silver					BRL	0.010	
Zinc					BRL	0.010	
Oil and Grease by EPA 1664	*Extracted:*						
	Analyzed:			Jun-05-06 15:46			
	Units/RL:			mg/L	RL		
Oil & Grease, Total Recovered				BRL	5.00		
TSS by EPA 160.2	*Extracted:*						
	Analyzed:		Jun-06-06 19:30				
	Units/RL:		mg/L	RL			
TSS by EPA 160.2			BRL	5.00			
Total Cyanide by EPA 335.4	*Extracted:*						
	Analyzed:						Jun-07-06 10:30
	Units/RL:						mg/L RL
Cyanide, Total							BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	266898-013		266898-014		266898-015		266898-016
		Field Id:	A4		A4		A4		A4
		Depth:							
		Matrix:	WATER		WATER		WATER		WATER
		Sampled:	May-31-06 16:20		May-31-06 16:20		May-31-06 16:20		May-31-06 16:20
Metals by EPA 200.8	*Extracted:*						Jun-13-06 09:08		
	Analyzed:						Jun-13-06 12:33		
	Units/RL:						mg/L	RL	
Aluminum							0.073	0.010	
Arsenic							0.031	0.002	
Barium							0.112	0.010	
Cadmium							BRL	0.001	
Chromium							BRL	0.010	
Copper							BRL	0.010	
Iron							0.210	0.200	
Lead							BRL	0.002	
Manganese							BRL	0.010	
Mercury							BRL	0.0004	
Nickel							BRL	0.010	
Selenium							BRL	0.010	
Silver							BRL	0.010	
Zinc							BRL	0.010	
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:				Jun-09-06 18:36				
	Units/RL:				mg/L	RL			
Oil & Grease, Total Recovered					BRL	5.00			
TSS by EPA 160.2	*Extracted:*								
	Analyzed:		Jun-06-06 19:30						
	Units/RL:		mg/L	RL					
TSS by EPA 160.2			14.0	5.00					
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:								Jun-07-06 10:32
	Units/RL:								mg/L RL
Cyanide, Total									BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	266898-017	266898-018	266898-019	266898-020
		Field Id:	A5	A5	A5	A5
		Depth:				
		Matrix:	WATER	WATER	WATER	WATER
		Sampled:	May-31-06 16:30	May-31-06 16:30	May-31-06 16:30	May-31-06 16:30
Metals by EPA 200.8		*Extracted:*			Jun-13-06 09:08	
		Analyzed:			Jun-13-06 12:37	
		Units/RL:			mg/L RL	
Aluminum					0.503 0.010	
Arsenic					0.018 0.002	
Barium					0.099 0.010	
Cadmium					BRL 0.001	
Chromium					0.013 0.010	
Copper					BRL 0.010	
Iron					0.940 0.200	
Lead					0.005 0.002	
Manganese					0.057 0.010	
Mercury					BRL 0.0004	
Nickel					BRL 0.010	
Selenium					BRL 0.010	
Silver					BRL 0.010	
Zinc					0.032 0.010	
Oil and Grease by EPA 1664		*Extracted:*				
		Analyzed:		Jun-09-06 18:38		
		Units/RL:		mg/L RL		
Oil & Grease, Total Recovered				BRL 5.00		
TSS by EPA 160.2		*Extracted:*				
		Analyzed:	Jun-06-06 19:30			
		Units/RL:	mg/L RL			
TSS by EPA 160.2			36.0 5.00			
Total Cyanide by EPA 335.4		*Extracted:*				
		Analyzed:				Jun-07-06 10:38
		Units/RL:				mg/L RL
Cyanide, Total						BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	266898-021	266898-022	266898-023	266898-024
		Field Id:	D2	D2	D2	D2
		Depth:				
		Matrix:	WATER	WATER	WATER	WATER
		Sampled:	May-31-06 16:40	May-31-06 16:40	May-31-06 16:40	May-31-06 16:40
Metals by EPA 200.8	*Extracted:*				Jun-13-06 09:08	
	Analyzed:				Jun-13-06 12:41	
	Units/RL:				mg/L RL	
Aluminum					0.030 0.010	
Arsenic					0.019 0.002	
Barium					0.109 0.010	
Cadmium					BRL 0.001	
Chromium					BRL 0.010	
Copper					BRL 0.010	
Iron					BRL 0.200	
Lead					BRL 0.002	
Manganese					BRL 0.010	
Mercury					BRL 0.0004	
Nickel					BRL 0.010	
Selenium					BRL 0.010	
Silver					BRL 0.010	
Zinc					BRL 0.010	
Oil and Grease by EPA 1664	*Extracted:*					
	Analyzed:			Jun-09-06 18:40		
	Units/RL:			mg/L RL		
Oil & Grease, Total Recovered				BRL 5.00		
TSS by EPA 160.2	*Extracted:*					
	Analyzed:		Jun-06-06 19:30			
	Units/RL:		mg/L RL			
TSS by EPA 160.2			BRL 5.00			
Total Cyanide by EPA 335.4	*Extracted:*					
	Analyzed:					Jun-07-06 10:40
	Units/RL:					mg/L RL
Cyanide, Total						BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-01-06 11:04 am
Report Date: 13-JUN-06
Project Manager: Debbie Simmons

Analysis Requested					
	Lab Id:	266898-025	266898-026	266898-027	266898-028
	Field Id:	Duplicate	Duplicate	Duplicate	Duplicate
	Depth:				
	Matrix:	WATER	WATER	WATER	WATER
	Sampled:	May-31-06 16:50	May-31-06 16:50	May-31-06 16:50	May-31-06 16:50
Metals by EPA 200.8	*Extracted:*			Jun-13-06 09:08	
	Analyzed:			Jun-13-06 12:45	
	Units/RL:			mg/L RL	
Aluminum				0.025 0.010	
Arsenic				0.018 0.002	
Barium				0.109 0.010	
Cadmium				BRL 0.001	
Chromium				BRL 0.010	
Copper				BRL 0.010	
Iron				BRL 0.200	
Lead				BRL 0.002	
Manganese				BRL 0.010	
Mercury				BRL 0.0004	
Nickel				BRL 0.010	
Selenium				BRL 0.010	
Silver				BRL 0.010	
Zinc				BRL 0.010	
Oil and Grease by EPA 1664	*Extracted:*				
	Analyzed:		Jun-09-06 18:42		
	Units/RL:		mg/L RL		
Oil & Grease, Total Recovered			BRL 5.00		
TSS by EPA 160.2	*Extracted:*				
	Analyzed:	Jun-06-06 19:30			
	Units/RL:	mg/L RL			
TSS by EPA 160.2		5.00 5.00			
Total Cyanide by EPA 335.4	*Extracted:*				
	Analyzed:				Jun-07-06 10:42
	Units/RL:				mg/L RL
Cyanide, Total					BRL 0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: CCC Grant Project

Work Order #: 266898 **Project ID:**

Lab Batch #: 680087 **Sample:** 485573-1-BKS **Matrix:** Water
Date Analyzed: 06/13/2006 **Date Prepared:** 06/13/2006 **Analyst:** MCH
Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
			BLANK /BLANK SPIKE RECOVERY STUDY			
Aluminum	<0.010	0.200	0.186	93	85-115	
Arsenic	<0.002	0.050	0.050	100	85-115	
Barium	<0.010	0.050	0.053	106	85-115	
Cadmium	<0.001	0.020	0.021	105	85-115	
Chromium	<0.010	0.050	0.051	102	85-115	
Copper	<0.010	0.050	0.049	98	85-115	
Iron	<0.200	0.200	0.190	95	85-115	
Lead	<0.002	0.050	0.048	96	85-115	
Manganese	<0.010	0.050	0.055	110	85-115	
Mercury	<0.0004	0.0010	0.0008	80	85-115	L
Nickel	<0.010	0.050	0.049	98	85-115	
Selenium	<0.010	0.050	0.050	100	85-115	
Silver	<0.010	0.020	0.021	105	85-115	
Zinc	<0.010	0.050	0.050	100	85-115	

Lab Batch #: 679779 **Sample:** 679779-1-BKS **Matrix:** Water
Date Analyzed: 06/07/2006 **Date Prepared:** 06/07/2006 **Analyst:** AMB
Reporting Units: mg/L **Batch #:** 1

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
			BLANK /BLANK SPIKE RECOVERY STUDY			
Cyanide, Total	<0.020	0.200	0.205	103	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: CCC Grant Project

Work Order #: 266898 **Project ID:**

Analyst: AMB **Date Prepared:** 06/05/2006 **Date Analyzed:** 06/05/2006

Lab Batch ID: 679735 **Sample:** 679735-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	20.0	23.6	118	20.0	23.6	118	0	70-130	20	

Analyst: AMB **Date Prepared:** 06/09/2006 **Date Analyzed:** 06/09/2006

Lab Batch ID: 679995 **Sample:** 679995-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	20.0	23.8	119	20.0	21.0	105	13	70-130	20	

Analyst: AMB **Date Prepared:** 06/06/2006 **Date Analyzed:** 06/06/2006

Lab Batch ID: 679757 **Sample:** 679757-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

TSS by EPA 160.2	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	941	94	1000.0	923	92	2	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: CCC Grant Project

Work Order # : 266898 **Project ID:**

Lab Batch ID: 680087 **QC- Sample ID:** 267249-001 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 06/13/2006 **Date Prepared:** 06/13/2006 **Analyst:** MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
Aluminum	0.016	0.200	0.171	78	0.200	0.173	79	1	75-125	25	
Arsenic	0.101	0.050	0.154	106	0.050	0.148	94	12	75-125	25	
Barium	0.114	0.050	0.182	136	0.050	0.181	134	1	75-125	25	X
Cadmium	<0.001	0.020	0.018	90	0.020	0.019	95	5	75-125	25	
Chromium	<0.010	0.050	0.057	114	0.050	0.059	118	3	75-125	25	
Copper	<0.010	0.050	0.046	92	0.050	0.046	92	0	75-125	25	
Iron	4.48	0.200	5.00	260	0.200	4.69	105	85	75-125	25	XF
Lead	0.002	0.050	0.047	90	0.050	0.049	94	4	75-125	25	
Manganese	0.667	0.050	0.766	198	0.050	0.709	84	81	75-125	25	XF
Mercury	<0.0004	0.0010	0.0009	90	0.0010	0.0009	90	0	75-125	25	
Nickel	0.011	0.050	0.056	90	0.050	0.056	90	0	75-125	25	
Selenium	<0.010	0.050	0.039	78	0.050	0.040	80	3	75-125	25	
Silver	<0.010	0.020	0.020	100	0.020	0.021	105	5	75-125	25	
Zinc	0.015	0.050	0.056	82	0.050	0.056	82	0	75-125	25	

Lab Batch ID: 679779 **QC- Sample ID:** 266867-001 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 06/07/2006 **Date Prepared:** 06/07/2006 **Analyst:** AMB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
Cyanide, Total	<0.020	0.200	0.217	109	0.200	0.223	112	3	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*(D-G)/(D+G)

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: CCC Grant Project

Work Order #: 266898

Lab Batch #: 680087 **Project ID:**
Date Analyzed: 06/13/2006 **Date Prepared:** 06/13/2006 **Analyst:** MCH
QC- Sample ID: 267249-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Metals by EPA 200.8 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY				
	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.016	<0.010	NC	25	
Arsenic	0.101	0.102	1	25	
Barium	0.114	0.117	3	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	25	
Copper	<0.010	<0.010	NC	25	
Iron	4.48	4.47	0	25	
Lead	0.002	0.003	40	25	F
Manganese	0.667	0.666	0	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	0.011	0.011	0	25	
Selenium	<0.010	<0.010	NC	25	
Silver	<0.010	<0.010	NC	25	
Zinc	0.015	0.015	0	25	

Lab Batch #: 679757
Date Analyzed: 06/06/2006 **Date Prepared:** 06/06/2006 **Analyst:** AMB
QC- Sample ID: 266898-017 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY				
	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	36.0	39.0	8	20	

Lab Batch #: 679779
Date Analyzed: 06/07/2006 **Date Prepared:** 06/07/2006 **Analyst:** AMB
QC- Sample ID: 266867-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY				
	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2619 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

LAB ONLY: 266898-H

Serial #: 178523 Page 1 of 3

Company-City: Port of Houston Authority
Phone: 713-670-2448
TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name ☐Previously performed at XENCO: CCL Grant Project
Site:
Project ID:

Proj. Manager (PM): Nicole Cass ncass@POHA
Fax Results to ☒ PM or: Fax No:
e-mail to: rsteinberg@deltaenv.com
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O
Bill to: Roxanna Herrera
Quote No: P.O No: ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)
TRRP PCLs: Tier 1 Tier 2 Residential Industrial
LPST No.:(Required)
Sampler Name: Kindra Brock Signature: Kindra Brock

	Sample ID	Sampling Date	Time	Depth ft' in' m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	TSS	O&G	Metals (Al, As, Ba, Ca, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn, Cr)	Cyanide	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks
1	A1	5-31-06	1545		W		X	1	2	P	NA									X				X				
2	A1	5-31-06	1545		W		X	1	1	G	S										X			X				
3	A1	5-31-06	1545		W		X	1	2	P	N											X		X				
4	A1	5-31-06	1545		W		X	1	5	P	A												X	X				
5	A2	5-31-06	1610		W		X	1	2	P	NA									X				X				
6	A2	5-31-06	1610		W		X	1	1	G	S										X			X				
7	A2	5-31-06	1610		W		X	1	2	P	N											X		X				
8	A2	5-31-06	1610		W		X	1	5	P	A												X	X				
9	A3	5-31-06	1600		W		X	1	2	P	NA									X				X				
10	A3	5-31-06	1600		W		X	1	1	G	S										X			X				

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time	
1	Kindra Brock	6-1-06 11:04			Rush Charges are Pre-Approved upon requesting them.
2					Instructions: All XENCO Standard Terms and Conditions Apply
3			Lab: [signature]	6/1/06 1104	Containers Received: 28 Cooler Temperature: 4°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O)
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other ______ Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O)

Matrix: Air (A), Product (P), Solid(S), Water (W)

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266898-H

XENCO Laboratories

11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 266898-H

Serial #: 178522 Page 1 of 3

Company-City: Port of Houston Authority | Phone: 713-670-2440
TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCC Grant Project ☐Previously performed at XENCO | Site | Project ID

Proj. Manager (PM): Nicole Cass ncass@poha.com

Fax Results to ☐ PM or | Fax No:

e-mail to: PM & rsteinberg@deltaenv.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O

Bill to: Roxana Herrara

Quote No: | P.O No: | ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brock Signature: Kindra Brock

	Sample ID	Sampling Date	Time	Depth ft. in. m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	A3	5-31-06	1620		W		X	1	2	P	NA
2	A3	5-31-06	1620		W		X	1	5	P	
3	A4	5-31-06	1620		W		X	1	2	P	NA
4	A4	5-31-06	1620		W		X	1	1	G	
5	A4	5-31-06	1620		W		X	1	2	P	NA
6	A4	5-31-06	1620		W		X	1	5	P	
7	A5	5-31-06	1630		W		X	1	2	P	NA
8	A5	5-31-06	1630		W		X	1	1	G	
9	A5	5-31-06	1630		W		X	1	2	P	NA
10	A5	5-31-06	1630		W		X	1	5	P	

	BTEX by 8021	8260	602	624	Other
	BTEX-MTBE by 8021	8260	624	Other	
	TPH by TX1005	FL-Pro	1664	8015GRO	8015DRO	418.1
	PAHs by 8270	8310			
	Metals by 6020	200.8	8RCRA	Tot Pb	TCLP8	13PP	23TAL
	VOCs by 8021	8260	624	VOA	VOH	PPs	TCL
	SVOCs by 8270	625	PAHs	BN&A	TCL	PPs	
	FL Preburn - Revised:	Virgin	Non-Virgin				
1							
2							
3	X						
4		X					
5			X				
6				X			
7	X						
8		X					
9			X				
10				X			

TSS
O&G
Metals (Al, As, Ba, Cd, Cu, Cr, Fe, Pb, mn, Hg, Ni, Se, Ag, Sn)
Cyanide

	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L Wt. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved
1	X			
2	X			
3	X			
4	X			
5	X			
6	X			
7	X			
8	X			
9	X			
10	X			

Remarks

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	Kindra Brock	6-1-06 11:04		
2				
3			Lab:	6/1/06 11:04

Rush Charges are Pre-Approved upon requesting them.
Instructions.
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

266898-H

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 266898 -H

Serial #: 181632 Page 3 of 3

Company-City: Port of Houston Authority Phone: 713-670-2440
TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
h is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CC Grant Project ☐Previously performed at XENCO Site: Project ID:

Prof. Manager (PM): Nicole Cass ncass@poha.com

Fax Results to ☐ PM or e-mail to: pm4 rsteinberg@deltaenv.com Fax No:

Invoice to: ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O
Bill to: Lovana Herrera

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brock Signature: Kindra Brock

	Sample ID	Sampling Date	Time	Depth ft' in" m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	D2	5-31-06	1040		W		X	1	2	P	NA
2	D2	5-31-06	1040		W		X	1	1	G	S
3	D2	5-31-06	1040		W		X	1	2	P	N
4	D2	5-31-06	1040		W		X	1	5	P	A
5	Duplicate	5-31-06	1050		W		X	1	2	P	NA
6	Duplicate	5-31-06	1050		W		X	1	1	G	S
7	Duplicate	5-31-06	1050		W		X	1	2	P	N
8	Duplicate	5-31-06	1050		W		X	1	5	P	A
9											
10											

BTEX by 8021 8260 602 524 Other
BTEX-MTBE by 8021 8260 624 Other
TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1
PAHs by 8270 8310
Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL
VOCs by 8021 8260 624 VOA VOH PPs TCL
SVOCs by 8270 625 PAHs BN&A TCL PPs
FL Preburn - Revised: Virgin Non-Virgin

TSS
DRO
Metals (Al, Sb, As, Ba, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sn, Zn, V)
Cyanide

TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d
Addn: PAH above mg/L W, mg/Kg S Highest Hit
Hold Disposal Hold Analysis (Surcharges will apply)
Sample Clean-ups are pre-approved

Remarks

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	Kindra Brock	11:04 6-1-06		
2				
3			Lab:	6/1/06 1104

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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Analytical Report 267633

for

Port of Houston Authority

Project Manager: Nicole Cass

CCC Grant Project

27-JUN-06

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E87603 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

27-JUN-06

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **267633**
CCC Grant Project
Project Address: Houston

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Chain of Custody Numbered 267633. All results being reported under this Chain of Custody apply to the samples analyzed and properly identified with a Laboratory ID number.

