Cycle 10 Coastal Coordination Council Grant Port of Houston Authority

"Storm Water BMP Demonstration Using Phytoremediation Techniques"



Project Report September 2007

Table of Contents

1.0	Grant Application	3
2.0	Project Scope	
3.0	Task 1: Develop Work and Sampling Plan	4
4.0	Task 2: Evaluate Sampling Data and Design Phytoremedial Area	
5.0	Task 3: Install Plants and Berm System	
	5.1 Installation of Mulch Socks	
	5.2 Planting Study Area	
6.0	Task 4: Post-Installation Site Monitoring	
	6.1 Analytical Results	6
	6.2 Grant Project Discussion	
7.0	Task 5: Public Outreach	
8.0	Figures	8
	8.1 Figure 1: Site Map	8
	8.2 Figure 2: Sample Stations	
9.0	Appendix A	
	9.1 Field Sampling and Analysis Plan	9
10.0	Appendix B	
	10.1 Pre-installation Analytical Results	10
11.0	Appendix C) 1
	11.1 Planting Plan	
12.0	Appendix D	12
	12.1 Site Photographs	12
13.0	Appendix E	
	13.1 Sampling Forms	
14.0	Appendix F	
	14.1 Post-installation Analytical Results	
15.0	Appendix G	
	15.1 Analytical Summary Report	

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)*

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

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

- 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,
 - o Plant coverage,

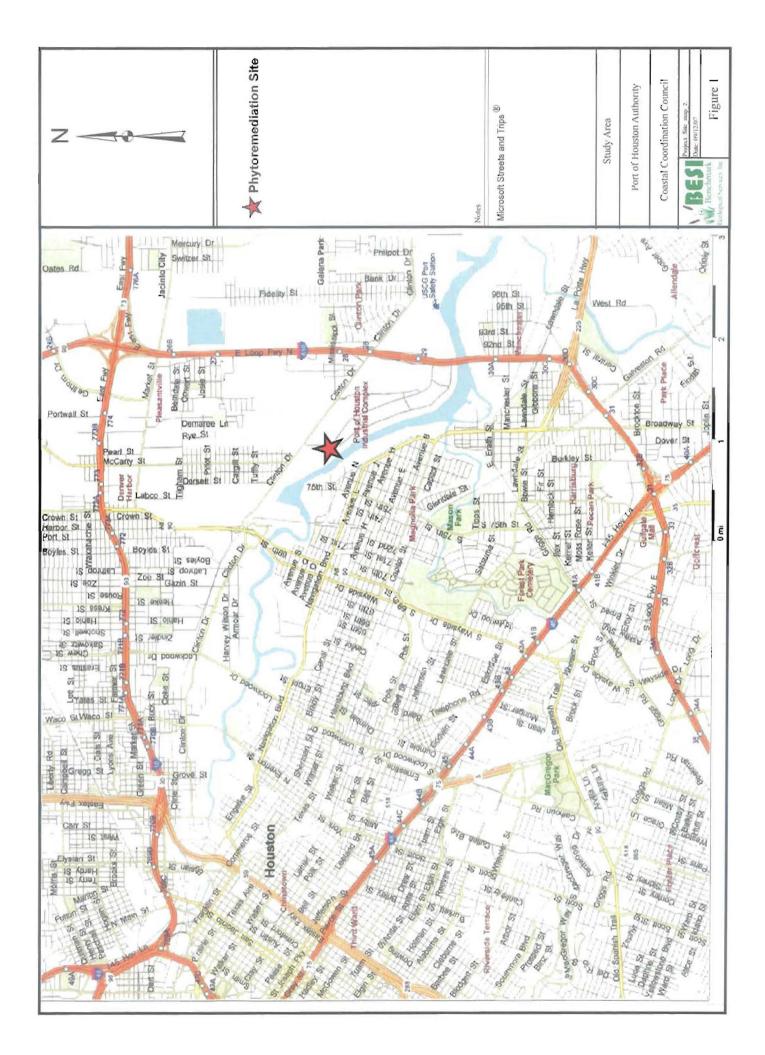
- o Biological activity in the mulch socks and the planting area,
- o Activities conducted within the watershed, and
- o Temperature

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
- 8.1
- Figure 1: Site Map Figure 2: Sample Stations 8.2





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



November 2005

TABLE OF CONTENTS

		Page
1.0 INTRODUCTION	***************************************	1
	ves	
2.0 SAMPLE TYPES,	LOCATION, AND FREQUENCY	3
3.0 SAMPLE DESIGN	ATION	4
4.0 SAMPLING EQUI	PMENT AND PROCEDURES	5
	le Collection	
5.0 SAMPLE HANDL	ING AND ANALYSIS	10
5.1 Chain-Of-Custody5.2 Shipping of Samp.	/les	10 11
6.0 QUALITY ASSUR	ANCE/QUALITY CONTROL	12
7.0 SCHEDULE		13

LIST OF FIGURES

Figure 1: Sampling Locations

Figure 2: Storm Water Sampling Form

LIST OF TABLES

Table 1: Analytical Summary Table

Table 2: Analysis and Methods Table

APPENDICES

Appendix A: Storm Water Sampling Event Data Form

Appendix B: Example Chain-of-Custody Form

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 (0.1 inches 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.
- The Site Specific Health and Safety Plan must be reviewed for applicability to this project.
- 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).
- 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.
- 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 <u>Storm Water Sampling Event Data Form</u> (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.