The results for the quality control samples were reviewed. All parameters for data reduction and validation were reviewed. Estimation of Data uncertainity for this report is found in the quality control section of this report unless otherwise noted. In view of this, we are able to release the analytical data for this report within acceptance criteria for accuracy, precision, completeness or properly flagged. Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 267633 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 267633

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-19-06 11:19 am
Report Date: 27-JUN-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	267633-001		267633-002		267633-003		267633-004	
	Field Id:	A1		A2		A3		A4	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jun-19-06 09:00		Jun-19-06 09:15		Jun-19-06 09:10		Jun-19-06 09:05	
Metals by EPA 200.8	*Extracted:*	Jun-20-06 09:09		Jun-20-06 09:09		Jun-20-06 09:09		Jun-20-06 09:09	
	Analyzed:	Jun-20-06 20:09		Jun-20-06 20:24		Jun-20-06 20:28		Jun-20-06 20:32	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum		0.221	0.010	0.137	0.010	0.091	0.010	0.139	0.010
Arsenic		0.005	0.002	0.010	0.002	0.003	0.002	0.015	0.002
Barium		0.022	0.010	0.027	0.010	0.021	0.010	0.035	0.010
Cadmium		BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Copper		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Iron		BRL	0.200	BRL	0.200	BRL	0.200	BRL	0.200
Lead		BRL	0.002	BRL	0.002	BRL	0.002	BRL	0.002
Manganese		BRL	0.010	BRL	0.010	BRL	0.010	0.011	0.010
Mercury		BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Selenium		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Silver		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Zinc		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jun-21-06 17:04		Jun-21-06 17:06		Jun-21-06 17:08		Jun-21-06 17:10	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*								
	Analyzed:	Jun-20-06 19:20		Jun-20-06 19:22		Jun-20-06 19:24		Jun-20-06 19:26	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2		BRL	5.00	BRL	5.00	BRL	5.00	5.00	5.00
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:	Jun-21-06 14:20		Jun-21-06 14:22		Jun-21-06 17:00		Jun-21-06 17:02	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total		BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 267633

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jun-19-06 11:19 am
Report Date: 27-JUN-06
Project Manager: Debbie Simmons

Analysis Requested							
	Lab Id:	267633-005		267633-006			
	Field Id:	A5		TBT-12			
	Depth:						
	Matrix:	WATER		WATER			
	Sampled:	Jun-19-06 09:20		Jun-19-06 09:25			
Metals by EPA 200.8	*Extracted:*	Jun-20-06 09:09		Jun-20-06 09:09			
	Analyzed:	Jun-20-06 19:12		Jun-20-06 20:36			
	Units/RL:	mg/L	RL	mg/L	RL		
Aluminum		0.149	0.010	0.122	0.010		
Arsenic		0.007	0.002	0.008	0.002		
Barium		0.022	0.010	0.026	0.010		
Cadmium		BRL	0.001	BRL	0.001		
Chromium		BRL	0.010	BRL	0.010		
Copper		BRL	0.010	BRL	0.010		
Iron		BRL	0.200	BRL	0.200		
Lead		0.004	0.002	BRL	0.002		
Manganese		0.016	0.010	BRL	0.010		
Mercury		BRL	0.0004	BRL	0.0004		
Nickel		BRL	0.010	BRL	0.010		
Selenium		BRL	0.010	BRL	0.010		
Silver		BRL	0.010	BRL	0.010		
Zinc		BRL	0.010	BRL	0.010		
Oil and Grease by EPA 1664	*Extracted:*						
	Analyzed:	Jun-21-06 17:12		Jun-21-06 17:14			
	Units/RL:	mg/L	RL	mg/L	RL		
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00		
TSS by EPA 160.2	*Extracted:*						
	Analyzed:	Jun-20-06 19:28		Jun-20-06 19:30			
	Units/RL:	mg/L	RL	mg/L	RL		
TSS by EPA 160.2		BRL	5.00	BRL	5.00		
Total Cyanide by EPA 335.4	*Extracted:*						
	Analyzed:	Jun-21-06 17:04		Jun-21-06 17:06			
	Units/RL:	mg/L	RL	mg/L	RL		
Cyanide, Total		BRL	0.020	BRL	0.020		

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: CCC Grant Project

Work Order #: 267633 **Project ID:**

Lab Batch #: 680660 **Sample:** 485779-1-BKS **Matrix:** Water
Date Analyzed: 06/20/2006 **Date Prepared:** 06/20/2006 **Analyst:** MCH
Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	BLANK /BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Aluminum	<0.010	0.200	0.212	106	85-115	
Arsenic	<0.002	0.050	0.043	86	85-115	
Barium	<0.010	0.050	0.050	100	85-115	
Cadmium	<0.001	0.020	0.017	85	85-115	
Chromium	<0.010	0.050	0.046	92	85-115	
Copper	<0.010	0.050	0.051	102	85-115	
Iron	<0.200	0.200	0.180	90	85-115	
Lead	<0.002	0.050	0.046	92	85-115	
Manganese	<0.010	0.050	0.046	92	85-115	
Mercury	<0.0004	0.0010	0.0010	100	85-115	
Nickel	<0.010	0.050	0.051	102	85-115	
Selenium	<0.010	0.050	0.050	100	85-115	
Silver	<0.010	0.020	0.018	90	85-115	
Zinc	<0.010	0.050	0.047	94	85-115	

Lab Batch #: 680505 **Sample:** 680505-1-BKS **Matrix:** Water
Date Analyzed: 06/21/2006 **Date Prepared:** 06/21/2006 **Analyst:** AMB
Reporting Units: mg/L **Batch #:** 1

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	BLANK /BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Cyanide, Total	<0.020	0.200	0.173	87	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: CCC Grant Project

Work Order #: 267633 **Project ID:**

Analyst: AMB **Date Prepared:** 06/21/2006 **Date Analyzed:** 06/21/2006

Lab Batch ID: 680504 **Sample:** 680504-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	20.0	22.6	113	20.0	23.0	115	2	70-130	20	

Analyst: MAB **Date Prepared:** 06/20/2006 **Date Analyzed:** 06/20/2006

Lab Batch ID: 680436 **Sample:** 680436-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

TSS by EPA 160.2	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	899	90	1000.0	907	91	1	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: CCC Grant Project

Work Order # : 267633 **Project ID:**

Lab Batch ID: 680660 **QC- Sample ID:** 267633-005 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 06/20/2006 **Date Prepared:** 06/20/2006 **Analyst:** MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.149	0.200	0.323	87	0.200	0.323	87	0	85-115	25	
Arsenic	0.007	0.050	0.046	78	0.050	0.047	80	3	85-115	25	X
Barium	0.022	0.050	0.070	96	0.050	0.075	106	10	85-115	25	
Cadmium	<0.001	0.020	0.016	80	0.020	0.016	80	0	85-115	25	X
Chromium	<0.010	0.050	0.004	8	0.050	0.043	86	166	85-115	20	XF
Copper	<0.010	0.050	0.048	96	0.050	0.049	98	2	85-115	25	
Iron	<0.200	0.200	0.310	155	0.200	0.310	155	0	85-115	25	X
Lead	0.004	0.050	0.045	82	0.050	0.043	78	5	85-115	25	X
Manganese	0.016	0.050	0.051	70	0.050	0.051	70	0	85-115	25	X
Mercury	<0.0004	0.0010	0.0008	80	0.0010	0.0008	80	0	85-115	25	X
Nickel	<0.010	0.050	0.046	92	0.050	0.047	94	2	85-115	25	
Selenium	<0.010	0.050	0.036	72	0.050	0.036	72	0	85-115	25	X
Silver	<0.010	0.020	0.017	85	0.020	0.017	85	0	85-115	25	
Zinc	<0.010	0.050	0.042	84	0.050	0.041	82	2	85-115	25	X

Lab Batch ID: 680505 **QC- Sample ID:** 267699-001 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 06/21/2006 **Date Prepared:** 06/21/2006 **Analyst:** AMB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.166	83	0.200	0.163	82	1	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*(D-G)/(D+G)

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: CCC Grant Project

Work Order #: 267633

Lab Batch #: 680660 **Project ID:**
Date Analyzed: 06/20/2006 **Date Prepared:** 06/20/2006 **Analyst:** MCH
QC- Sample ID: 267633-005 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.149	0.141	6	25	
Arsenic	0.007	0.007	0	25	
Barium	0.022	0.026	17	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	20	
Copper	<0.010	<0.010	NC	25	
Iron	<0.200	<0.200	NC	25	
Lead	0.004	0.007	55	25	F
Manganese	0.016	<0.010	NC	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	<0.010	<0.010	NC	25	
Selenium	<0.010	<0.010	NC	25	
Silver	<0.010	<0.010	NC	25	
Zinc	<0.010	<0.010	NC	25	

Lab Batch #: 680436
Date Analyzed: 06/20/2006 **Date Prepared:** 06/20/2006 **Analyst:** MAB
QC- Sample ID: 267634-003 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	<5.00	NC	20	

Lab Batch #: 680505
Date Analyzed: 06/21/2006 **Date Prepared:** 06/21/2006 **Analyst:** AMB
QC- Sample ID: 267699-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
5767 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 267633-H

Serial #: 181797 Page 1 of 3

Company-City: Port of Houston Authority Phone: 713-670-2400

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
Typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCL Grunt Project 7 ☐Previously performed at XENCO Site: Project ID:

Proj. Manager (PM): Nicole Cass ncassa@pohha

Fax Results to ☐ PM or e-mail to: PM & RSteinberg@DeltaEnv.com Fax No:

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O
Bill to: Roxana Herrera

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brak Signature: Kindra Brak

	Sample ID	Sampling Date	Time	Depth ft/in/m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	A1	6-19-06	0900		W		X	1	2	P	NA
2	A1		0900					1	1	G	S
3	A1		0900					1	2	P	N
4	A1		0900					1	5	P	A
5	A2		0915					1	2	P	NA
6	A2		0915					1	1	G	S
7	A2		0915					1	2	P	N
8	A2		0915					1	5	P	A
9	A3		0910					1	2	P	NA
10	A3		0910					1	1	G	S

	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP 8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	
1								X	SS
2								X	D&G
3								X	Metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Zn, Cu)
4								X	Cyanide
5								X	
6								X	
7								X	
8								X	
9								X	
10								X	

	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved
1	X			
2				
3				
4				
5				
6				
7				
8				
9				
10				

Remarks

267633-H

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	Kindra Brak	11-19-6-19-06		
2				
3			Lab:	06/19/06 11:19

Rush Charges are Pre-Approved upon requesting them.

Instructions:

All XENCO Standard Terms and Conditions Apply

Containers Received: 25 Cooler Temperature: 2.0°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 267633-H

Serial #: 181796 Page 2 of 2 (10) 2 OF 3

Company-City: Port of Houston Authority Phone: 713 670-2440
Project Name: ☐ Previously performed at XENCO — Site
CC Grant project
Proj. Manager (PM): Nicole Cass NCass@POHA
Fax Results to: ☐ PM or — Fax No:
e-mail to: PM's LSteinberg@deltaEnvicom
Invoice to: ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O
Bill to: Lokana Herrara
Quote No: — P.O No: — ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:
Target DLs (DW CRDI TRRP QAPP MDLs See Lab PM Attached Call)
TRRP PCLs: Tier 1 Tier 2 Residential Industrial
LPST No.:(Required)
Sampler Name: Kindra Brock Signature: Kindra Brock

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project ID

	Sample ID	Sampling Date	Time	Depth ft in m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	A3	6-19-06	0910		W		X	1	2	P	N
2	A3		0910					1	5	P	A
3	A4		0905					1	2	P	NA
4	A4		0905					1	1	G	S
5	A4		0905					1	2	P	N
6	A4		0905					1	5	P	A
7	A5		0920					1	2	P	NA
8	A5		0920					1	1	G	S
9	A5		0920					1	2	P	N
10	A5		0920					1	5	P	A

	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	TSS	0&G	(As, Ag, Ba, Cd, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn, Sr)	Cyanide
1										X	X	
2												X
3									X			
4										X		
5											X	
6												X
7									X			
8										X		
9											X	
10												X

TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d
Addn: PAH above mg/L W mg/Kg S Highest Hit
Hold Disposal Hold Analysis (Surcharges will apply)
Sample Clean-ups are pre-approved

Remarks

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 Kindra Brock	11:19 6-19-06		
2			
3		Lab:	6/19/06 11:19

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: 10 Cooler Temperature: 2.0°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Ascc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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267633-H

XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY:

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

Serial #: 181792 Page 3 of 3

Company-City: Port Of Houston Authority Phone: 713/670 2446

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name ☐ Previously performed at XENCO: CCC Grant Project Site: Project ID:

Proj. Manager (PM): Nicole Cass ncass@POHA.com

Fax Results to ☐ PM or Fax No:

e-mail to: PM & RSteinberg@delta Env.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O

Bill to: Roxana Herrara

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brock Signature: Kindra Brock

	Sample ID	Sampling Date	Time	Depth ft in m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum - Revised: Virgin Non-Virgin	TSS	O&G	Metals (Al, As, Ba, Cd, Cu, Cr, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn)	Cyanide	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks	
1	ARB TBT-12	6-19-06	0925		W		X		2	G	NA									X				↓					1
2	TBT12	|	0925		|		|		1	G	S										X			|					2
3	TBT12	|	0925		|		|		2	P	N											X		|					3
4	TBT12	|	0925		|		|		5	P	A												X	|					4
5																														5
6																														6
7																														7
8																														8
9																														9
10																														10

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	Kindra Brock	11:19 6-19-06		6/19/06 11:19
2				
3			Lab:	6/19/06 11:19

Rush Charges are Pre-Approved upon requesting them.

Instructions:

All XENCO Standard Terms and Conditions Apply.

Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O)

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other ______ Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O)

Matrix: Air (A), Product (P), Solid(S), Water (W)

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Analytical Report 268300

for

Port of Houston Authority

Project Manager: Nicole Cass

CCC Grant Project

18-JUL-06

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E87603 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

18-JUL-06

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **268300**
CCC Grant Project
Project Address: Houston

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Chain of Custody Numbered 268300. All results being reported under this Chain of Custody apply to the samples analyzed and properly identified with a Laboratory ID number.

The results for the quality control samples were reviewed. All parameters for data reduction and validation were reviewed. Estimation of Data uncertainity for this report is found in the quality control section of this report unless otherwise noted. In view of this, we are able to release the analytical data for this report within acceptance criteria for accuracy, precision, completeness or properly flagged. Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 268300 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	268300-001		268300-002		268300-003		268300-004	
	Field Id:	A1		A1		A1		A1	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:35		Jul-05-06 15:35		Jul-05-06 15:35		Jul-05-06 15:35	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 17:43			
	Units/RL:					mg/L	RL		
Aluminum						0.084	0.010		
Arsenic						0.005	0.002		
Barium						0.043	0.010		
Cadmium						BRL	0.001		
Chromium						0.057	0.010		
Copper						BRL	0.010		
Iron						2.08	0.200		
Lead						BRL	0.002		
Manganese						BRL	0.010		
Mercury						0.0011	0.0004		
Nickel						0.055	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						BRL	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-10-06 11:16							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:30					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				BRL	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-10-06 15:08	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	268300-005		268300-006		268300-007		268300-008	
	Field Id:	A2		A2		A2		A2	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:30		Jul-05-06 15:30		Jul-05-06 15:30		Jul-05-06 15:30	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 17:47			
	Units/RL:					mg/L	RL		
Aluminum						0.110	0.010		
Arsenic						0.015	0.002		
Barium						0.046	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						1.55	0.200		
Lead						BRL	0.002		
Manganese						0.014	0.010		
Mercury						BRL	0.0004		
Nickel						0.042	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						BRL	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-10-06 11:18							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:32					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				BRL	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-10-06 15:16	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	268300-009		268300-010		268300-011		268300-012	
	Field Id:	A3		A3		A3		A3	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:25		Jul-05-06 15:25		Jul-05-06 15:25		Jul-05-06 15:25	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 17:51			
	Units/RL:					mg/L	RL		
Aluminum						0.231	0.010		
Arsenic						BRL	0.002		
Barium						0.031	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						1.02	0.200		
Lead						0.003	0.002		
Manganese						0.026	0.010		
Mercury						BRL	0.0004		
Nickel						0.028	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						0.013	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-10-06 11:20							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:34					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				14.0	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-10-06 15:18	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	268300-013		268300-014		268300-015		268300-016	
	Field Id:	A4		A4		A4		A4	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:40		Jul-05-06 15:40		Jul-05-06 15:40		Jul-05-06 15:40	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 17:55			
	Units/RL:					mg/L	RL		
Aluminum						0.096	0.010		
Arsenic						0.011	0.002		
Barium						0.048	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						1.71	0.200		
Lead						BRL	0.002		
Manganese						0.013	0.010		
Mercury						BRL	0.0004		
Nickel						0.046	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						BRL	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-18-06 11:06							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:36					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				BRL	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-10-06 15:20	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	268300-017		268300-018		268300-019		268300-020	
	Field Id:	A5		A5		A5		A5	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:50		Jul-05-06 15:50		Jul-05-06 15:50		Jul-05-06 15:50	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 18:10			
	Units/RL:					mg/L	RL		
Aluminum						0.132	0.010		
Arsenic						0.011	0.002		
Barium						0.046	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						1.63	0.200		
Lead						BRL	0.002		
Manganese						0.014	0.010		
Mercury						BRL	0.0004		
Nickel						0.043	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						BRL	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-18-06 11:08							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:38					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				7.00	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-10-06 15:22	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 268300

Port of Houston Authority, Houston, TX

Project Name: CCC Grant Project

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Jul-06-06 03:52 pm
Report Date: 18-JUL-06
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	268300-021		268300-022		268300-023		268300-024	
	Field Id:	TBT-12		TBT-12		TBT-12		TBT-12	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Jul-05-06 15:45		Jul-05-06 15:45		Jul-05-06 15:45		Jul-05-06 15:45	
Metals by EPA 200.8	*Extracted:*					Jul-07-06 09:25			
	Analyzed:					Jul-07-06 18:13			
	Units/RL:					mg/L	RL		
Aluminum						0.153	0.010		
Arsenic						0.005	0.002		
Barium						0.041	0.010		
Cadmium						BRL	0.001		
Chromium						BRL	0.010		
Copper						BRL	0.010		
Iron						1.44	0.200		
Lead						BRL	0.002		
Manganese						0.018	0.010		
Mercury						BRL	0.0004		
Nickel						0.038	0.010		
Selenium						BRL	0.010		
Silver						BRL	0.010		
Zinc						0.011	0.010		
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Jul-18-06 11:10							
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	*Extracted:*								
	Analyzed:			Jul-06-06 20:40					
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				5.00	5.00				
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:							Jul-11-06 13:52	
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: CCC Grant Project

Work Order #: 268300 **Project ID:**

Lab Batch #: 681342 **Sample:** 486257-1-BKS **Matrix:** Water
Date Analyzed: 07/07/2006 **Date Prepared:** 07/07/2006 **Analyst:** MCH
Reporting Units: mg/L **Batch #:** 1

BLANK /BLANK SPIKE RECOVERY STUDY

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Aluminum	<0.010	0.200	0.194	97	85-115	
Arsenic	0.002	0.050	0.054	108	85-115	
Barium	<0.010	0.050	0.056	112	85-115	
Cadmium	<0.001	0.020	0.022	110	85-115	
Chromium	<0.010	0.050	0.053	106	85-115	
Copper	<0.010	0.050	0.054	108	85-115	
Iron	<0.200	0.200	0.169	85	85-115	
Lead	<0.002	0.050	0.051	102	85-115	
Manganese	<0.010	0.050	0.051	102	85-115	
Mercury	<0.0004	0.0010	0.0011	110	85-115	
Nickel	<0.010	0.050	0.053	106	85-115	
Selenium	<0.010	0.050	0.054	108	85-115	
Silver	<0.010	0.020	0.022	110	85-115	
Zinc	<0.010	0.050	0.055	110	85-115	

Lab Batch #: 681308 **Sample:** 681308-1-BKS **Matrix:** Water
Date Analyzed: 07/10/2006 **Date Prepared:** 07/10/2006 **Analyst:** AMB
Reporting Units: mg/L **Batch #:** 1

BLANK /BLANK SPIKE RECOVERY STUDY

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Cyanide, Total	<0.020	0.200	0.166	83	80-120	

Lab Batch #: 681355 **Sample:** 681355-1-BKS **Matrix:** Water
Date Analyzed: 07/11/2006 **Date Prepared:** 07/11/2006 **Analyst:** AMB
Reporting Units: mg/L **Batch #:** 1

BLANK /BLANK SPIKE RECOVERY STUDY

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Cyanide, Total	<0.020	0.200	0.181	91	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: CCC Grant Project

Work Order #: 268300 **Project ID:**

Analyst: AMB **Date Prepared:** 07/10/2006 **Date Analyzed:** 07/10/2006

Lab Batch ID: 681268 **Sample:** 681268-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	20.0	23.9	120	20	23.6	118	2	70-130	20	

Analyst: AMB **Date Prepared:** 07/18/2006 **Date Analyzed:** 07/18/2006

Lab Batch ID: 681710 **Sample:** 681710-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	20.0	20.0	100	20	19.3	97	3	70-130	20	

Analyst: AMB **Date Prepared:** 07/06/2006 **Date Analyzed:** 07/06/2006

Lab Batch ID: 681165 **Sample:** 681165-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

TSS by EPA 160.2	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	935	94	1000	921	92	2	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: CCC Grant Project

Work Order # : 268300

Project ID:

Lab Batch ID: 681342 QC- Sample ID: 268251-002 S Batch #: 1 Matrix: Water

Date Analyzed: 07/07/2006 Date Prepared: 07/07/2006 Analyst: MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.039	0.200	0.154	58	0.200	0.139	50	15	75-125	25	X
Arsenic	0.073	0.050	0.116	86	0.050	0.120	94	9	75-125	25	
Barium	0.363	0.050	0.413	100	0.050	0.400	74	30	75-125	25	XF
Cadmium	<0.001	0.020	0.017	85	0.020	0.017	85	0	75-125	25	
Chromium	<0.010	0.050	0.039	78	0.050	0.036	72	8	75-125	25	X
Copper	<0.010	0.050	0.053	106	0.050	0.051	102	4	75-125	25	
Iron	8.63	0.200	9.37	370	0.200	9.55	460	22	75-125	25	X
Lead	0.005	0.050	0.046	82	0.050	0.045	80	2	75-125	25	
Manganese	0.043	0.050	0.078	70	0.050	0.073	60	15	75-125	25	X
Mercury	<0.0004	0.0010	0.0009	90	0.0010	0.0009	90	0	75-125	25	
Nickel	0.226	0.050	0.272	92	0.050	0.267	82	11	75-125	25	
Selenium	0.106	0.050	0.160	108	0.050	0.172	132	20	75-125	25	X
Silver	<0.010	0.020	0.016	80	0.020	0.015	75	6	75-125	25	
Zinc	0.012	0.050	0.045	66	0.050	0.043	62	6	75-125	25	X

Lab Batch ID: 681308 QC- Sample ID: 268300-004 S Batch #: 1 Matrix: Water

Date Analyzed: 07/10/2006 Date Prepared: 07/10/2006 Analyst: AMB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.162	81	0.200	0.163	82	1	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*(D-G)/(D+G)

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Form 3 - MS / MSD Recoveries

Project Name: CCC Grant Project

Work Order # : 268300 **Project ID:**

Lab Batch ID: 681355 **QC- Sample ID:** 268300-024 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 07/11/2006 **Date Prepared:** 07/11/2006 **Analyst:** AMB

Reporting Units: mg/L

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
Total Cyanide by EPA 335.4 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.189	95	0.200	0.189	95	0	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*(D-G)/(D+G)

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: CCC Grant Project

Work Order #: 268300

Lab Batch #: 681342 | Project ID:
Date Analyzed: 07/07/2006 | Date Prepared: 07/07/2006 | Analyst: MCH
QC- Sample ID: 268251-002 D | Batch #: 1 | Matrix: Water
Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.039	0.037	5	25	
Arsenic	0.073	0.073	0	25	
Barium	0.363	0.362	0	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	25	
Copper	<0.010	0.017	NC	25	
Iron	8.63	8.93	3	25	
Lead	0.005	0.004	22	25	
Manganese	0.043	0.042	2	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	0.226	0.229	1	25	
Selenium	0.106	0.118	11	25	
Silver	<0.010	<0.010	NC	25	
Zinc	0.012	0.012	0	25	

Lab Batch #: 681165
Date Analyzed: 07/06/2006 | Date Prepared: 07/06/2006 | Analyst: AMB
QC- Sample ID: 268228-001 D | Batch #: 1 | Matrix: Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	<5.00	NC	20	

Lab Batch #: 681165
Date Analyzed: 07/06/2006 | Date Prepared: 07/06/2006 | Analyst: AMB
QC- Sample ID: 268300-022 D | Batch #: 1 | Matrix: Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	5.00	5.00	0	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

Sample Duplicate Recovery

Project Name: CCC Grant Project

Work Order #: 268300

Lab Batch #: 681308 **Project ID:**
Date Analyzed: 07/10/2006 **Date Prepared:** 07/10/2006 **Analyst:** AMB
QC- Sample ID: 268300-004 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Lab Batch #: 681355
Date Analyzed: 07/11/2006 **Date Prepared:** 07/11/2006 **Analyst:** AMB
QC- Sample ID: 268300-024 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 268300-H

Serial #: 161764 Page 1 of 3

Company-City: Port Of Houston	Phone: 713-670-2440
Project Name: CCC Grant Project	☐ Previously performed at XENCO; Site; Project ID
Proj. Manager (PM): Nicole Cass ncass@poha	
Fax Results to ☐ PM or e-mail to: PM+ RSteinberg@dgtla.inv.com	Fax No:
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☑ Invoice must have a P.O Bill to: Loyanna Herrera	
Quote No:	P.O No: ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name: Kindra Brock Signature: Kindra Brock	

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

	Sample ID	Sampling Date	Time	Depth ft* in* m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	A1	7-5-06	15:35		W		X	1	1	G	S
2	A1		15:35					1	2	P	NA
3	A1		1535					1	2	P	N
4	A1		15.35					1	5	P	A
5	A2		1530					1	1	G	S
6	A2		1530					1	2	P	NA
7	A2		1530					1	2	P	N
8	A2		1530					1	5	P	A
9											
10											

Analysis	1	2	3	4	5	6	7	8
BTEX by 8021 8260 602 624 Other								
BTEX-MTBE by 8021 8260 624 Other								
TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1								
PAHs by 8270 8310								
Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL								
VOCs by 8021 8260 624 VOA VOH PPs TCL								
SVOCs by 8270 625 PAHs BN&A TCL PPs								
FL Prebum - Revised: Virgin Non-Virgin								
O&G	X							
Cyanide		X		X				
TSS			X					
Metals					X	X	X	X
TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	X	X	X	X	X	X	X	X
Addn: PAH above mg/L W. mg/Kg S Highest Hit								
Hold Disposal Hold Analysis (Surcharges will apply)								
Sample Clean-ups are pre-approved								

Remarks

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 Kindra Brock	7-6-06 1552		
2			
3		Lab:	7/6/06 19:52

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other 250ml (2) **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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268300-H

XENCO Laboratories

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☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 26830-H

Serial #: 161765 Page 1 of 3

Company-City: Port of Houston | Phone: 713-670-2416

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
TAT is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCC Grant Project ☐Previously performed at XENCO | Site | Project ID

Proj. Manager (PM): ncuss@poha Nicole Cass

Fax Results to ☒ PM ☐ | Fax No:

e-mail to: RSteinberg@deltaenv.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O

Bill to: Roxanna Herrera

Quote No: | P.O No: | ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brock Signature: Kindra Brock

	Sample ID	Sampling Date	Time	Depth ft in	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1634 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLPs 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Probum - Revised: Virgin Non-Virgin	08G	Cyanide	ASS	metals	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks
1	A3	7-5-06	1525		W		X	1	1	G	S									X				X				1
2	A3		1525					1	2	P	NA											X		X				2
3	A3		1525					1	2	P	N												X	X				3
4	A3		1525					1	5	P	A										X			X				4
5	A4		1540					1	1	G	S									X				X				5
6	A4		1540					1	2	P	NA											X		X				6
7	A4		1540					1	2	P	N												X	X				7
8	A4		1540					1	5	P	A										X			X				8
9																								X				9
10																												10

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 Kindra Brock	7-6-06 1552		
2			
3		Lab: [signature]	7/6/06 15:52

Rush Charges are Pre-Approved upon requesting them.

Instructions:

All XENCO Standard Terms and Conditions Apply.

Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool.<4C) (C), None (NA), See Label (L), Other (O) _____

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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26830-H

XENCO Laboratories

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ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

LAB ONLY: 268380-H

Serial #: 161763 Page 3 of 3

Company-City: Port of Houston Phone: 713-670-2440

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: CCL Grant Project ☐Previously performed at XENCO Site: Project ID:

Proj. Manager (PM): Nicole Cass ncass@PDha.com

Fax Results to ☒ PM or Fax No:

e-mail to: Pm & rsteinberg@deltaenv.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☒ Invoice must have a P.O

Bill to: Loyana Herrera

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Kindra Brock Signature: Kindra Brock

#	Sample ID	Sampling Date	Time	Depth ft in	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 (8260) 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1634 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum - Revised: Virgin Non-Virgin	0xG	Cyanide	TCLP Metals	TAT 5h 12h 24h 48h 3d 5d 7d (10d) 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Remarks: Sample Clean-ups are pre-approved
1	AS	7-5-04	1550		W		X	1	1	G	S									X			X			
2	AS		1550					1	2	P	NA										X		X			
3	AS		1550					1	2	P	N											X	X			
4	AS		1550					1	5	P	A										X		X			
5	TBT-12		1545					1	1	G	S									X			X			
6	TBT-12		1545					1	2	P	NA										X		X			
7	TBT-12		1545					1	2	P	N											X	X			
8	TBT-12		1545					1	5	P	A										X		X			
9																										
10																										

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 Kindra Brock	7-6-04 1552		
2			
3		Lab:	7/6/04 15:52

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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www.xenco.com

268380-H

11.0 Appendix C

11.1 Planting Plan

By: Benchmark Ecological Services, Inc

Coastal Coordination Council Phytoremediation Project
Planting Plan

1.0 Introduction

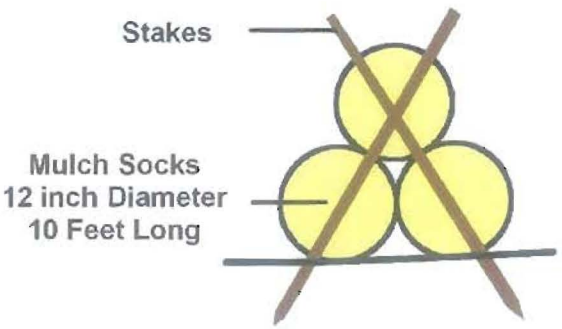
This document is to provide the planting strategy for the Coastal Coordination Council (CCC) Grant Project – Storm Water Phytoremediation Study being conducted by the Port of Houston Authority (PHA). The goal of the project is to establish wetland plants which, in conjunction with physical and biological filtration provided by mulch socks, will enhance storm water quality.

Benchmark Ecological Services, Inc. has been contracted by PHA to complete the design phase, install the mulch socks, plant the area, and monitor the inflow and outflow storm water quality at the project site. The location of this project is shown on Figure 1. The site selected for the study is a storm water ditch on PHA property.

2.0 Site Preparation

In order to restrain storm water flow in the ditch, two sets of mulch socks will be installed perpendicular to the flow direction. Each set will consist of three 12-inch diameter socks that will be installed in a pyramid configuration (Figure 2). Wooden or metal stakes will be used to hold the mulch socks in place. The mulch sock sets will be positioned such that the ditch area is divided into wetland segments. Existing grade and ditch contours will be considered when making final determinations for mulch sock location to maximize the efficiency of the mulch sock barriers for storm water velocity control, wetland plant habitat enhancement, and physical and biological filtration by the socks. The goal will be to position the downstream set of mulch socks as close to the project discharge as possible, and to place second set as close as possible midway between the first set and the upstream road intersection.

Figure 2- Mulch Sock Cross-Sectional Diagram



Prior to planting, herbicide will be applied to the species currently growing in the planting area.

N

★ **Phytoremediation Site**

Notes

Microsoft Streets and Trips ®

Study Area

Port of Houston Authority

Coastal Coordination Council

BESI Benchmark Ecological Services, Inc.

Project: CCC_Area_Location
Date: 02/22/07

Figure 1

3.0 Wetland Plant Selection

The anticipated intermittent wetting/drying within the planting area limits the suitable plant species to those adapted to similar natural habitats. In addition to growing well under the site environmental conditions, species selection will be limited to plants that tend to establish dense stands. Higher plant density will ensure maximum surface area for microbial colonization and maximize suspended particulate filtration within the planting beds. The microbes will augment biofiltration of dissolved organics and nutrients. Since some of the known contaminants previously documented in the site stormwater are suspected to be bound to suspended particulates, it is desirable to maximize physical filtration by the plants and mulch socks. The other critical trait necessary for selected species is rapid establishment due to project time constraints and the need for plants to rebound quickly following long dry periods.

Plant species currently being considered for planting include:

- Maidencane (*Panicum hemitomum*)
- Mountain spikerush (*Eleocharis montana*)
- Sand spikerush (*Eleocharis montevidensis*)
- Squarestem spikerush (*Eleocharis quadrangulata*
- Common spikerush (*Eleocharis palustris*)
- Dwarf spikerush (*Eleocharis parvula*)
- Arrowhead (*Sagittaria spp.*)
- Softrush (*Juncus effusus*)
- Jointed flatsedge (*Cyperus articulatus*)

Some combination of the above listed wetland plants will be planted. Multiple species that tend to be "less wet" may also be planted at elevations above the wetland species. Since the ditch is relatively narrow and is not expected to be continuously wet, it is uncertain how successful the development of the wetland species will be. It is felt that the more transitional plants may ultimately dominate on at least a portion of the planted area and provide the desired contaminant removal functions. Species being considered are Bushy bluestem (*Andropogon glomeratus*), Eastern gamagrass (*Tripsacum dactyloides*), and Vassey grass. Additional wetland and transitional plant species will be considered, depending on availability at the time of planting. Actual species transplanted will be recorded for future reporting.

4.0 Planting Plan

The selected species will be harvested from local habitats and/or nursery stock and transplanted within 24 hours of harvest. Plants will be harvested as plugs with multiple culms and roots still attached. Plugs will be stored and transported in tubs, buckets, and/or plastic bags so that they are protected from dehydration, freezing, and wind damage. All plants will be sprigged

averaging one plug per foot. Shovels, dibbles, or other devices will be used to create soil depressions. Plugs will be inserted into the depression such that the roots are below the mud line. Light tamping around each plug will help minimize uprooting by flowing water. Figure 3 shows a conceptual layout of a planting bed.

5.0 Plant Maintenance

Plants will be periodically monitored to document survival and stand development. Supplemental watering will be conducted as needed during extended dry periods.

N

0 25 50 Feet

Mulch Socks

Planting Area

Notes

HGAC 2004 Aerial

Phytoremediation Planting Area

Port of Houston Authority

Coastal Coordination Council

BESI Benchmark Ecological Services, Inc.

Project: CCC area project_BESI.mxd

Date: 02/22/07

Figure 3

M:\11111\Proposals\pha\Informal 11410\Arc\Pha_Data\CCC Area Project_BESI.mxd

12.0 Appendix D

12.1 Site Photographs

Installation of Mulch Socks

Mulch Socks

Mulch Socks and Rope Barricade

Rope Barricade and Sign

BESI Benchmark

PHA-CCC
Phytoremedition
A-1

Wetland Vegetation Planting- 3/02/2007

BESI Benchmark Biological Services Inc.

PHA-CCC
Phytoremedition
A-2

Study Area 3/12/2007

Study Area 6/12/2007

Study Area 7/18/2007

Study Area 7/18/2007

BESI Benchmark	PHA-CCC
	Phytoremedition
	A-3

Tanks Used to Irrigate the Study Area (March 6, 2007)

Irrigation of the Study Area

Water Sampling

Sample Area A

13.0 Appendix E

13.1 Sampling Forms

STORMWATER SAMPLING EVENT DATA FORM

Event Description:
1st event Phytoremediation Study

Fill this out when sampling is conducted. This is an internal record of your laboratory submission and it shows how your sample collection is compliant with the storm water rules.

Time since the last measurable rainfall event (i.e., the most recent one that occurred before the one being sampled now - must be greater than 72 hours)	772 hours
Name of sampler:	Neil Henthorne
Date of sampling:	3-12-07
Time at which rainfall began:	~0600
Time at which discharge began:	
Time at which sample was taken:	1215
Total amount of rainfall for this event: (note that you must remember to check your rain gauge after the rain event is concluded)	
Describe condition of sampling site: • Is there visual evidence of contamination, such as sheen, debris, or muddiness? • Are odors present?	Yes / (No) Explain Yes / (No) Explain

Other notes and observations (it is important to record all outfall conditions as they may influence your sample results! Continue on reverse side of this sheet if necessary)
Sampled 8 of the 10 samples

Laboratory where samples delivered	Xenco
Date Delivered (or picked up by lab): NOTE: Samples need to be delivered to lab within 24hrs of collection.	
Copy of Chain of Custody attached to this sheet? (circle)	(Yes) / No

XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston, TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY:

Serial #: 204359 Page 1 of 1

Company-City: Benchmark Ecological Services	Phone: 281 471 3103
Project Name: PHA Phytoremediation Study ☐ Previously performed at XENCO	Site: PHA
Proj. Manager (PM): Neil Heathcote / Nicole Cass	
Fax Results to ☐ PM or e-mail to: nheathcote@benchmarkeco.com	Fax No:
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O Bill to: PHA	
Quote No:	P.O No: ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name: Neil Heathcote Signature:	

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data. PHA Std TAT

	Sample ID	Sampling Date	Time	Depth (ft / in / m)	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	O&G Grease	TSS	Arsenic, Barium, Cadmium	Chromium, Copper, Cyanide	Iron, Lead, Manganese	Mercury, Nickel, Selenium	Silver, Zinc							TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	Remarks	
1	PRS-0001	3-12-07	1215	Surface	W		X	3			HCl									X	X	X	X	X	X	X													
2	PRS-0002		1225				X	3												X	X	X	X	X	X	X													
3	PRS-0003		1227				X	3												X	X	X	X	X	X	X													
4	PRS-0004		1234				X	3												X	X	X	X	X	X	X													
5	PRS-0005		1231				X	3												X	X	X	X	X	X	X													
6	PRS-0006		1234				X	3												X	X	X	X	X	X	X													
7	PRS-0007		1237				X	3												X	X	X	X	X	X	X													
8	PRS-0008		1240				X	3												X	X	X	X	X	X	X													
9	PRS-0009		1243				X	3												X	X	X	X	X	X	X													
10																																						

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 N. Heathcote NH	3.12.07 1622		
2			3/12/07 16:22
3		Lab:	3/12/07 16.22

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Ascb Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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STORMWATER SAMPLING EVENT DATA FORM

Event Description: 2ND event Phytoremediation Study

Fill this out when sampling is conducted. This is an internal record of your laboratory submission and it shows how your sample collection is compliant with the storm water rules.

Time since the last measurable rainfall event (i.e., the most recent one that occurred before the one being sampled now - must be greater than 72 hours)	> 72 hours
Name of sampler:	Meagan Atkinson, Brett Sandor
Date of sampling:	5/22/07
Time at which rainfall began:	~ 0600
Time at which discharge began:	
Time at which sample was taken:	0930
Total amount of rainfall for this event: (note that you must remember to check your rain gauge after the rain event is concluded)	
Describe condition of sampling site: • Is there visual evidence of contamination, such as sheen, debris, or muddiness? • Are odors present?	Yes / (No) Explain Yes / (No) Explain

Other notes and observations (it is important to record all outfall conditions as they may influence your sample results! Continue on reverse side of this sheet if necessary)

Laboratory where samples delivered	Xenco
Date Delivered (or picked up by lab): NOTE: Samples need to be delivered to lab within 24hrs of collection	
Copy of Chain of Custody attached to this sheet? (circle)	(Yes) / No

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston, TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY:

Serial #: 204363 Page of

Company-City / Phone	Benchmark Ecological Services 281-999-3103
TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.	PM ctd
Project Name ☐Previously performed at XENCO / Site	Baseline Sediment Study / PHA
Project ID	
Proj. Manager (PM)	Nat Hamilton / Nicole Cass
Fax Results to ☐ PM or / Fax No:	
e-mail to:	nhamilton@benchmarkeco.com
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O	
Bill to:	PHA
Quote No: / P.O No: / ☐ Call for a P.O.	
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name / Signature	Morgan Arellano

	Sample ID	Sampling Date	Time	Depth ft in m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021	BTEX-MTBE by 8021	TPH by TX1005	PAHs by 8270	Metals by 6020	VOCs by 8021	SVOCs by 8270	FL Preburn - Revised: Virgin																TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Sample Clean-ups are pre-approved	
												8260 602 624 Other	8260 602 624 Other	FL-Pro 1664 8015GRO 8015DRO 418.1	8310	200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	8260 624 VOA VOH PPs TCL	625 PAHs BN&A TCL PPs	Non-Virgin	9012 Grease	TSS	Aluminum Cadmium	Chromium Copper Cyanide	Iron Lead Nickel	Silver Zinc												
1	FBS-0010	5/21/12	0933		W		X	3												X	X	X	X	X	X	X	X										
2	-0011		0935				X	3												X	X	X	X	X	X	X											
3	-0014		0936				X	3												X	X	X	X	X	X												
4	-0015		0942				X	3												X	X	X	X	X	X	X											
5	-0016		0948				X	3												X	X	X	X	X	X	X											
6	-0017		0951				X	3												X	X	X	X	X	X	X											
7	-0018		0954				X	3												X	X	X	X	X	X	X											
8	-0019		0958				X	3												X	X	X	X	X	X	X											
9	-0020		1003				X	3												X	X	X	X	X	X	X											
10																																						

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 MA	5/21/12 11:22		
2			
3		Lab:	5/21/12 11:22

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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STORMWATER SAMPLING EVENT DATA FORM

Event Description: 3rd event

Fill this out when sampling is conducted. This is an internal record of your laboratory submission and it shows how your sample collection is compliant with the storm water rules.

Time since the last measurable rainfall event (i.e., the most recent one that occurred before the one being sampled now - must be greater than 72 hours)	72 hours
Name of sampler:	Neil Hentharne
Date of sampling:	8/16/07
Time at which rainfall began:	~ 0730
Time at which discharge began:	~ 0900
Time at which sample was taken:	1145
Total amount of rainfall for this event: (note that you must remember to check your rain gauge after the rain event is concluded)	3-4 inches
Describe condition of sampling site:	
• Is there visual evidence of contamination, such as sheen, debris, or muddiness?	(Yes) / No — Explain
• Are odors present?	Yes / (No) — Explain

Other notes and observations (it is important to record all outfall conditions as they may influence your sample results! Continue on reverse side of this sheet if necessary)

The water coming out of the pipe next to A3 was light brown. Water coming from A1 & A4 ~~is~~ was relatively clear.

Laboratory where samples delivered	Xenco
Date Delivered (or picked up by lab): NOTE: Samples need to be delivered to lab within 24hrs of collection.	8-16-07
Copy of Chain of Custody attached to this sheet? (circle)	(Yes) / No

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

LAB ONLY:

Serial #: 183617 Page of

Company-City: Benchmark Ecological Services Phone: 281 534-3468

TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: PHA Phytoremediation Study ☐ Previously performed at XENCO Site: Project ID:

Proj. Manager (PM): Neil Heathorne / Nicole Cass

Fax Results to ☐ PM or Fax No:
e-mail to: nheathorne@benchmarkeco.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O
Bill to: Nicole Cass PHA

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Neil Heathorne Signature: N. Heathorne

	Sample ID	Sampling Date	Time	Depth ft in m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	PRS-0021	8-16-07	1145	Surface	W		X	3			SW
2	-0022		1148					3			
3	-0023		1150					3			
4	-0024		1155					3			
5	-0025		1205					3			
6	-0026		1210					3			
7	-0027		1215					3			
8	-0028		1220					3			
9	-0029		1225					3			
10	-0030		1230					3			

BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Preburn - Revised: Virgin Non-Virgin	Old Grave, TSS	Arsenic, Barium, Cadmium	Chromium, Copper, Cyanide	Iron, Lead, Manganese	Mercury, Nickel, Selenium	Silver, Zinc									
								X	X	X	X	X	X									

TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d | Addn: PAH above mg/L W, mg/Kg S Highest Hit | Hold Disposal Hold Analysis (Surcharges will apply) | Sample Clean-ups are pre-approved

Remarks

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 N. Heathorne	8-16-07 1440		
2			
3		Lab:	8/16/07 14:40

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston, TX 77082 **281-589-0592**
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 **210-509-3334**
☐ 9700 Harry Hines Blvd., Dallas, TX 75220 **972-902-0300**

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 **305-823-8500**
☐ 3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 **813-620-2000**

LAB ONLY:

Serial #: 204624 Page of

Company-City: Benchmark Ecological Services **Phone:** 281-534 3403

TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name ☑Previously performed at XENCO **Site** **Project ID**
PHA Phytoremediation Study

Proj. Manager (PM): Neil Hawthorne / Nicole Cass

Fax Results to ☐ PM or **Fax No:**
e-mail to: nhawthorne@benchmarkeco.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O
Bill to: PHA

Quote No: **P.O No:** ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name Neil Hawthorne **Signature**

	Sample ID	Sampling Date	Time	Depth ft' In" m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives
1	PRS-0031	8/16-07	1230		W		X	3			HN
2											
3											
4											
5											
6											
7											
8											
9											
10											