 Water-resistant clipboard containing paperwork including, but not necessarily limited to, blank copies of the <u>StormWater Sampling Event Data Form</u>, 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:

- 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 <u>Storm Water Sampling Event Data Form</u> 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

- 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 <u>Storm Water Sampling Event Data Form</u>. 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.
- 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

 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

- 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		Aluminum				Chromium		Cyanide	Iron	Lead	Manganese			DII & Grease			TSS	Zinc
ID	Date	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Benchmark		0.75	-			-	****		1	0.0816	_			-				0.117
itts Study	Averages	***	0.0057	bissel	0.01589	0.01135	0.03069	0.01625	4.07654	0.0386		0.00033	0.01478	31.77	-	and a	123.05	0.2348
itts Study	Medians	200	0.003		0.001	0.007	0.016	0.005	1.955	0.016		0.0002	0.008	4	-	e000	58	0.1163
A1		T									_							011100
A2											-							
A3											-							
A4																-		
B1											-					-	-	
B2							_										-	
C1						-		-										-
C2								_	-					-			-	
D1														- :				
D2					-					_								
A1																		
A2				1					1									
										_								
A3			l:															
A4																		
B1																		
B2																		
C1																		
C2																		-
D1											·-						-	
D2									-								-	-
A1																-		-
A2																		
A3																-		
A4									-		-							
B1												_						-
B2						-			-				-					
C1						-												
C2		_																
D1																		
	-																	
D2																		
A1																		
A2																		
А3																		

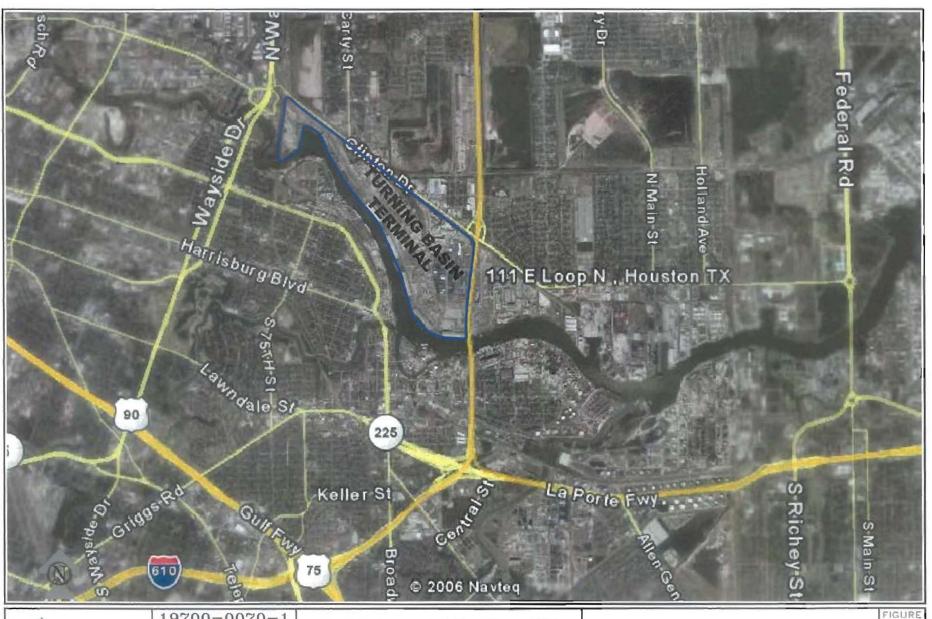
Table 1 Analytical Summary Table

Sample	Sample	Aluminum	Arsenic	Barium	Cadmium	Chromium	Copper	Cyanide	Iron	Lead	Manganese	Mercury	Nickel	Dil & Grease	Selenium	Silver	TSS	Zinc
ID	Date	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)		(mg/L)	
Benchmark	k 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	
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			1															
D1	1 1										-							
D2								_										
A1																		-
A2											-							
A3										-							-	
A4		1										-			1			-
B1										_								
B2		-						r			-						-	
C1										_			-					
C2																		-
D1															_			1
D2																		-
A1				-		0												
A2					-			500	-									
A3					-													
A4						_			-									
B1								-										
B2			-				-	-										
C1					-			-		_					_			
C2				-	-													
D1			_					_										
D2											-							
DZ	-		_							_								
	i d																	

Table 2
Analytical Specifications

Analyte	Method	Volume	Container	Preservative	Hold Time
0&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	ниоз	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.

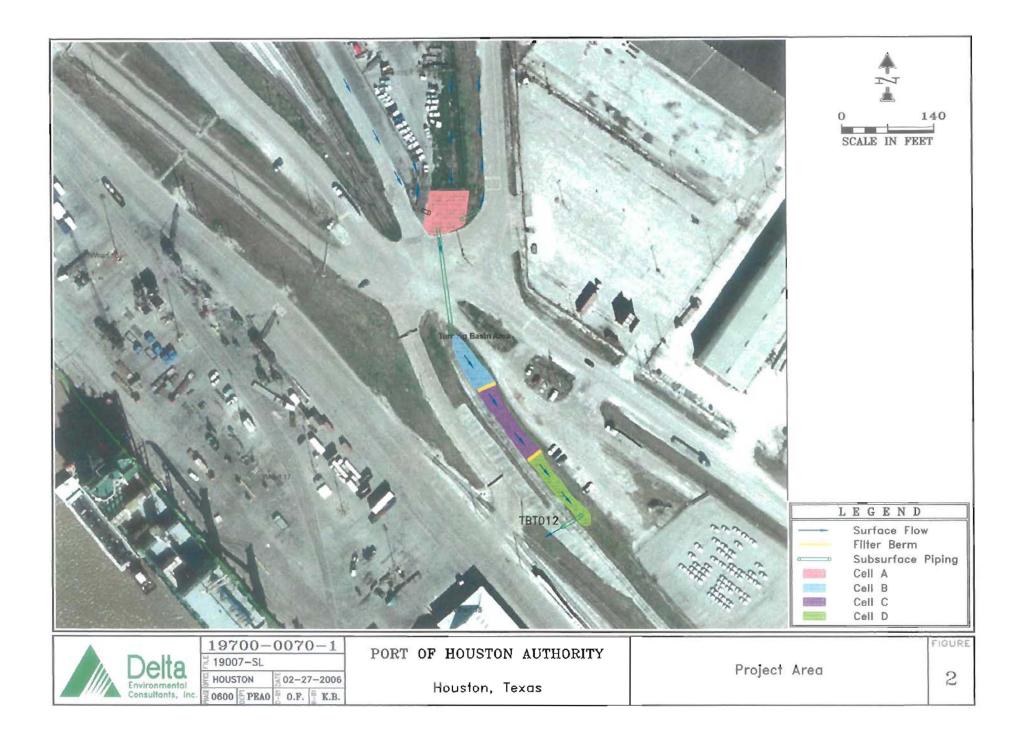
19700-0070-1 19007-SLM HOUSTON 502-27-2006 0600 5 PEAO 5 0.F. 5 K.B.