BTEX by 8021 8260 602 624 Other
BTEX-MTBE by 8021 8260 624 Other
TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1
PAHs by 8270 8310
Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL
VOCs by 8021 8260 624 VOA VOH PPs TCL
SVOCs by 8270 625 PAHs BN&A TCL PPs
FL Preburn - Revised: Virgin Non-Virgin
Old Grade TSS
Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Zinc
TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d
Addn: PAH above mg/L W, mg/Kg S Highest Hit
Hold Disposal Hold Analysis (Surcharges will apply)
Sample Clean-ups are pre-approved

Remarks

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	NH	8-16-07 1440		
2				
3			Lab:	8/16/07 1440

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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14.0 Appendix F

14.1 Post-installation Analytical Results

Analytical Report 278924

for

Port of Houston Authority

Project Manager: Nicole Cass

PHA Phytoremediation Study

28-MAR-07

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NELAC certification numbers:
Houston, TX E87603 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

28-MAR-07

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **278924**
PHA Phytoremediation Study
Project Address: PHA

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 278924. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 278924 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

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Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: Mar-12-07 04:22 pm
Report Date: 28-MAR-07
Project Manager: Debbie Simmons

Analysis Requested									
	Lab Id:	278924-001		278924-002		278924-003		278924-004	
	Field Id:	PRS-0001		PRS-0002		PRS-0003		PRS-0004	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Mar-12-07 12:15		Mar-12-07 12:25		Mar-12-07 12:27		Mar-12-07 12:29	
Metals by EPA 200.8	*Extracted:*	Mar-19-07 10:47		Mar-19-07 10:47		Mar-19-07 10:47		Mar-19-07 10:47	
	Analyzed:	Mar-19-07 16:26		Mar-19-07 16:44		Mar-19-07 16:48		Mar-19-07 16:51	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum		0.108	0.010	0.109	0.010	0.262	0.010	0.150	0.010
Arsenic		0.009	0.002	0.019	0.002	0.008	0.002	BRL	0.002
Barium		0.072	0.010	0.083	0.010	0.064	0.010	0.056	0.010
Cadmium		BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium		0.017	0.010	BRL	0.010	BRL	0.010	0.010	0.010
Copper		0.010	0.010	0.014	0.010	0.015	0.010	0.011	0.010
Iron		0.793	0.200	0.560	0.200	0.680	0.200	1.30	0.200
Lead		0.002	0.002	BRL	0.002	0.003	0.002	0.009	0.002
Manganese		0.021	0.010	0.015	0.010	0.042	0.010	0.095	0.010
Mercury		BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Selenium		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Silver		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Zinc		0.019	0.010	0.012	0.010	0.025	0.010	0.052	0.010
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Mar-16-07 18:00		Mar-16-07 18:02		Mar-16-07 18:04		Mar-16-07 18:06	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*								
	Analyzed:	Mar-15-07 18:00		Mar-15-07 18:02		Mar-15-07 18:04		Mar-15-07 18:06	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2		21.0	5.00	12.0	5.00	13.0	5.00	50.0	5.00
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:	Mar-16-07 16:28		Mar-16-07 16:30		Mar-16-07 16:32		Mar-16-07 16:34	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total		BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: Mar-12-07 04:22 pm
Report Date: 28-MAR-07
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	278924-005		278924-006		278924-007		278924-008	
	Field Id:	PRS-0005		PRS-0006		PRS-0007		PRS-0008	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Mar-12-07 12:31		Mar-12-07 12:34		Mar-12-07 12:37		Mar-12-07 12:40	
Metals by EPA 200.8	*Extracted:*	Mar-19-07 10:47		Mar-19-07 11:40		Mar-19-07 11:40		Mar-19-07 11:40	
	Analyzed:	Mar-19-07 16:55		Mar-19-07 21:48		Mar-19-07 22:25		Mar-19-07 22:30	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum		0.470	0.010	0.415	0.010	0.391	0.010	0.420	0.010
Arsenic		BRL	0.002	BRL	0.002	BRL	0.002	BRL	0.002
Barium		0.036	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Cadmium		BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Copper		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Iron		0.789	0.200	0.390	0.200	0.310	0.200	0.350	0.200
Lead		0.005	0.002	BRL	0.002	BRL	0.002	BRL	0.002
Manganese		0.048	0.010	0.036	0.010	0.017	0.010	0.019	0.010
Mercury		BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Selenium		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Silver		BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Zinc		0.037	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Mar-16-07 18:08		Mar-16-07 18:10		Mar-16-07 18:18		Mar-16-07 18:20	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*								
	Analyzed:	Mar-15-07 18:08		Mar-15-07 18:10		Mar-15-07 18:12		Mar-15-07 18:14	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2		19.0	5.00	27.0	5.00	23.0	5.00	18.0	5.00
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:	Mar-16-07 16:36		Mar-16-07 16:38		Mar-16-07 16:40		Mar-16-07 16:42	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total		BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

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Managing Director, Texas

Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: Mar-12-07 04:22 pm
Report Date: 28-MAR-07
Project Manager: Debbie Simmons

Analysis Requested			
	Lab Id:	278924-009	
	Field Id:	PRS-0009	
	Depth:		
	Matrix:	WATER	
	Sampled:	Mar-12-07 12:43	
Metals by EPA 200.8	*Extracted:*	Mar-19-07 11:40	
	Analyzed:	Mar-19-07 22:34	
	Units/RL:	mg/L	RL
Aluminum		0.229	0.010
Arsenic		BRL	0.002
Barium		0.033	0.010
Cadmium		BRL	0.001
Chromium		BRL	0.010
Copper		BRL	0.010
Iron		0.280	0.200
Lead		BRL	0.002
Manganese		0.025	0.010
Mercury		BRL	0.0004
Nickel		BRL	0.010
Selenium		BRL	0.010
Silver		BRL	0.010
Zinc		BRL	0.010
Oil and Grease by EPA 1664	*Extracted:*		
	Analyzed:	Mar-16-07 18:22	
	Units/RL:	mg/L	RL
Oil & Grease, Total Recovered		5.33	5.00
TSS by EPA 160.2	*Extracted:*		
	Analyzed:	Mar-15-07 18:16	
	Units/RL:	mg/L	RL
TSS by EPA 160.2		17.0	5.00
Total Cyanide by EPA 335.4	*Extracted:*		
	Analyzed:	Mar-16-07 16:44	
	Units/RL:	mg/L	RL
Cyanide, Total		BRL	0.020

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Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 278924 **Project ID:**

Lab Batch #: 693519 **Sample:** 493258-1-BKS **Matrix:** Water

Date Analyzed: 03/19/2007 **Date Prepared:** 03/19/2007 **Analyst:** MCH

Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
	BLANK /BLANK SPIKE RECOVERY STUDY					
Aluminum	0.011	0.200	0.201	95	85-115	
Arsenic	<0.002	0.050	0.055	110	85-115	
Barium	<0.010	0.050	0.051	102	85-115	
Cadmium	<0.001	0.020	0.021	105	85-115	
Chromium	<0.010	0.050	0.057	114	85-115	
Copper	<0.010	0.050	0.057	114	85-115	
Iron	<0.200	0.200	0.176	88	85-115	
Lead	<0.002	0.050	0.055	110	85-115	
Manganese	<0.010	0.050	0.055	110	85-115	
Mercury	<0.0004	0.0010	0.0010	100	85-115	
Nickel	<0.010	0.050	0.050	100	85-115	
Selenium	<0.010	0.050	0.055	110	85-115	
Silver	<0.010	0.020	0.020	100	85-115	
Zinc	<0.010	0.050	0.053	106	85-115	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

Blank Spike Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 278924 **Project ID:**

Lab Batch #: 693565 **Sample:** 493259-1-BKS **Matrix:** Water
Date Analyzed: 03/19/2007 **Date Prepared:** 03/19/2007 **Analyst:** MCH
Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
	BLANK /BLANK SPIKE RECOVERY STUDY					
Aluminum	<0.010	0.200	0.196	98	85-115	
Arsenic	<0.002	0.050	0.049	98	85-115	
Barium	<0.010	0.050	0.050	100	85-115	
Cadmium	<0.001	0.020	0.019	95	85-115	
Chromium	<0.010	0.050	0.046	92	85-115	
Copper	<0.010	0.050	0.045	90	85-115	
Iron	<0.200	0.200	0.180	90	85-115	
Lead	<0.002	0.050	0.048	96	85-115	
Manganese	<0.010	0.050	0.048	96	85-115	
Mercury	<0.0004	0.0010	0.0011	110	85-115	
Nickel	<0.010	0.050	0.045	90	85-115	
Selenium	<0.010	0.050	0.054	108	85-115	
Silver	<0.010	0.020	0.018	90	85-115	
Zinc	<0.010	0.050	0.044	88	85-115	

Lab Batch #: 693521 **Sample:** 693521-1-BKS **Matrix:** Water
Date Analyzed: 03/16/2007 **Date Prepared:** 03/16/2007 **Analyst:** MAB
Reporting Units: mg/L **Batch #:** 1

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
	BLANK /BLANK SPIKE RECOVERY STUDY					
Cyanide, Total	<0.020	0.200	0.197	99	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order #: 278924 **Project ID:**

Analyst: AMB **Date Prepared:** 03/16/2007 **Date Analyzed:** 03/16/2007

Lab Batch ID: 693470 **Sample:** 693470-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
Oil and Grease by EPA 1664 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	40.0	36.3	91	40.0	31.5	79	14	70-130	20	

Analyst: AMB **Date Prepared:** 03/16/2007 **Date Analyzed:** 03/16/2007

Lab Batch ID: 693472 **Sample:** 693472-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
Oil and Grease by EPA 1664 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	40.0	36.4	91	40.0	35.5	89	2	70-130	20	

Analyst: KHM **Date Prepared:** 03/15/2007 **Date Analyzed:** 03/15/2007

Lab Batch ID: 693403 **Sample:** 693403-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
TSS by EPA 160.2 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	944	94	1000.0	964	96	2	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order # : 278924 Project ID:

Lab Batch ID: 693519 QC- Sample ID: 279246-003 S Batch #: 1 Matrix: Water

Date Analyzed: 03/19/2007 Date Prepared: 03/19/2007 Analyst: MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.036	0.200	0.295	130	0.200	0.291	128	2	75-125	25	X
Arsenic	<0.002	0.050	0.057	114	0.050	0.057	114	0	75-125	25	
Barium	0.140	0.050	0.189	98	0.050	0.192	104	6	75-125	25	
Cadmium	<0.001	0.020	0.021	105	0.020	0.021	105	0	75-125	25	
Chromium	<0.010	0.050	0.062	124	0.050	0.062	124	0	75-125	25	
Copper	<0.010	0.050	0.056	112	0.050	0.055	110	2	75-125	25	
Iron	1.45	0.200	1.65	100	0.200	1.67	110	10	75-125	25	
Lead	<0.002	0.050	0.057	114	0.050	0.058	116	2	75-125	25	
Manganese	0.189	0.050	0.187	0	0.050	0.181	0	NC	75-125	25	X
Mercury	<0.0004	0.0010	0.0011	110	0.0010	0.0011	110	0	75-125	25	
Nickel	0.014	0.050	0.069	110	0.050	0.070	112	2	75-125	25	
Selenium	<0.010	0.050	0.062	124	0.050	0.061	122	2	75-125	25	
Silver	<0.010	0.020	0.020	100	0.020	0.019	95	5	75-125	25	
Zinc	<0.010	0.050	0.056	112	0.050	0.053	106	6	75-125	25	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*(D-G)/(D+G)

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Form 3 - MS / MSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order # : 278924 **Project ID:**

Lab Batch ID: 693565 **QC- Sample ID:** 278924-006 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 03/19/2007 **Date Prepared:** 03/19/2007 **Analyst:** MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.415	0.200	0.631	108	0.200	0.636	111	3	85-115	25	
Arsenic	<0.002	0.050	0.033	66	0.050	0.035	70	6	85-115	25	X
Barium	<0.010	0.050	0.052	104	0.050	0.053	106	2	85-115	25	
Cadmium	<0.001	0.020	0.007	35	0.020	0.007	35	0	85-115	25	X
Chromium	<0.010	0.050	0.038	76	0.050	0.038	76	0	85-115	20	X
Copper	<0.010	0.050	0.035	70	0.050	0.036	72	3	85-115	25	X
Iron	0.390	0.200	0.660	135	0.200	0.660	135	0	85-115	25	X
Lead	<0.002	0.050	0.040	80	0.050	0.040	80	0	85-115	25	X
Manganese	0.036	0.050	0.080	88	0.050	0.081	90	2	85-115	25	
Mercury	<0.0004	0.0010	0.0011	110	0.0010	0.0012	120	9	85-115	25	X
Nickel	<0.010	0.050	0.031	62	0.050	0.031	62	0	85-115	25	X
Selenium	<0.010	0.050	0.039	78	0.050	0.041	82	5	85-115	25	X
Silver	<0.010	0.020	0.013	65	0.020	0.013	65	0	85-115	25	X
Zinc	<0.010	0.050	0.047	94	0.050	0.049	98	4	85-115	25	

Lab Batch ID: 693521 **QC- Sample ID:** 278896-001 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 03/16/2007 **Date Prepared:** 03/16/2007 **Analyst:** MAB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.201	101	0.200	0.201	101	0	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*(D-G)/(D+G)

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 278924

Lab Batch #: 693519 **Project ID:**

Date Analyzed: 03/19/2007 **Date Prepared:** 03/19/2007 **Analyst:** MCH

QC- Sample ID: 279246-003 D **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.036	0.029	22	25	
Arsenic	<0.002	0.002	NC	25	
Barium	0.140	0.136	3	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	25	
Copper	<0.010	<0.010	NC	25	
Iron	1.45	1.40	4	25	
Lead	<0.002	<0.002	NC	25	
Manganese	0.189	0.179	5	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	0.014	0.012	15	25	
Selenium	<0.010	<0.010	NC	25	
Silver	<0.010	<0.010	NC	25	
Zinc	<0.010	<0.010	NC	25	

Spike Relative Difference RPD 200 * |(B-A)/(B+A)|
All Results are based on MDL and validated for QC purposes.

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 278924

Lab Batch #: 693565 **Project ID:**
Date Analyzed: 03/19/2007 **Date Prepared:** 03/19/2007 **Analyst:** MCH
QC- Sample ID: 278924-006 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.415	0.495	18	25	
Arsenic	<0.002	<0.002	NC	25	
Barium	<0.010	0.012	NC	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	20	
Copper	<0.010	<0.010	NC	25	
Iron	0.390	0.520	29	25	F
Lead	<0.002	0.002	NC	25	
Manganese	0.036	0.043	18	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	<0.010	<0.010	NC	25	
Selenium	<0.010	<0.010	NC	25	
Silver	<0.010	<0.010	NC	25	
Zinc	<0.010	0.012	NC	25	

Lab Batch #: 693470
Date Analyzed: 03/16/2007 **Date Prepared:** 03/16/2007 **Analyst:** AMB
QC- Sample ID: 278897-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Oil and Grease by EPA 1664	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	9.49	9.75	3	20	

Lab Batch #: 693403
Date Analyzed: 03/15/2007 **Date Prepared:** 03/15/2007 **Analyst:** KHM
QC- Sample ID: 278909-002 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	<5.00	NC	20	

Spike Relative Difference RPD 200 * |(B-A)/(B+A)|
All Results are based on MDL and validated for QC purposes.