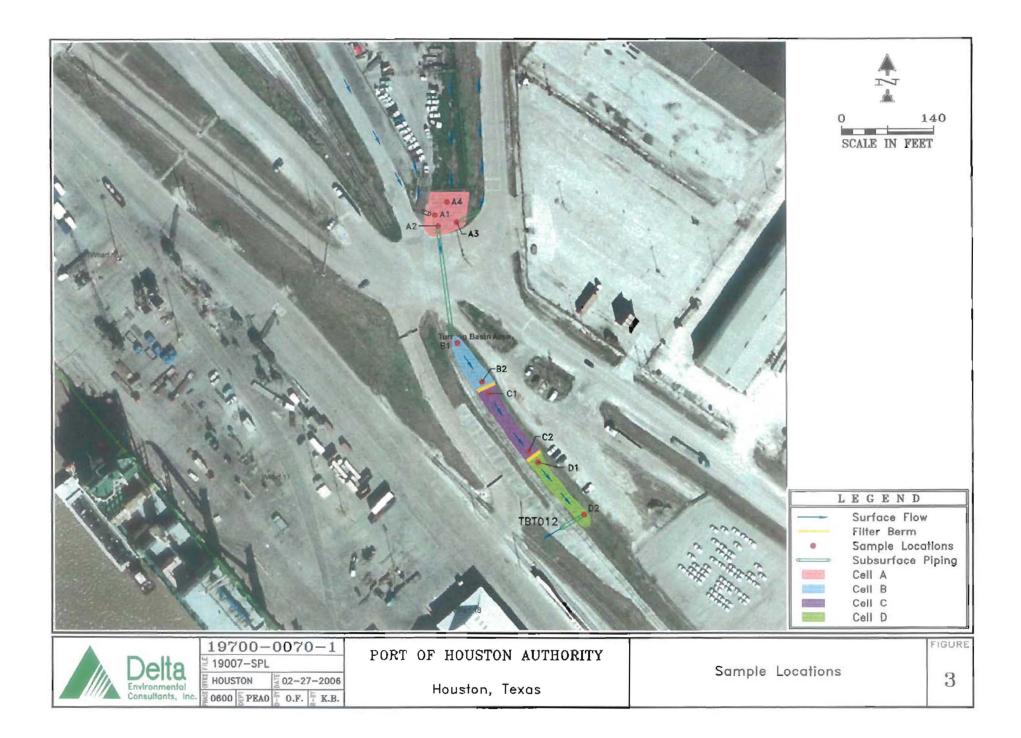
PORT OF HOUSTON AUTHORITY

Houston, Texas

Site Location Map

1







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 inte shows how your sample collection is compliant with the	
Time since the last measurable rainfall event (i.e., the most recent one that occurred <u>before</u> 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 hr., but you must provide a written explanation as to why you could? 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?	
Other notes and observations (it is important to record all or on reverse side of this sheet if necessary)	utfall conditions as they may influence your sample results! Continue
Laboratory where samples delivered Date Delivered (or picked up by lab): NOTE: Samples must be delivered to lab promptly, or else a new storm must be sampled.	Xenco Laboratories, 11381 Meadowglen, Houston, Texas 77082 / 281-589-0692 phone / 281-589-0695 fax
Copy of Chain of Custody attached to this sheet? (circle)	Yes / No

Appendix B

Example Cain-of-Custody Form

XENCO	11381 Meadowg 5309 Wurzbach,							1334	ANALYSIS REQUES 5757 N.W. 158th Street, Miami					CHAIN OF CUSTODY RECORD LAB ONLY: akes, Fl 33014 305-823-8500										
aboratories	11078 Morrison I	ane, Suit	e D, Dallas	, TX 7	5229	972-4	81-999	9			2618	South	h Falk	enbur	Rd, Ri	verview, F	133569 8	13-620-200	0 Serial #:				Page	of
Company-City Por of Houston Authority				Ph	one)-244		713-			TAT	r: 5	h 12	h 24	h 4	8h 3d	5d 7d	10d 2	1d Stand	ard TAT is project days for level III ar			1.	,	
Project Name Prev Grant Project BMP Study	iously performed a	XENCO			S	ite										F	Project ID							
Proj. Manager (PM) Nicole Cass Fax Results to PM (a.com	e-mai	l Fa	k No:							Ag. Zn)									计计		Remarks	S
to: PM and rsteinberg@ Invoice to□ Accounting Bill to: Roxana Herrera		ith Final	Report	Invo	oice m	nust h	ave a F	2.0				K, Se,								10d 21d	mg/Kg S Highest Hit	l apply)		
Quote No:		P.0 No		•			Call	for a F	2.0.			Mn, Hg, Ni,								7d 1	mg/Kg	lliw sei	0	
Reg Program: CLP AF	CEE TRRP DW	UST S	tate O	ther.]		Σ										harg	0.0ve	
Target DLs (DW CRDI	TRRP QAPP	MDLs S	ee Lab PM	Att	ache	d Ca	H)					ď.								20	>	Surc	Idde	
TRRP PCLs: Tier 1 Tie	r 2 Residential		Indus	strial								E S								39	mg/L W.	Analysis (Surcharges	pre-approved	
LPST No.:(Required)												3								48h	Ē	naly	are	
Sampler Name		Signa	ature							1		8								24h		Hold A		
Sample ID	Sampling Date	Time	Depth ft In" m	Matrix	Composite		Container Size	Container Type	Preservatives	158	080	Metals (Al, As, Ba,								TAT 5h 12h	Addn	Hold Disposal P	Sample Clean-ups	
				.		K			NA	X	-				\perp					X				
					2	X			Н		X									X				
					2	X			N			X								X				
<u> </u>								_												X				
										_				_										
										-				_										
										_										1				
Relinquished by (In	nitials and Sign)	Da	ate & Tim	е	_ F	Relinqu	uished	to (In	nitials	and	Sign	1)	D.	ate 8	Time	Rush	Charges	are Pre-A	pproved upon requ	uestir	ng the	em.		
		1														Instru	ictions;							
																All X	ENCO Sta	ndard Tem	ns and Conditions A	pply.				
					Lab											Cont	ainers Re	ceived:	Cooler	Temp	perat	ure:		

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

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Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Mar-30-06 09:30 am

Report Date:

18-APR-06

Contact: Nicole Cass Project Location:

Project Id:

Project Manager:

Debbie Simmons

	Lab Id:	264371-001	264371-0	02	264371-0	003	264371-	004
Analysis Requested	Field Id:	AI	Al		A1		A2	
	Depth:							
	Matrix:	WATER	WATER	3	WATE	R	WATE	R
	Sampled:	Mar-29-06 15:00	Mar-29-06 1	5:00	Mar-29-06	15:00	Mar-29-06	15:15
Oil and Grease by EPA 1664	Extracted:							
on that division by 2111 1001	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:							
100 09 2211 10012	Analyzed:		Mar-31-06 1	9:09				
	Units/RL:		mg/L	RL				
TSS by EPA 160.2			23.0	5.00				
Total Metals by SW6020A	Extracted:				Mar-31-06	10:55		
Total Metals by 5 W 002014	Analyzed:				Apr-03-06	15:48		
	Units/RL:			i	mg/L	RL		
Aluminum	1				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		3.14
Nickel					BRL	0.010		
Potassium					1.48	0.500		
Selenium					BRL	0.010		
Silver					BRL	0.010		
Zinc					0.050	0.010		

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Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Data Pagaiyad

Date Received in Lab: Mar-30-06 09:30 am

Contact: Nicole Cass

Project Id:

Project Location:

Report Date: 18-APR-06

Project Manager:

Debbie Simmons

	Lab Id:	264371-005		264371-0	006	264371-007	264371-	008
Analysis Requested	Fleld Id:	A2		A2		A3	A3	
	Depth:							
	Matrix:	WATER	-	WATE	R	WATER	WATE	R
	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:					Mar-31-06	
	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				
•	Analyzed:			Apr-03-06				
	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			
Potassjum				2.02	0.500		1	
Selenium				BRL	0.010			
Silver				BRL	0.010			
Zinc				0.038	0.010			

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Port of Houston Authority, Houston, TX



Project Id:

Project Location:

Project Name: CCC Grant Project

Date Received in Lab: Mar-30-06 09:30 am

Contact: Nicole Cass

Report Date: Project Manager:

Debbie Simmons

18-APR-06

rioject Escation.					rojecti	rianager.	Debbie 5		
	Lab Id:	264371-0	009	264371-0	10	264371-0	11	264371-	012
Analysis Requested	Field 1d:	A3		A4		A4		A4	
	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	2	WATE	R
	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:								
on and orease by Earla 2001	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	0:55					Mar-31-06	10:55
Total Metals by SW0020A	Analyzed:	Apr-03-06	16:29					Apr-03-06	16:33
	Units/RL:	mg/L_	RL		Į.			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		1			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				- 1	BRL	0.010
Silver		BRL	0.010					BRL	0.010
Zinc		0.252	0.010					0.036	0.010

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Project Location:

Certificate of Analysis Summary 264371

Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Mar-30-06 09:30 am

18-APR-06

Contact: Nicole Cass Report Date:

Project Manager: I

Debbie Simmons

	Lab Id:	264371-0	13	264371-0	14	264371-0	15	264371-0	016
Analysis Requested	Field Id:	A5		A5		A5		TBT12	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Depth:								
	Matrix:	WATER	3	WATER		WATE	3	WATE	R
	Sampled:	Mar-29-06 1	5:25	Mar-29-06 I	5:25	Mar-29-06	15:25	Mar-29-06	15:35
Oil and Grease by EPA 1664	Extracted: Analyzed: Units/RL:	Mar-31-06 1 mg/L							
Oil & Grease, Total Recovered		BRL	5.00						-
TSS by EPA 160.2	Extracted: Analyzed: Units/RL:			Mar-31-06 1	9:17 RL				
TSS by EPA 160.2				34.0	5.00				
Total Metals by SW6020A	Extracted: Analyzed: Units/RL:					Mar-31-06 Apr-03-06 mg/L		Mar-31-06 Apr-03-06 mg/L	
Aluminum	Cinis RE.					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			1			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
Zine						0.046	0.010	0.041	0.010

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Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Mar-30-06 09:30 am

18-APR-06

Contact: Nicole Cass

Project Id:

Project Location:

Report Date:

Project Manager: Debbie Simmons

	Lab Id:	264371-017	264371-018								
Analysis Requested	Field 1d:	TBT12	TBT12								
	Depth:										
	Matrix:	WATER	WATER								
	Sampled:	Mar-29-06 15:35	Mar-29-06 15:35								
Oil and Grease by EPA 1664	Extracted:										
31 and 31 and 4, 21 and 1	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								

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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.