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 278924

Lab Batch #: 693403 **Project ID:**

Date Analyzed: 03/15/2007 **Date Prepared:** 03/15/2007 **Analyst:** KHM

QC- Sample ID: 278924-009 D **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	17.0	16.0	6	20	

Lab Batch #: 693521

Date Analyzed: 03/16/2007 **Date Prepared:** 03/16/2007 **Analyst:** MAB

QC- Sample ID: 278896-001 D **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

11381 Meadowglen, Suite L, Houston, TX 77082 281-589-0692
5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300
5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 278924-H

Serial #: 204359 Page 1 of 1

Company-City: Benchmark Ecological Services | Phone: 281 934 3903

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific. PHA Std TAT
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: PHA Phytoremediation Study ☐Previously performed at XENCO | Site: PHA | Project ID:

Proj. Manager (PM): Neil Henthorne / Nicole Cass

Fax Results to ☐ PM or Fax No:

e-mail to: nhenthorne@benchmarkeco.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O

Bill to: PHA

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Neil Henthorne Signature:

	Sample ID	Sampling Date	Time	Depth ft In m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum - Revised: Virgin Non-Virgin	Oil & Grease	TSS	Arsenic, Barium, Cadmium	Chromium, Copper, Cyanide	Iron, Lead, Manganese	Mercury, Nickel, Selenium	Silver, Zinc	TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Remarks: Sample Clean-ups are pre-approved
1	PRS-0001	3-12-07	1215	Surface	W		X	3			5C									X	X	X	X	X	X	X				
2	PRS-0002		1225				X	3												X	X	X	X	X	X	X				
3	PRS-0003		1227				X	3												X	X	X	X	X	X	X				
4	PRS-0004		1229				X	3												X	X	X	X	X	X	X				
5	PRS-0005		1231				X	3												X	X	X	X	X	X	X				
6	PRS-0006		1234				X	3												X	X	X	X	X	X	X				
7	PRS-0007		1237				X	3												X	X	X	X	X	X	X				
8	PRS-0008		1240				X	3												X	X	X	X	X	X	X				
9	PRS-0009		1243				X	3												X	X	X	X	X	X	X				
10																														

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 MA	3-12-07 1622		3/12/07 16:22
2			
3		Lab:	3/12/07 16 22

Rush Charges are Pre-Approved upon requesting them.

Instructions:

All XENCO Standard Terms and Conditions Apply

Containers Received: 27 Cooler Temperature: 1-8°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), AsbC Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), ~~Wipe (W)~~, Other _____ Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

SDBE Committed to Excellence in Service and Quality since 1990

www.xenco.com

278924-H

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: POTH

Date/ Time: 3/12/17

Lab ID # : 278924-H

Initials:

Sample Receipt Checklist

#1	Temperature of container/ cooler?	Yes	No	N/A	1.8 °C
#2	Shipping container in good condition?	Yes	No	None	
#3	Samples received on ice?	Yes	No	N/A	Blue/Water
#4	Custody Seals intact on shipping container/ cooler?	Yes	No	N/A	
#5	Custody Seals intact on sample bottles/ container?	Yes	No		
#6	Chain of Custody present?	Yes	No		
#7	Sample instructions complete of Chain of Custody?	Yes	No		
#8	Any missing/extra samples?	Yes	No		
#9	Chain of Custody signed when relinquished/ received?	Yes	No		
#10	Chain of Custody agrees with sample label(s)?	Yes	No		
#11	Container label(s) legible and intact?	Yes	No		
#12	Sample matrix/ properties agree with Chain of Custody?	Yes	No		
#13	Samples in proper container/ bottle?	Yes	No		
#14	Samples properly preserved?	Yes	No	N/A	
#15	Sample container intact?	Yes	No		
#16	Sufficient sample amount for indicated test(s)?	Yes	No		
#17	All samples received within sufficient hold time?	Yes	No		
#18	Subcontract of sample(s)?	Yes	No	N/A	
#19	VOC samples have zero headspace?	Yes	No	N/A	

Nonconformance Documentation

Contact: _____ Contacted by: _____ Date/ Time: _____

Regarding: _____

Corrective Action Taken: _____

Check all that Apply:

- ☐ Client understands and would like to proceed with analysis
- ☐ Cooling process had begun shortly after sampling event

Analytical Report 282953

for

Port of Houston Authority

Project Manager: Nicole Cass

PHA Phytoremediation Study

04-JUN-07

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E871002 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

04-JUN-07

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **282953**
PHA Phytoremediation Study
Project Address: PHA

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 282953. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 282953 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 282953

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: May-22-07 11:22 am
Report Date: 04-JUN-07
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	282953-001		282953-002		282953-003		282953-004	
		Field Id:	PRS-0010		PRS-0011		PRS-0014		PRS-0015	
		Depth:								
		Matrix:	WATER		WATER		WATER		WATER	
		Sampled:	May-22-07 09:30		May-22-07 09:33		May-22-07 09:40		May-22-07 09:42	
Metals by EPA 200.8	*Extracted:*		May-23-07 09:45		May-23-07 09:45		May-23-07 09:45		May-23-07 09:45	
	Analyzed:		May-23-07 14:38		May-23-07 14:42		May-23-07 14:47		May-23-07 14:51	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum			0.124	0.010	1.23	0.010	1.24	0.010	1.37	0.010
Arsenic			0.004	0.002	0.006	0.002	0.003	0.002	0.004	0.002
Barium			0.021	0.010	0.041	0.010	0.035	0.010	0.044	0.010
Cadmium			BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Copper			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Iron			0.260	0.200	1.01	0.200	1.22	0.200	1.36	0.200
Lead			BRL	0.002	0.004	0.002	0.006	0.002	0.008	0.002
Manganese			0.010	0.010	0.082	0.010	0.079	0.010	0.113	0.010
Mercury			BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel			0.016	0.010	0.018	0.010	0.010	0.010	0.015	0.010
Selenium			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Silver			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Zinc			BRL	0.010	0.014	0.010	0.031	0.010	0.037	0.010
Oil and Grease by EPA 1664	*Extracted:*									
	Analyzed:		May-24-07 08:30		May-24-07 08:35		May-24-07 08:40		May-24-07 08:45	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered			BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*									
	Analyzed:		May-23-07 15:05		May-23-07 15:07		May-23-07 15:08		May-23-07 15:09	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2			12.0	5.00	175	5.00	127	5.00	80.0	5.00
Total Cyanide by EPA 335.4	*Extracted:*									
	Analyzed:		May-24-07 15:06		May-24-07 15:08		May-24-07 15:10		May-24-07 15:12	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total			BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 282953

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: May-22-07 11:22 am
Report Date: 04-JUN-07
Project Manager: Debbie Simmons

Analysis Requested		Lab Id:	282953-005		282953-006		282953-007		282953-008	
		Field Id:	PRS-0016		PRS-0017		PRS-0018		PRS-0019	
		Depth:								
		Matrix:	WATER		WATER		WATER		WATER	
		Sampled:	May-22-07 09:48		May-22-07 09:51		May-22-07 09:54		May-22-07 09:56	
Metals by EPA 200.8		Extracted:	May-23-07 09:45		May-23-07 09:45		May-23-07 09:45		May-23-07 09:45	
		Analyzed:	May-23-07 14:55		May-23-07 15:00		May-23-07 15:04		May-23-07 15:21	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum			3.06	0.010	1.08	0.010	0.949	0.010	0.774	0.010
Arsenic			0.007	0.002	0.008	0.002	0.008	0.002	0.007	0.002
Barium			0.086	0.010	0.063	0.010	0.079	0.010	0.065	0.010
Cadmium			BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium			0.012	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Copper			0.011	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Iron			2.56	0.200	1.16	0.200	1.01	0.200	0.770	0.200
Lead			0.026	0.002	0.004	0.002	0.004	0.002	0.002	0.002
Manganese			0.319	0.010	0.239	0.010	0.077	0.010	0.060	0.010
Mercury			BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel			0.035	0.010	0.030	0.010	0.016	0.010	0.022	0.010
Selenium			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Silver			BRL	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Zinc			0.067	0.010	0.019	0.010	0.013	0.010	BRL	0.010
Oil and Grease by EPA 1664		Extracted:								
		Analyzed:	May-24-07 08:50		May-24-07 08:55		May-24-07 09:00		May-24-07 09:05	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered			BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2		Extracted:								
		Analyzed:	May-23-07 15:10		May-23-07 15:11		May-23-07 15:12		May-23-07 15:13	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2			978	5.00	341	5.00	52.9	5.00	37.0	5.00
Total Cyanide by EPA 335.4		Extracted:								
		Analyzed:	May-24-07 15:18		May-24-07 15:20		May-24-07 15:22		May-24-07 15:24	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total			BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 282953

Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: PHA

Date Received in Lab: May-22-07 11:22 am
Report Date: 04-JUN-07
Project Manager: Debbie Simmons

Analysis Requested			
	Lab Id:	282953-009	
	Field Id:	PRS-0020	
	Depth:		
	Matrix:	WATER	
	Sampled:	May-22-07 10:03	
Metals by EPA 200.8	*Extracted:*	May-23-07 09:45	
	Analyzed:	May-23-07 15:25	
	Units/RL:	mg/L	RL
Aluminum		1.21	0.010
Arsenic		0.003	0.002
Barium		0.032	0.010
Cadmium		BRL	0.001
Chromium		BRL	0.010
Copper		BRL	0.010
Iron		1.13	0.200
Lead		0.006	0.002
Manganese		0.067	0.010
Mercury		BRL	0.0004
Nickel		0.019	0.010
Selenium		BRL	0.010
Silver		BRL	0.010
Zinc		0.030	0.010
Oil and Grease by EPA 1664	*Extracted:*		
	Analyzed:	May-24-07 09:10	
	Units/RL:	mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00
TSS by EPA 160.2	*Extracted:*		
	Analyzed:	May-23-07 15:14	
	Units/RL:	mg/L	RL
TSS by EPA 160.2		160	5.00
Total Cyanide by EPA 335.4	*Extracted:*		
	Analyzed:	May-24-07 15:26	
	Units/RL:	mg/L	RL
Cyanide, Total		BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 282953 **Project ID:**

Lab Batch #: 697252 **Sample:** 495386-1-BKS **Matrix:** Water

Date Analyzed: 05/23/2007 **Date Prepared:** 05/23/2007 **Analyst:** MCH

Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
	BLANK /BLANK SPIKE RECOVERY STUDY					
Aluminum	<0.010	0.200	0.200	100	85-115	
Arsenic	<0.002	0.050	0.055	110	85-115	
Barium	<0.005	0.050	0.054	108	85-115	
Cadmium	<0.001	0.020	0.022	110	85-115	
Chromium	<0.010	0.050	0.055	110	85-115	
Copper	<0.003	0.050	0.055	110	85-115	
Iron	<0.150	0.200	0.210	105	85-115	
Lead	<0.002	0.050	0.053	106	85-115	
Manganese	<0.003	0.050	0.054	108	85-115	
Mercury	<0.0004	0.0010	0.0010	100	85-115	
Nickel	<0.005	0.050	0.056	112	85-115	
Selenium	<0.003	0.050	0.054	108	85-115	
Silver	<0.002	0.020	0.020	100	85-115	
Zinc	<0.003	0.050	0.050	100	85-115	

Lab Batch #: 697320 **Sample:** 697320-1-BKS **Matrix:** Water

Date Analyzed: 05/24/2007 **Date Prepared:** 05/24/2007 **Analyst:** MAB

Reporting Units: mg/L **Batch #:** 1

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
	BLANK /BLANK SPIKE RECOVERY STUDY					
Cyanide, Total	<0.020	0.200	0.196	98	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order #: 282953 **Project ID:**

Analyst: ELC **Date Prepared:** 05/24/2007 **Date Analyzed:** 05/24/2007

Lab Batch ID: 697303 **Sample:** 697303-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

Oil and Grease by EPA 1664	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	40.0	35.4	89	40.0	33.9	85	5	70-130	20	

Analyst: CRU **Date Prepared:** 05/23/2007 **Date Analyzed:** 05/23/2007

Lab Batch ID: 697264 **Sample:** 697264-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

TSS by EPA 160.2	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	911	91	1000.0	931	93	2	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order # : 282953 **Project ID:**

Lab Batch ID: 697252 **QC- Sample ID:** 282787-002 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 05/23/2007 **Date Prepared:** 05/23/2007 **Analyst:** MCH

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	0.067	0.200	0.232	83	0.200	0.241	87	5	75-125	25	
Arsenic	0.448	0.050	0.503	110	0.050	0.512	128	15	75-125	25	X
Barium	0.214	0.050	0.273	118	0.050	0.278	128	8	75-125	25	X
Cadmium	<0.001	0.020	0.015	75	0.020	0.016	80	6	75-125	25	
Chromium	<0.010	0.050	0.045	90	0.050	0.046	92	2	75-125	25	
Copper	<0.010	0.050	0.043	86	0.050	0.044	88	2	75-125	25	
Iron	0.400	0.200	0.570	85	0.200	0.580	90	6	75-125	25	
Lead	0.013	0.050	0.058	90	0.050	0.058	90	0	75-125	25	
Manganese	0.073	0.050	0.119	92	0.050	0.122	98	6	75-125	25	
Mercury	<0.0004	0.0010	0.0008	80	0.0010	0.0008	80	0	75-125	25	
Nickel	0.022	0.050	0.064	84	0.050	0.066	88	5	75-125	25	
Selenium	<0.010	0.050	0.040	80	0.050	0.041	82	2	75-125	25	
Silver	<0.010	0.020	0.026	130	0.020	0.025	125	4	75-125	25	X
Zinc	0.019	0.050	0.057	76	0.050	0.057	76	0	75-125	25	

Lab Batch ID: 697320 **QC- Sample ID:** 282760-001 S **Batch #:** 1 **Matrix:** Water

Date Analyzed: 05/24/2007 **Date Prepared:** 05/24/2007 **Analyst:** MAB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.189	95	0.200	0.193	97	2	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*(D-G)/(D+G)

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 282953

Lab Batch #: 697252 **Project ID:**
Date Analyzed: 05/23/2007 **Date Prepared:** 05/23/2007 **Analyst:** MCH
QC- Sample ID: 282787-002 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	0.067	0.066	2	25	
Arsenic	0.448	0.484	8	25	
Barium	0.214	0.240	11	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.010	<0.010	NC	25	
Copper	<0.010	<0.010	NC	25	
Iron	0.400	0.410	2	25	
Lead	0.013	0.014	7	25	
Manganese	0.073	0.078	7	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	0.022	0.023	4	25	
Selenium	<0.010	<0.010	NC	25	
Silver	<0.010	<0.010	NC	25	
Zinc	0.019	0.022	15	25	

Lab Batch #: 697264
Date Analyzed: 05/23/2007 **Date Prepared:** 05/23/2007 **Analyst:** CRU
QC- Sample ID: 282953-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	12.0	12.0	0	20	

Lab Batch #: 697320
Date Analyzed: 05/24/2007 **Date Prepared:** 05/24/2007 **Analyst:** MAB
QC- Sample ID: 282760-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston, TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 28295 3-H

Serial #: 204363 Page 1 of 1

Company-City Phone: Benchmark Ecological Services 281-934-3403	TAT: 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific. It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data. PHA Std. TAT
Project Name ☐Previously performed at XENCO: PHA Phytoremediation Study	Site: PHA
Proj. Manager (PM): Neil Hentharne / Nicole Cass	Project ID
Fax Results to ☐ PM or e-mail to: nhentharne@benchmarkeco.com	Fax No:
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O Bill to: PHA	
Quote No:	P.O No: ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name: Meagan Atkinson Signature:	

	Sample ID	Sampling Date	Time	Depth ft/in/m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum · Revised: Virgin Non-Virgin	Oil + Grease	TSS	Arsenic, Barium, Cadmium	Chromium, Copper, Cyanide	Iron, Lead, Manganese	Mercury, Nickel, Selenium	Silver, Zinc				TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Remarks: Sample Clean-ups are pre-approved	
1	PRS-0010	5/22/07	0930	surface	W		X	3			SNC									X	X	X	X	X	X	X							1
2	-0011		0933				X	3												X	X	X	X	X	X	X							2
3	-0014		0940				X	3												X	X	X	X	X	X	X							3
4	-0015		0942				X	3												X	X	X	X	X	X	X							4
5	-0016		0948				X	3												X	X	X	X	X	X	X							5
6	-0017		0951				X	3												X	X	X	X	X	X	X							6
7	-0018		0954				X	3												X	X	X	X	X	X	X							7
8	-0019		0956				X	3												X	X	X	X	X	X	X							8
9	-0020		1003				X	3												X	X	X	X	X	X	X							9
10																																10

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 MA	5/22/07 11:22		
2			
3		Lab:	5/23/07 11:22

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: 27 Cooler Temperature: 2.5°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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Analytical Report 288057

for

Port of Houston Authority

Project Manager: Nicole Cass

PHA Phytoremediation Study

27-AUG-07

11381 Meadowglen, Suite L Houston, TX 77082 Ph:(281) 589-0692 Fax:(281) 589-0695

NELAC certification numbers:
Houston, TX E871002 - Miami, FL E86678 - Tampa, FL E86675