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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	BLANK /BLANK SPIKE RECOVERY STUDY								
Total Metals by SW6020A Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R D	Control Limits %R	Flags				
Aluminum	0.010	0.200	0.212	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	<0.00	0.050	0.045	90	75-125					
Silver	010.0>	0.020	0.019	95	75-125					
Zinc	<0.010	0.050	0.062	124	75-125					



BS/BSD Recoveries



Project Name: CCC Grant Project

Work Order #: 264371

Project ID:

Analyst: MAB

Date Prepared: 03/31/2006

<5.00

Date Analyzed: 03/31/2006

Lab Batch ID: 676650

Sample: 676650-1-BKS

Batch #: 1

Matrix: Water

Units:	mg/L
	5.7

Analytes Oil & Grease, Total Recovered

	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY														
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					
<5.00	10.0	10.5	105	10.0	10.9	100	4	70-130	20						

Analyst: MCH

Oil and Grease by EPA 1664

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 BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
TSS by EPA 160.2	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added (E)	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag
Analytes	3.2		[C]	[D]		Result [F]	[G]				
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



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 #:

Matrix: Water

Date Analyzed: 04/03/2006

Date Prepared: 03/31/2006

Analyst:

TAH

Reporting Units: mg/L		N	IATRIX SPIK	E / MAT	RIX SPI	KE DUPLICA	TE REC	OVERY	STUDY		
Total Metals by SW6020A 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
Aluminum	0.576	0.200	1.12	272	0.200	1.18	302	10	85-115	25	Х
Arsenic	< 0.002	0.050	0.052	104	0.050	D .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	Х
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	



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 #: I
 Matrix: Water

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

Lab Batch #: 676616

 Date Analyzed: 03/31/2006
 Date Prepared: 03/31/2006
 O3/31/2006
 Analyst: MCH

 QC- Sample ID: 264382-002 D
 Batch #: 1
 Matrix: Water

SAMPLE/SAMPLE DUPLICATE RECOVERY Reporting Units: mg/L TSS by EPA 160.2 Sample Control Parent Sample RPD Limits Duplicate Result Flag %RPD Result A [B] Analyte TSS by EPA 160.2 44.0 46.0 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 SAMPLE SAMPLE DUPLICATE RECOVERY

Reporting Units: mg/L	SAMPLE/SAMPLE DUPLICATE RECOVERY										
Total Metals by SW6020A 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.

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Company-City PORT OF	Hous How	n		Phone	9	24		_		TAT	r: 5	h 12	h 2	4h	48h	3d	5d	70 evel	10d	9 813-620-200 1 21d Stand 10+ Working	Serial dard TAT is p		pecifi	C.	53	Pag	ge (
Proj. Manager (PM) Fax Results to PM	it pro	jeu	<i>A</i>	Fax N								0 418.1		PD23TAL	3			1	10,00					est Hit	F	Rema	arks
e-mail to: NCCC Invoice to Accounting Bill to: RDYANI Quote No:		h Final Re		Invoice	e mus		e a P		P.O.	Other	Other	3RO 8015DRO		3 8 E	N N	TCL PPs	, lugiu					25	7d 10d 21d	/Kg S High	2		
Reg Program: CLP AF Target DLs (DW CRD TRRP PCLs: Tier 1 Tie LPST No.:(Required) Sampler Name R. STE	L TRRP QAPP M er 2 Residential		Lab PM Indus		hed	Call)				8260 602 624 (8021 8260 624		8310	8 BRCRA Tot	624	PAHs B	Revised: Virgin Non-Virgin						24h 48h 3c 5d	3	Analysis	Ū.	
Sample ID	Sampling Date	Time	Depth If in m	Matrix	Grab	# Containers	Container Size	Container Type	Preservativos	BTEX by 8021	WIBE by	2	PAHs by 8270			OCs by 8	FL Prebum - Revi	3	590				TAT 5h 12h 3	: PAH abo	5 6	Sample Orean-ups	
Al	3-29-4	150 150		W	X	1	5	C	N	5)								y.	1				ナナ				
A-1 841	3-29-06 3-29-06 3-29-06	1500		W	X	1	5	P	6	V	-			4	-	+			V				+	-	-		

3/30/06 9:30am Lab: 1 3/30/06 0430 Containers Received: 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. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O) Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tediar Bag (B), Wipe (W), Other _

Relinquished to (Initials and Sign)

Kelly Steinlero

Rush Charges are Pre-Approved upon requesting them.

Cooler Temperature:

All XENCO Standard Terms and Conditions Apply.

Date & Time

3/29/06 1800

Date & Time

3)89/06 1800

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Company-City	11078 Morrison L			Phon	18			_		30									69 813-620-2000 Seri	al #: 19		5	1	Page 2
Post of E	touston			71	30	070	2	44	0	It is	typic	ally s	5-7 W	orkin	g Day	ys for	rleve		d 10+ Working days for le	vel III and IV	data.	_		
Project Name	eviously performed at		iest		Sit	8												Proje	ect ID					
Proj. Manager (PM)	Grace	PIC	gen		_	_			Т			-	-	4	1		Г				П		Re	emarks
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Fax Results to □ PM -mail to: N(uS	4.5.0	(Am										2	(8	1 5						V B	hest			
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Reg Program: CLP A	AFCEE TRRP DW	UST Sta	ate Of	her:							824	0150		40	BN&A	lon-				pg		shar	ove	
Target DLs (DW CRI	DL TRRP QAPP N	MDLs Se	e Lab PM	Attac	ched	Call)			624										PE PE	×.	(Surcharges	appr	
TRRP PCLs: Tier 1 T	ler 2 Residential		Indus	strial						802	8260	1664	1	824	PAHS	Virgin					ng/L W.	yais	pre-approved	1 1
LPST No.:(Required)				N	20	1			_	8		FL-Pro								48 48 48	-	Analysis	are	
Sampler Name RCC/	+ STEINBER S	Signa	iture a	11/10	1	200				8260	8021			-		30				245		Hold		
Sample ID	Sampling Date	Time	Depth ff In° m	Metrix	Composite	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021	BTEX-MTBE by	TPH by TX1005	PAHs by 8270	Metals by 6020	SVOCs by 8270		755	5780		TAT 5h 12h	n: PAH abov	Hold Disposal H	Sample Clean-ups	
A4	3-29-11	K20		W	X	1	1	C	11									X		V				
A4	32900	1570		W	V	,	5	9 0	AN	0					1		X			8				
AY	3-29N	16213		W	V	1	Ė	O.	LA	V)			7	1	1		1			1 5				
45	2.10-1	1571		is	0	1	1	00	MI	1			-	-	+		-	X		X				
NE	3-29-1	1570		10	X	1	1	Pa	1	1	-		-	-	+-	-	V	7		4		-		
MU	3-20 0	11/25	,	101	1	1)	P	14	1	-		-	V	-	-	X	-			-			

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

Relinquished to (Initials and Sign)

N

Date & Time

3/29/04 1800

Relinquished by Unitials and Sign)

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

3/09/04 1800 Instructions:

Rush Charges are Pre-Approved upon requesting them.