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America

27-AUG-07

Project Manager: **Nicole Cass**
Port of Houston Authority
Post Office Box 2562
Houston, TX 77252

Reference: XENCO Report No: **288057**
PHA Phytoremediation Study
Project Address: Houston

Nicole Cass:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 288057. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 288057 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 288057
Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Aug-16-07 02:40 pm
Report Date: 27-AUG-07
Project Manager: Debbie Simmons

Analysis Requested	*Lab Id:*	288057-001		288057-002		288057-003		288057-004	
	Field Id:	PRS-0021		PRS-0022		PRS-0023		PRS-0024	
	Depth:								
	Matrix:	WATER		WATER		WATER		WATER	
	Sampled:	Aug-16-07 11:45		Aug-16-07 11:48		Aug-16-07 11:50		Aug-16-07 11:55	
Metals by EPA 200.8	*Extracted:*	Aug-20-07 08:00		Aug-20-07 08:00		Aug-20-07 08:00		Aug-20-07 08:00	
	Analyzed:	Aug-24-07 13:55		Aug-24-07 13:59		Aug-24-07 14:03		Aug-24-07 14:08	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum		0.149	0.010	0.265	0.010	0.299	0.010	11.0	0.010
Arsenic		0.002	0.002	0.004	0.002	0.005	0.002	0.004	0.002
Barium		0.009	0.005	0.017	0.005	0.019	0.005	0.148	0.005
Cadmium		BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium		0.003	0.003	0.004	0.003	0.004	0.003	0.016	0.003
Copper		BRL	0.003	BRL	0.003	BRL	0.003	0.021	0.003
Iron		0.150	0.150	0.270	0.150	0.360	0.150	9.47	0.150
Lead		0.004	0.002	0.005	0.002	0.004	0.002	0.277	0.002
Manganese		0.033	0.003	0.041	0.003	0.040	0.003	0.408	0.003
Mercury		BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel		BRL	0.005	BRL	0.005	BRL	0.005	0.012	0.005
Selenium		BRL	0.003	BRL	0.003	BRL	0.003	BRL	0.003
Silver		BRL	0.002	BRL	0.002	BRL	0.002	BRL	0.002
Zinc		0.015	0.003	0.016	0.003	0.015	0.003	0.069	0.003
Oil and Grease by EPA 1664	*Extracted:*								
	Analyzed:	Aug-20-07 18:32		Aug-20-07 18:34		Aug-20-07 18:36		Aug-20-07 18:38	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*								
	Analyzed:	Aug-20-07 13:10		Aug-20-07 13:11		Aug-20-07 13:12		Aug-20-07 13:13	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2		11.0	5.00	19.0	5.00	11.0	5.00	680	5.00
Total Cyanide by EPA 335.4	*Extracted:*								
	Analyzed:	Aug-24-07 12:08		Aug-24-07 12:10		Aug-24-07 12:12		Aug-24-07 12:14	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total		BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 288057
Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Aug-16-07 02:40 pm
Report Date: 27-AUG-07
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	288057-005		288057-006		288057-007		288057-008	
		Field Id:	PRS-0025		PRS-0026		PRS-0027		PRS-0028	
		Depth:								
		Matrix:	WATER		WATER		WATER		WATER	
		Sampled:	Aug-16-07 12:05		Aug-16-07 12:10		Aug-16-07 12:15		Aug-16-07 12:20	
Metals by EPA 200.8		*Extracted:*	Aug-20-07 08:00		Aug-20-07 08:00		Aug-20-07 08:00		Aug-20-07 08:00	
		Analyzed:	Aug-24-07 14:12		Aug-24-07 14:16		Aug-24-07 14:33		Aug-24-07 14:37	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Aluminum			11.6	0.010	10.4	0.010	6.00	0.010	6.16	0.010
Arsenic			0.006	0.002	0.006	0.002	0.004	0.002	0.005	0.002
Barium			0.192	0.005	0.183	0.005	0.102	0.005	0.109	0.005
Cadmium			BRL	0.001	BRL	0.001	BRL	0.001	BRL	0.001
Chromium			0.043	0.003	0.039	0.003	0.015	0.003	0.017	0.003
Copper			0.025	0.003	0.024	0.003	0.014	0.003	0.014	0.003
Iron			12.0	0.150	10.9	0.150	5.93	0.150	6.12	0.150
Lead			0.245	0.002	0.240	0.002	0.150	0.002	0.159	0.002
Manganese			0.686	0.003	0.671	0.003	0.323	0.003	0.337	0.003
Mercury			BRL	0.0004	BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel			0.013	0.005	0.013	0.005	0.007	0.005	0.007	0.005
Selenium			BRL	0.003	BRL	0.003	BRL	0.003	BRL	0.003
Silver			BRL	0.002	BRL	0.002	BRL	0.002	BRL	0.002
Zinc			0.118	0.003	0.111	0.003	0.058	0.003	0.060	0.003
Oil and Grease by EPA 1664		*Extracted:*								
		Analyzed:	Aug-20-07 18:40		Aug-20-07 18:42		Aug-20-07 18:44		Aug-20-07 18:46	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered			BRL	5.00	BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2		*Extracted:*								
		Analyzed:	Aug-20-07 13:14		Aug-20-07 13:15		Aug-20-07 13:16		Aug-20-07 13:17	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2			633	5.00	620	5.00	477	5.00	417	5.00
Total Cyanide by EPA 335.4		*Extracted:*								
		Analyzed:	Aug-24-07 12:16		Aug-24-07 12:18		Aug-24-07 12:20		Aug-24-07 12:22	
		Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total			BRL	0.020	BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, Ph.D., MBA
Managing Director, Texas

Certificate of Analysis Summary 288057
Port of Houston Authority, Houston, TX

Project Name: PHA Phytoremediation Study

Project Id:
Contact: Nicole Cass
Project Location: Houston

Date Received in Lab: Aug-16-07 02:40 pm
Report Date: 27-AUG-07
Project Manager: Debbie Simmons

Analysis Requested		*Lab Id:*	288057-009		288057-010		288057-011	
		Field Id:	PRS-0029		PRS-0030		PRS-0031	
		Depth:						
		Matrix:	WATER		WATER		WATER	
		Sampled:	Aug-16-07 12:25		Aug-16-07 12:30		Aug-16-07 12:35	
Metals by EPA 200.8	*Extracted:*		Aug-20-07 08:00		Aug-20-07 08:00		Aug-20-07 08:00	
	Analyzed:		Aug-24-07 14:41		Aug-24-07 14:45		Aug-24-07 14:49	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL
Aluminum			6.51	0.010	6.00	0.010	6.08	0.010
Arsenic			0.005	0.002	0.005	0.002	0.005	0.002
Barium			0.112	0.005	0.101	0.005	0.108	0.005
Cadmium			BRL	0.001	BRL	0.001	BRL	0.001
Chromium			0.017	0.003	0.015	0.003	0.016	0.003
Copper			0.017	0.003	0.013	0.003	0.015	0.003
Iron			6.35	0.150	5.81	0.150	6.04	0.150
Lead			0.159	0.002	0.142	0.002	0.147	0.002
Manganese			0.337	0.003	0.312	0.003	0.332	0.003
Mercury			BRL	0.0004	BRL	0.0004	BRL	0.0004
Nickel			0.008	0.005	0.007	0.005	0.007	0.005
Selenium			BRL	0.003	BRL	0.003	BRL	0.003
Silver			BRL	0.002	BRL	0.002	BRL	0.002
Zinc			0.060	0.003	0.056	0.003	0.060	0.003
Oil and Grease by EPA 1664	*Extracted:*							
	Analyzed:		Aug-20-07 18:48		Aug-20-07 18:50		Aug-20-07 18:52	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL
Oil & Grease, Total Recovered			BRL	5.00	BRL	5.00	BRL	5.00
TSS by EPA 160.2	*Extracted:*							
	Analyzed:		Aug-20-07 13:18		Aug-20-07 13:19		Aug-20-07 13:20	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL
TSS by EPA 160.2			407	5.00	433	5.00	110	5.00
Total Cyanide by EPA 335.4	*Extracted:*							
	Analyzed:		Aug-24-07 12:28		Aug-24-07 12:30		Aug-24-07 12:32	
	Units/RL:		mg/L	RL	mg/L	RL	mg/L	RL
Cyanide, Total			BRL	0.020	BRL	0.020	BRL	0.020

Carlos A. Castro, ~~Ph.D.~~, MBA
Managing Director, Texas

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the MQL and above the SQL.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

Blank Spike Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 288057 **Project ID:**

Lab Batch #: 702983 **Sample:** 498516-1-BKS **Matrix:** Water

Date Analyzed: 08/24/2007 **Date Prepared:** 08/20/2007 **Analyst:** HAT

Reporting Units: mg/L **Batch #:** 1

Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
		BLANK /BLANK SPIKE RECOVERY STUDY				
Aluminum	<0.010	0.200	0.197	99	85-115	
Arsenic	<0.002	0.050	0.047	94	85-115	
Barium	<0.005	0.050	0.049	98	85-115	
Cadmium	<0.001	0.020	0.020	100	85-115	
Chromium	<0.003	0.050	0.047	94	85-115	
Copper	<0.003	0.050	0.047	94	85-115	
Iron	<0.150	0.200	0.190	95	85-115	
Lead	<0.002	0.050	0.047	94	85-115	
Manganese	<0.003	0.050	0.047	94	85-115	
Mercury	<0.0004	0.0010	0.0012	120	85-115	H
Nickel	<0.005	0.050	0.048	96	85-115	
Selenium	<0.003	0.050	0.048	96	85-115	
Silver	<0.002	0.020	0.020	100	85-115	
Zinc	<0.003	0.050	0.048	96	85-115	

Lab Batch #: 703063 **Sample:** 703063-1-BKS **Matrix:** Water

Date Analyzed: 08/24/2007 **Date Prepared:** 08/24/2007 **Analyst:** AMB

Reporting Units: mg/L **Batch #:** 1

Total Cyanide by EPA 335.4 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
		BLANK /BLANK SPIKE RECOVERY STUDY				
Cyanide, Total	<0.020	0.200	0.212	106	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order #: 288057 **Project ID:**

Analyst: AMB **Date Prepared:** 08/20/2007 **Date Analyzed:** 08/20/2007

Lab Batch ID: 702645 **Sample:** 702645-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Oil and Grease by EPA 1664 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	40.0	37.1	93	40	33.5	84	10	70-130	20	

Analyst: AMB **Date Prepared:** 08/20/2007 **Date Analyzed:** 08/20/2007

Lab Batch ID: 702660 **Sample:** 702660-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Oil and Grease by EPA 1664 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	<5.00	40.0	35.8	90	40	37.0	93	3	70-130	20	

Analyst: CRU **Date Prepared:** 08/20/2007 **Date Analyzed:** 08/20/2007

Lab Batch ID: 702689 **Sample:** 702689-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TSS by EPA 160.2 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TSS by EPA 160.2	<5.00	1000	921	92	1000	929	93	1	80-120	20	

Relative Percent Difference RPD = 200*|(D-F)/(D+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: PHA Phytoremediation Study

Work Order # : 288057

Project ID:

Lab Batch ID: 702983 QC- Sample ID: 288047-004 S Batch #: 1 Matrix: Water

Date Analyzed: 08/24/2007 Date Prepared: 08/20/2007 Analyst: HAT

Reporting Units: mg/L

Metals by EPA 200.8 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Aluminum	<0.010	0.200	0.190	95	0.200	0.187	94	1	75-125	25	
Arsenic	0.003	0.050	0.038	70	0.050	0.036	66	6	75-125	25	X
Barium	0.407	0.050	0.520	226	0.050	0.507	200	12	75-125	25	X
Cadmium	<0.001	0.020	0.014	70	0.020	0.013	65	7	75-125	25	X
Chromium	<0.003	0.050	0.042	84	0.050	0.040	80	5	75-125	25	
Copper	<0.003	0.050	0.036	72	0.050	0.033	66	9	75-125	25	X
Iron	0.530	0.200	0.800	135	0.200	0.770	120	12	75-125	25	X
Lead	<0.002	0.050	0.040	80	0.050	0.037	74	8	75-125	25	X
Manganese	0.496	0.050	0.619	246	0.050	0.612	232	6	75-125	25	X
Mercury	<0.0004	0.0010	0.0007	70	0.0010	0.0006	60	15	75-125	25	X
Nickel	<0.005	0.050	0.040	80	0.050	0.037	74	8	75-125	25	X
Selenium	<0.003	0.050	0.030	60	0.050	0.029	58	3	75-125	25	X
Silver	<0.002	0.020	0.014	70	0.020	0.013	65	7	75-125	25	X
Zinc	<0.003	0.050	0.029	58	0.050	0.027	54	7	75-125	25	X

Lab Batch ID: 703063 QC- Sample ID: 288271-002 S Batch #: 1 Matrix: Water

Date Analyzed: 08/24/2007 Date Prepared: 08/24/2007 Analyst: AMB

Reporting Units: mg/L

Total Cyanide by EPA 335.4 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Cyanide, Total	<0.020	0.200	0.227	114	0.200	0.228	114	0	80-120	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*(D-G)/(D+G)

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 288057

Lab Batch #: 702983 **Project ID:**
Date Analyzed: 08/24/2007 **Date Prepared:** 08/20/2007 **Analyst:** HAT
QC- Sample ID: 288047-004 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Metals by EPA 200.8	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Aluminum	<0.010	<0.010	NC	25	
Arsenic	0.003	0.005	50	25	F
Barium	0.407	0.458	12	25	
Cadmium	<0.001	<0.001	NC	25	
Chromium	<0.003	0.003	NC	25	
Copper	<0.003	<0.003	NC	25	
Iron	0.530	0.580	9	25	
Lead	<0.002	0.002	NC	25	
Manganese	0.496	0.557	12	25	
Mercury	<0.0004	<0.0004	NC	25	
Nickel	<0.005	<0.005	NC	25	
Selenium	<0.003	<0.003	NC	25	
Silver	<0.002	<0.002	NC	25	
Zinc	<0.003	<0.003	NC	25	

Lab Batch #: 702645
Date Analyzed: 08/20/2007 **Date Prepared:** 08/20/2007 **Analyst:** AMB
QC- Sample ID: 287958-001 D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

Oil and Grease by EPA 1664	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Oil & Grease, Total Recovered	7.67	8.62	12	20	

Lab Batch #: 702689
Date Analyzed: 08/20/2007 **Date Prepared:** 08/20/2007 **Analyst:** CRU
QC- Sample ID: 287927-001 M D **Batch #:** 1 **Matrix:** Water
Reporting Units: mg/L

TSS by EPA 160.2	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
TSS by EPA 160.2	11.0	10.0	10	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

Sample Duplicate Recovery

Project Name: PHA Phytoremediation Study

Work Order #: 288057

Lab Batch #: 703063 **Project ID:**

Date Analyzed: 08/24/2007 **Date Prepared:** 08/24/2007 **Analyst:** AMB

QC- Sample ID: 288271-002 D **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Total Cyanide by EPA 335.4	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	<0.020	NC	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY # 288057-A

Serial #: 183617 Page 1 of 2

Company-City: Benchmark Ecological Services	Phone: 281 534-3403
Project Name: PHA Phytoremediation Study ☑ Previously performed at XENCO	Site:
Proj. Manager (PM): Neil Hetherne / Nicole Cass	
Fax Results to ☐ PM or	Fax No:
e-mail to: nhetherne@benchmarkeco.com	
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O	
Bill to: Nicole Cass PHA	
Quote No:	P.O No: ☐ Call for a P.O.
Reg Program: CLP AFCEE TRRP DW UST State Other:	
Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)	
TRRP PCLs: Tier 1 Tier 2 Residential Industrial	
LPST No.:(Required)	
Sampler Name: Neil Hetherne Signature: N. Hetherne	

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project ID:

	Sample ID	Sampling Date	Time	Depth ft/in/m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 8RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum - Revised: Virgin Non-Virgin	Grid Grave, TSS	Arsenic, Barium, Cadmium	Chromium, Copper, Cyanide	Iron Lead Manganese	Mercury Nickel Selenium	Silver Zinc	TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Remarks: Sample Clean-ups are pre-approved
1	PRS-0021	8-16-07	1145	Surface	W		X	3			SN									X	X	X	X	X	X				
2	-0022		1148					3																					
3	0023		1150					3																					
4	-0024		1155					3																					
5	-0025		1205					3																					
6	-0026		1210					3																					
7	-0027		1215					3																					
8	0028		1220					3																					
9	-0029		1225					3																					
10	-0030		1230					3																					

	Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1	N. Hetherne	8-16-07 1440		
2				
3			Lab:	8/16/07 14:40

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: 33 Cooler Temperature: 1.4°C

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W). Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

288057-A

XENCO Laboratories

☐ 11381 Meadowglen, Suite L, Houston, TX 77082 281-589-0692
☐ 5309 Wurzbach, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300
☐ 5757 N.W. 158th Street, Miami Lakes, Fl 33014 305-823-8500
☐ 3016 US Highway 301 N., Suite 900, Tampa, Fl 33619 813-620-2000

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

LAB ONLY: 288057-1A

Serial #: 204624 Page 2 of 2

Company-City: Benchmark Ecological Services | Phone: 281-534 3403

TAT: 5h 12h 24h 48h 3d 5d 7d (10d) 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Project Name: PHA Phytoremediation Study ☐ Previously performed at XENCO | Site | Project ID

Proj. Manager (PM): Neil Hawthorne / Nicole Cass

Fax Results to ☐ PM or Fax No:
e-mail to: nhawthorne@benchmarkeco.com

Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O
Bill to: PHA

Quote No: P.O No: ☐ Call for a P.O.