All XENCO Standard Terms and Conditions Apply.

Containers Received:

Date & Time

10

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

XENCO
Laboratories

REQUEST FOR ADDITIONS / CORRECTIONS FORM

Х	11381 Meadowglen, Suite L, Houston, TX 77082 (281) 589-0692	This form is a sup	plement to
	2025 McKenzie Rd., Suite 160, Carrollon, TX 75006 (972) 620-7966		
	5309 Wurzbach Rd., Suite 104, San Antonio, TX 78238 (210) 509-3334	COC No:	264371
	5757 N.W. 158th St., Miami Lakes, FL 33014 (305) 823-8555		
	2618 South Falkenburg Rd., Riverview, FL 33569 (813) 620-2000	Page 1_	of <u>1</u>

No:

This information sh	ould be taken from the	original COC.					Requ	uestec	Ву:	Kind	dra E	3rock	D/T	: 4/17/2006 10:00
Contractor:		ort of Houston		Phone:		X Addition		T			Г			TAT
Address:		,				Correction	П							24 HOURS
Project Name:	CC	C Grant Project		Project Mana	ger: Nicole Cass	Hold	nium							48 HOURS
Project Location						Cancellation	Chromium	Expires:	pires:	pires:		pires:	pires:	3 DAYS
Project No.:				Project Direc	tor:	No Addition		ime Ex	Hold Time Expires:	Hold Time Expires:		Hold Time Expires:	Hold Time Expires:	5 DAYS
Lab ID	Field ID	Date/Time	Depth	Matrix	Sample Descrip	otion		Hold Time	Hold T	Hold T		Hold T	Hold T	7-days Remarks
264371-003													*	
264371-006)							
264371-009)	<						
264371-015)	(
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Comments:	Chromium left of	list of required me	tals, please	provide.										
		ans&Corrections.	ligio Sanc	hez	Matrix Legend S = Solid P = Product L = Liquid SI = Studge	Add Received Add Assigned	Ву:	Deb	bie Sir	nmons	D/T	Γ:		4/17/2006 10:00
Date/Time:	3/30/2	006 9:30			A = Air O =	Add Processes					DЛ	r:		

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 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. 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,

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

maging Director, Texas

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.

Certified and approved by numerous States and Agencies.

A Small Business and Minority Status Company that delivers SERVICE and QUALITY

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



Port of Houston Authority, Houston, TX





Project Id:

Project Location: Houston

Contact: Nicole Cass

Date Received in Lab: Jun-01-06 11:04 am

Report Date:

13-JUN-06

Project Manager:

Debbie Simmons

	Lab Id:	266898-001	266898-00)2	266898-	003	266898-	004
Analysis Requested	Field Id:	Al	Al		Al		Al	
1. 100 may	Depth:							
	Matrix:	WATER	WATER		WATE	R	WATE	R
	Sampled:	May-31-06 15:45	May-31-06 1	5:45	May-31-06	15:45	May-31-06	15:45
Metals by EPA 200.8	Extracted:				Jun-13-06	09:08		
Wictals by ETA 200.0	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		
Sclenium					BRL	0.010		
Silver					BRL	0.010		
Zinc					0.019	0.010	***	
Oil and Grease by EPA 1664	Extracted:							
on and Grease by DIA 1004	Analyzed:		Jun-05-06 15	:42				
	Units/RL:		mg/L	RL				
Oil & Grease, Total Recovered		9	BRL	5.00				
TSS by EPA 160.2	Extracted:							
100 by Dill 10012	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:							
a come of managery and the control	Analyzed:						Jun-07-06	0:26
	Units/RL;						mg/L	RL
Cyanide, Total							BRL	0.02

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to a writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tamps - Miami - Latin America



Project Location: Houston

Contact: Nicole Cass

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jun-01-06 11:04 am

Report Date:

13-JUN-06

Project Manager:

Debbie Simmons

	Lab Id:	266898-005	266898-0	006	266898-0	007	266898-	008
Analysis Requested	Field Id:	A2	A2		A2		A2	
	Depth:							
	Matrix:	WATER	WATE	R	WATE	R	WATE	ER
	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		
Metals by D. A. 200.0	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		
Sclenium					BRL	0.010		
Silver					BRL	0.010		
Zinc					BRL	0.010		
Oil and Grease by EPA 1664	Extracted:							
	Analyzed:		Jun-05-06 1	5:44				
V	Units/RL:		mg/L	RL	_			
Oil & Grease, Total Recovered			BRL	5.00				
TSS by EPA 160.2	Extracted:							
	Analyzed:	Jun-06-06 19:30	ļ					
	Units/RL:	mg/L R						
TSS by EPA 160.2		BRL 5.	.00				171-17	
Total Cyanide by EPA 335.4	Extracted:							
	Analyzed:						Jun-07-06	10:28
	Units/RL:						mg/L	RL
Cyanide, Total			_				BRL	0.02

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America



Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Project Id: Date Received in Lab: Jun-01-06 11:04 am Report Date: 13-JUN-06 Contact: Nicole Cass Project Location: Houston Project Manager: Debbie Simmons