Reg Program: CLP AFCEE TRRP DW UST State Other:

Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call)

TRRP PCLs: Tier 1 Tier 2 Residential Industrial

LPST No.:(Required)

Sampler Name: Neil Hawthorne Signature:

	Sample ID	Sampling Date	Time	Depth ft' in" m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021 8260 602 624 Other	BTEX-MTBE by 8021 8260 624 Other	TPH by TX1005 FL-Pro 1664 8015GRO 8015DRO 418.1	PAHs by 8270 8310	Metals by 6020 200.8 6RCRA Tot Pb TCLP8 13PP 23TAL	VOCs by 8021 8260 624 VOA VOH PPs TCL	SVOCs by 8270 625 PAHs BN&A TCL PPs	FL Prebum - Revised: Virgin Non-Virgin	Oil & Grease TSS	Arsenic, Barium, Cadmium, Chromium, Copper, Cyanide, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Zinc	TAT 5h 12h 24h 48h 3d 5d 7d 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Disposal Hold Analysis (Surcharges will apply)	Remarks: Sample Clean-ups are pre-approved
1	PRS-0031	8-16-07	1235		W		X	3			SW									X	X	X	X	X	X	
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1 NH	8-16-07 1440		
2			
3		Lab:	8/16/07 1440

Rush Charges are Pre-Approved upon requesting them.
Instructions:
All XENCO Standard Terms and Conditions Apply.
Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asbc Acid&NaOH (A), ZnAc&NaOH (Z), (Cool,<4C) (C), None (NA), See Label (L), Other (O) _____
Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tedlar Bag (B), Wipe (W), Other _____ **Cont. Type:** Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) _____

Matrix: Air (A), Product (P), Solid(S), Water (W)

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288057-1A

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: DOT

Date/ Time: 8/16/17

Lab ID # : 288057-17

Initials: DJ

Sample Receipt Checklist

#1	Temperature of container/ cooler?	(Yes)	No	N/A	1.4 °C
#2	Shipping container in good condition?	(Yes)	No	None	
#3	Samples received on ice?	(Yes)	No	N/A	(Blue/Water)
#4	Custody Seals intact on shipping container/ cooler?	Yes	(No)	N/A	
#5	Custody Seals intact on sample bottles/ container?	Yes	(No)		
#6	Chain of Custody present?	(Yes)	No		
#7	Sample instructions complete of Chain of Custody?	(Yes)	No		
#8	Any missing/extra samples?	Yes	(No)		
#9	Chain of Custody signed when relinquished/ received?	(Yes)	No		
#10	Chain of Custody agrees with sample label(s)?	(Yes)	No		
#11	Container label(s) legible and intact?	(Yes)	No		
#12	Sample matrix/ properties agree with Chain of Custody?	(Yes)	No		
#13	Samples in proper container/ bottle?	(Yes)	No		
#14	Samples properly preserved?	(Yes)	No	N/A	
#15	Sample container intact?	(Yes)	No		
#16	Sufficient sample amount for indicated test(s)?	(Yes)	No		
#17	All samples received within sufficient hold time?	(Yes)	No		
#18	Subcontract of sample(s)?	Yes	No	N/A	
#19	VOC samples have zero headspace?	Yes	No	(N/A)	

Nonconformance Documentation

Contact: _____ Contacted by: _____ Date/ Time: _____

Regarding: _____

Corrective Action Taken: _____

Check all that Apply:

- ☐ Client understands and would like to proceed with analysis
- ☐ Cooling process had begun shortly after sampling event

15.0 Appendix G

15.1 Analytical Summary Report

Table 1: Analytical results from the storm water event on 3/29/2006.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample Station					
					A1	A2	A3	A4	B1	D2
Aluminum	0.75	---	---	0.01	1.01	0.897	6.83	0.786	0.73	0.645
Arsenic	---	0.0057	0.003	0.002	0.002	0.002	0.002	0.011	0.002	0.002
Barium	---	---	---	0.01	0.022	0.023	0.238	0.049	0.035	0.038
Cadmium	---	0.01589	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Chromium	---	0.01135	0.007	0.01	0.01	0.01	0.031	0.01	0.01	0.02
Copper	---	0.03069	0.016	0.01	BRL	BRL	0.34	BRL	BRL	0.011
Cyanide	---	0.01625	0.005	0.02	---	---	---	---	---	---
Iron	1	4.07654	1.955	0.2	0.687	0.624	5.83	0.997	1.070	1.020
Lead	0.0816	0.0386	0.016	0.002	0.009	0.008	0.057	0.005	0.0009	0.008
Manganese	---	---	---	0.01	0.08	0.057	0.414	0.062	0.051	0.09
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	0.0004
Nickel	---	0.01478	0.008	0.01	BRL	BRL	BRL	BRL	BRL	0.078
Oil & Grease	---	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Silver	---	---	---	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TSS	---	123.05	58	5	23	14	218	45	34	36
Zinc	0.117	0.2348	0.1163	0.01	0.050	0.038	0.252	0.036	0.046	0.041

Bolded cells are Below Report Limit (BRL)

Table 2: Analytical results from the storm water event on 5/31/2006.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample Station					
					A1	A2	A3	A4	B1	D2
Aluminum	0.75	---	---	0.01	0.113	0.076	0.091	0.073	0.503	0.03
Arsenic	---	0.0057	0.003	0.002	0.005	0.023	0.003	0.031	0.018	0.019
Barium	---	---	---	0.01	0.043	0.083	0.021	0.112	0.099	0.109
Cadmium	---	0.01589	0.001	0.001	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.01	0.013	BRL	BRL	0.01	0.013	BRL
Copper	---	0.03069	0.016	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Cyanide	---	0.01625	0.005	0.02	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.2	0.22	BRL	BRL	0.21	0.94	BRL
Lead	0.0816	0.0386	0.016	0.002	BRL	BRL	BRL	0.21	0.005	BRL
Manganese	---	---	---	0.01	0.017	BRL	BRL	BRL	0.057	BRL
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Oil & Grease	---	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5	13	BRL	BRL	14	36	BRL
Zinc	0.117	0.2348	0.1163	0.01	0.190	BRL	BRL	BRL	BRL	BRL

Bolded cells are Below Report Limit (BRL)

Table 3: Analytical results from the storm water event on 6/19/2006.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample Station					
					A1	A2	A3	A4	B1	D2
Aluminum	0.75	---	---	0.01	0.0221	0.137	0.139	0.139	0.149	0.122
Arsenic	---	0.0057	0.003	0.002	0.005	0.01	0.139	0.015	0.007	0.007
Barium	---	---	---	0.01	0.022	0.027	0.022	0.035	0.022	0.022
Cadmium	---	0.01589	0.001	0.001	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Copper	---	0.03069	0.016	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Cyanide	---	0.01625	0.005	0.02	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.2	BRL	BRL	BRL	BRL	BRL	BRL
Lead	0.0816	0.0386	0.016	0.002	BRL	BRL	BRL	BRL	0.004	BRL
Manganese	---	---	---	0.01	BRL	BRL	BRL	BRL	0.016	BRL
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Oil & Grease	---	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5	BRL	BRL	BRL	BRL	BRL	BRL
Zinc	0.117	0.2348	0.1163	0.01	BRL	BRL	BRL	BRL	BRL	BRL

Bolded cells are Below Report Limit (BRL)

Table 4: Analytical results from the storm water event on 5/31/2006.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample Station					
					A1	A2	A3	A4	B1	D2
Aluminum	0.75	---	---	0.01	0.084	0.11	0.231	0.096	0.132	0.153
Arsenic	---	0.0057	0.003	0.002	0.005	0.015	BRL	0.011	0.011	0.005
Barium	---	---	---	0.01	0.043	0.046	0.031	0.048	0.046	0.041
Cadmium	---	0.01589	0.001	0.001	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.01	0.057	BRL	BRL	BRL	BRL	BRL
Copper	---	0.03069	0.016	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Cyanide	---	0.01625	0.005	0.02	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.2	2.08	1.55	1.02	1.71	1.63	1.44
Lead	0.0816	0.0386	0.016	0.002	BRL	BRL	0.003	BRL	BRL	BRL
Manganese	---	---	---	0.01	BRL	0.014	0.026	0.013	0.014	0.018
Mercury	---	0.00033	0.0002	0.0004	0.0011	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.01	0.055	0.042	0.028	0.046	0.043	0.038
Oil & Grease	---	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.01	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5	BRL	BRL	14	BRL	7	5
Zinc	0.117	0.2348	0.1163	0.01	BRL	BRL	0.013	BRL	BRL	BRL

Bolded cells are Below Report Limit (BRL)

Table 5: Analytical results from the stormwater event on 3/12/2007

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample ID/(Station ID)										
					PRS-0001	PRS-0002			PRS-0003	PRS-0004	PRS-0005	PRS-0006	PRS-0007	PRS-0008	PRS-0009
					A1	A2	A3	A4	B1	B2	C1	C2	D1	D2	B1*
Aluminum	0.75	---	---	0.01	0.168	0.109			0.262	0.150	0.47	0.415	0.391	0.420	0.229
Arsenic	---	0.0057	0.003	0.002	0.009	0.019			0.008	BRL	BRL	BRL	BRL	BRL	BRL
Barium	---	---	---	0.01	0.072	0.083			0.064	0.056	0.036	BRL	BRL	BRL	0.033
Cadmium	---	0.01589	0.001	0.001	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.01	0.017	BRL			BRL	0.010	BRL	BRL	BRL	BRL	BRL
Copper	---	0.03069	0.016	0.01	0.010	0.014			0.015	0.011	BRL	BRL	BRL	BRL	BRL
Cyanide	---	0.01625	0.005	0.02	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.2	0.793	0.56			0.680	1.30	0.789	0.390	0.310	0.350	0.280
Lead	0.0816	0.0386	0.016	0.002	0.002	BRL			0.003	0.009	0.005	BRL	BRL	BRL	BRL
Manganese	---	---	---	0.01	0.021	0.015			0.042	0.095	0.048	0.036	0.017	0.019	0.025
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.01	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Oil & Grease	---	31.77	4	5	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	5.33
Selenium	---	---	---	0.01	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.01	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5	21.0	12.0			13.0	50.0	19.0	27.0	23.0	18.0	17.0
Zinc	0.117	0.2348	0.1163	0.01	0.019	0.012			0.025	0.052	0.037	BRL	BRL	BRL	BRL

* Duplicate Sample Collected from Station B1

Bolded cells are Below Report Limit (BRL)

Samples were not taken at Station ID A3 and A4 due to lack of water at the sampling event

Table 6: Analytical results from the stormwater event on 5/22/2007.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample ID/(Station ID)										
					PRS-0010	PRS-0011			PRS-0014	PRS-0015	PRS-0016	PRS-0017	PRS-0018	PRS-0019	PRS-0020
					A1	A2	A3	A4	B1	B2	C1	C2	D1	D2	B1*
Aluminum	0.75	---	---	0.010	0.124	1.23			1.24	1.37	3.00	1.08	9.49	0.774	1.21
Arsenic	---	0.0057	0.003	0.002	0.004	0.006			0.003	0.004	0.007	0.008	0.008	0.007	0.003
Barium	---	---	---	0.010	0.021	0.041			0.035	0.044	0.086	0.063	0.079	0.065	0.032
Cadmium	---	0.01589	0.001	0.001	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.010	BRL	BRL			BRL	BRL	0.012	BRL	BRL	BRL	BRL
Copper	---	0.03069	0.016	0.010	BRL	BRL			BRL	BRL	0.011	BRL	BRL	BRL	BRL
Cyanide	---	0.01625	0.005	0.020	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.200	0.260	1.01			1.22	1.36	2.56	1.16	1.01	0.770	1.13
Lead	0.0816	0.0386	0.016	0.002	BRL	0.004			0.006	0.008	0.026	0.004	0.004	0.002	0.006
Manganese	---	---	---	0.010	0.010	0.082			0.079	0.113	0.319	0.239	0.077	0.060	0.067
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.010	0.016	0.018			0.010	0.015	0.035	0.030	0.016	0.022	0.019
Oil & Grease	---	31.77	4	5.00	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.01	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.010	BRL	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5.00	12.0	175			127	80.0	978	341	52.9	37.0	160
Zinc	0.117	0.2348	0.1163	0.010	BRL	0.014			0.031	0.037	0.067	0.019	0.013	BRL	0.030

* Duplicate Sample Collected from Station B1

Bolded cells are Below Report Limit (BRL)

Samples were not taken at Station ID A3 and A4 due to lack of water at the sampling event.

Table 7: Analytical results from the stormwater event on 8/16/2007.

Analyte (mg/L)	Benchmark Value	Pitts Study Average	Pitts Study Medians	Report Limit	Sample ID/(Station ID)										
					PRS-0021	PRS-0022	PRS-0024	PRS-0023	PRS-0025	PRS-0027	PRS-0028	PRS-0029	PRS-0030	PRS-0031	*PRS-0026
					A1	A2	A3	A4	B1	B2	C1	C2	D1	D2	DUP
Aluminum	0.75	---	---	0.01	0.149	0.265	1.10	0.299	11.6	6.00	6.16	6.51	6.00	6.08	9.4
Arsenic	---	0.0057	0.003	0.002	0.002	0.004	0.004	0.005	0.006	0.004	0.005	0.005	0.005	0.005	0.006
Barium	---	---	---	0.005	0.009	0.017	0.148	0.019	0.192	0.102	0.109	0.112	0.101	0.108	0.183
Cadmium	---	0.01589	0.001	0.001	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Chromium	---	0.01135	0.007	0.003	0.005	0.004	0.016	0.004	0.043	0.015	0.017	0.017	0.015	0.016	0.039
Copper	---	0.03069	0.016	0.003	BRL	BRL	0.021	BRL	0.025	0.014	0.014	0.017	0.013	0.015	0.024
Cyanide	---	0.01625	0.005	0.02	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Iron	1	4.07654	1.955	0.15	0.150	0.270	9.47	0.360	12.0	5.93	6.12	6.35	5.81	6.040	10.900
Lead	0.0816	0.0386	0.016	0.002	0.004	0.005	0.277	0.004	0.245	0.150	0.159	0.159	0.142	0.147	0.240
Manganese	---	---	---	0.003	0.033	0.641	0.408	0.040	0.686	0.323	0.337	0.337	0.312	0.332	0.671
Mercury	---	0.00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Nickel	---	0.01478	0.008	0.005	BRL	BRL	0.012	BRL	0.013	0.007	0.007	0.008	0.007	0.007	0.013
Oil & Grease	---	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Selenium	---	---	---	0.003	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
Silver	---	---	---	0.002	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL
TSS	---	123.05	58	5	11.0	19.0	680	11.0	633	477	417	407	433	110	620
Zinc	0.117	0.2348	0.1163	0.003	0.015	0.016	0.069	0.015	0.118	0.058	0.069	0.061	0.056	0.060	0.111

*PRS-00026 is a duplicate of PRS-00025

Bolded cells are Below Report Limit (BRL)