	Lab Id:	266898-0	09	266898-6	010	266898-	011	266898-	012
Analysis Requested	Field Id:	A3		A3		A3		A3	
	Depth:		1						
	Matrix:	WATER		WATE	R	WATE	R	WATE	R
	Sampled:	May-31-06 1	6:00	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		
Metals by EFA 200.6	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:								
On and Grease by Erri 1004	Analyzed:			Jun-05-06 J	5:46				
	Units/RL:			mg/L	RL				
Oil & Grease, Total Recovered				BRL	5.00				
TSS by EPA 160.2	Extracted:								
LOU Of DECK ADVIN	Analyzed:	Jun-06-06 19	9:30						
	Units/RL:	mg/L	RL						
TSS by EPA 160.2		BRL	5.00						
Total Cyanide by EPA 335.4	Extracted:								
gotal Cjaniac by Di It 555,4	Analyzed:							Jun-07-06 I	0:30
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

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Carlos A. Castro, Ph.D. MBA



Port of Houston Authority, Houston, TX





Project Id:

Date Received in Lab: Jun-01-06 11:04 am Report Date:

13-JUN-06

Contact: Nicole Cass Project Location: Houston

Project Manager:

Debbie Simmons

	Lab Id:	266000 012	277000 014	255000 015	244000 044
V 2007/07/07 ******************************		266898-013	266898-014	266898-015	266898-016
Analysis Requested	Field Id:	A4	Α4	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	
# 100 m 100	Analyzed:			Jun-13-06 12:33	
	Units/RL:	0.00		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:				
On and Grease by Erre 100-7	Analyzed:		Jun-09-06 18:36		
	Units/RL:		mg/L RL		
Oil & Grease, Total Recovered			BRL 5.00		
TSS by EPA 160.2	Extracted:				
100 UJ ELIA 100.2	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:				
Total Cyallide by DIA 333.4	Analyzed:				Jun-07-06 10:32
	Units/RL:				mg/L RL
Cyanide, Total					BRL 0.02

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Project Location: Houston

Contact: Nicole Cass

Certificate of Analysis Summary 266898

Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jun-01-06 11:04 am

13-JUN-06

Report Date:

Project Manager: Debbie Simmons

	Lab Id:	266898-017	266898-	018	266898-	019	266898-	020
Analysis Requested	Field Id:	A5	AS	0.10	AS	012	A5	020
zirusysis requesteu	Depth:	1.0						
	Matrix:	WATER	WATE	R	WATE	R	WATE	R
	Sampled:	May-31-06 16:3			May-31-06		May-31-06	
Matala by EBA 200.9	Extracted:	3 200 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			Jun-13-06			
Metals by EPA 200.8	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		
Sclenium					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 R	XL .					
TSS by EPA 160.2		36.0	5.00					
Total Cyanide by EPA 335.4	Extracted:							
	Analyzed:						Jun-07-06 1	
	Units/RL;						mg/L	RL
Cyanide, Total							BRL	0.02

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Project Location: Houston

Contact: Nicole Cass

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Project Name: CCC Grant Project

Date Received in Lab: Jun-01-06 11:04 am

Report Date:

13-JUN-06

Project Manager:

Debbie Simmons

	Lab Id:	266898-021	266898-0	22	266898-	023	266898-	024
Analysis Requested	Field Id:	D2	D2	1	D2		D2	
	Depth:							
	Matrix:	WATER	WATER	Ł	WATE	R	WATE	R
	Sampled:	May-31-06 16:40	May-31-06 I	6:40	May-31-06	16:40	May-31-06	16:40
Metals by EPA 200.8	Extracted:				Jun-13-06	09:08		
Metals by El A 200.0	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		
Zine					BRL	0.010		
Oil and Grease by EPA 1664	Extracted:							
o,, and oreast 5, 2111 100.	Analyzed:		Jun-09-06 18	3:40				
	Units/RL:		mg/L	RL				
Oil & Grease, Total Recovered			BRL	5.00				
TSS by EPA 160.2	Extracted:							
100 27 2212 1002	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:							
- come wy manus wy man ne www. T	Analyzed:						Jun-07-06	0:40
	Units/RL:						mg/L	RL
Cyanide, Total							BRL	0.02

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Project Location: Houston

Contact: Nicole Cass

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Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jun-01-06 11:04 am

Report Date: 13-JUN-06
Project Manager: Debbie Simmons

1 Toject Estation, Treasies					-	, and e			
	Lab Id:	266898-02		266898-0		266898-0	part	266898-	
Analysis Requested	Field Id:	Duplicate		Duplicat	e	Duplica	ie	Duplica	te
	Depth;								
	Matrix:	WATER		WATE	ર	WATE	R	WATE	R
	Sampled:	May-31-06 16	5:50	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	1					BRL	0.010		
Zinc						BRL	0.010		
Oil and Grease by EPA 1664	Extracted:								
On and Grease by Extraor	Analyzed:			Jun-09-06 I	8:42				
	Units/RL:			mg/L	RL				
Oil & Grease, Total Recovered				BRL	5.00				
TSS by EPA 160.2	Extracted:								
100 by 1111 10012	Analyzed:	Jun-06-06 19:	:30		i				
	Units/RL:	mg/L	RL						
TSS by EPA 160.2		5.00	5.00						
Total Cyanide by EPA 335.4	Extracted:								
Total Cyanide by Et A 355.4	Analyzed:							Jun-07-06 1	0:42
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.02

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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.

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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 #:	BLANK /	BLANK SP	IKE REC	COVERYS	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	0.186	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	(1) The last of th
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 #: BLANK/BLANK SPIKE RECOVERY STUDY Control Blank Spike Blank Blank Total Cyanide by EPA 335.4 Added Spike Limits Result Splke Flags [A] [B] Result %R %R Analytes [C] [D] < 0.020 0.200 0.205 Cyanide, Total 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

Matrix: Water

Batch #: 1

Units: mg/L BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY								ΟY			
Oil and Grease by EPA 1664	Blank Sample Result	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added [E]	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD %	Centrol Limits %R	Control Limits %RPD	Flag
Analytes			[C]	IDI		Result [F]	[G]				
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 BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY								Y			
Oil and Grease by EPA 1664	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added [E]	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD %	Control Limits %R	Control Limits %RPD	Flag
Analytes			[C]	[D]		Result [F]	[G]				
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 #:

Matrix: Water

Units: mg/L	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY									ΟY	
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	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

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

Date Analyzed: 06/13/2006 Analyst: MCH

Reporting Units: mg/L		N	IATRIX SPIK	E/MAT	RIX SPI	KE DUPLICA	ATE RECOVERY STUDY										
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						
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	Х						
Cadmium	< 0.001	0.020	0.018	90	0.020	0.019	95	5	75-125	25							
Chrotnium	<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 Analysi: AMB

Reporting Units: mg/L		MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY									
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Sample	l	Duplicate Spiked Sample		RPD	Control Limits	Control Limits	Flag
Analytes	Result [A]	Added [B]	lci	%R [D]	Added [E]	Result [F]	%R [G]	%	%R	%RPD	
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



Sample Duplicate Recovery



Project Name: CCC Grant Project

Work Order #: 266898

Lab Batch #: 680087 Date Analyzed: 06/13/2006

QC- Sample ID: 267249-001 D

Project ID:

Date Prepared: 06/13/2006 Analyst: MCH Batch #: Matrix: Water

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

Lab Batch #: 679757

Date Analyzed: 06/06/2006 QC- Sample 1D: 266898-017 D Date Prepared: 06/06/2006

Analyst: AMB

Reporting Units: mg/L

Batch #: Matrix: Water SAMPLE / SAMPLE DUPLICATE RECOVERY

Reporting Cinis. ing E	SAMI LE?	DAMIL CE	DOLLIC	AIL MEC	OVERI
TSS by EPA 160.2	Parent Sample Result	Sample Duplicate Result	RPD	Control Limits %RPD	Flag
Analyte	[A]	[B]		/ekt b	
TSS by EPA 160.2	36.0	39.0	8	20	

Lab Batch #: 679779

Date Analyzed: 06/07/2006 QC-Sample ID: 266867-001 D

06/07/2006 Date Prepared:

Analyst: AMB

Batch #:

Matrix: Water

Reporting Units: mg/L	SAMPLE / SAMPLE DUPLICATE RECOVERY									
Total Cyanide by EPA 335.4 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.

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11381 Meadowglen, Suite L, 5309 Wurzbach, Suite 104,	Houston TX 77082 28	1-589-0692
5309 Wurzbach, Suite 104,	San Antonio, TX 78238	210-509-333

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD 266898-H

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TRRP PCLs: Tier 1 Tie	r 2 Residential		Industr	ial					802	8260	0 16			PAHS	Virgin		80			48h	mg/L			
LPST No.:(Required)	17		- 17		4 .	7)	_	_	8260	8021	FL-Pro	8310	8280		ö		C, PS, 8			1				
Sampler Name	ra Brock	Signa	ture	M	Me	ist	RI	_	82					0	- Revised:		32			24h	9	Clean-uns	3	
	-					120	ype	9	120	E by	TX1005	8270	1008	8270	- Re		5	2		12	above	Sal	3	
Sample ID	Sampling	Time	E	ette	П.	iner S	er T	atly	6	Ę		2 3		Ď.	mnc	21	13	4		듄	PAH			
	Date			Matrix	Q	# Containers Container Size	Container Type	Preservatives	BTEX by 8021	BTEX-MTBE	н Бу	Metals by	WOO hu	SVOCs by	FL Prebum	750	meta	2			122	Hold Dis		
0.1			Depth ff in	Matrix	Grab				_	E	TPH	Q 5	3	3	il	10	3	Q'		TAT	B	운 0	Ď	-
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Al	5-31-01	545		N	X	12	8	N									X			X				
Ai Al	5-31-06	15715		W	X	15	P	Δ					T				1	X		X				
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11381 Meadowglen, Suite L.	Houston TX 77082 281-589-0692 San Antonio, TX 78238 210-509-333
5309 Wurzbach, Suite 104,	San Antonio, TX 78238 210-509-333

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD LAB ONLY:

266 898-H

	5757 N.W. 158th Street, Miami Lakes, FI 33014	305-823-8500
П	2618 South Falkenburn Rd. Riverview, FI 33569	813-620-2000

■ 11078 Morrison Lane, Suite D, Dallas, TX 75229 972-481-9999 78522 Page 7 of 3 TAT; 5h 12h 24h 48h 3d 5d 7d flod 21d Standard TAT is project specific. Phone Company-City It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data. Prolect ID Remarks 23TAL 418.1 至 PPs TCL PPs mg/Kg S Highest 8015DRO 210 Invoice to Accounting Inc. Invoice with Final Report Invoice must have a P.O. 200.8 SACRA Tot Pb TCLP8 Herrara-1 YOH Other 호 Non-Virgin 8015GRO 24 Call for a P.O. Quote No: Clean-ups are pre-approved VOA BN&A 624 Reg Program: CLP AFCEE TRRP DW UST State Other: Target DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call) 624 Virgin 802 PAHS TRRP PCLs: Tier 1 Tier 2 Residential Industrial LPST No.: (Required) 8021 825 FL Prebum - Revised: Sampler Name Kindra Signature Addn: PAH above Metals by 6020 SVOCs by 8270 à BTEX by 8021 PAHs by 8270 Sampling VOCs by Sample ID Sample Time Date 0 9 Relinquished by (Initials and Sign) Date & Time Relinquished to (Initials and Sign) Date & Time Rush Charges are Pre-Approved upon requesting them. 61-16 11:04 emolin All XENCO Standard Terms and Conditions Apply. 6/1/06 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)

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

Cont. Size: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (5), Tediar Bag (B), Wipe (W), Other _____

SDBE Committed to Excellence in Service and Quality since 1990

Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O)

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Manage Ma	11078 Morrison L	ane, Sulte	e D, Dallas,	TX 7	5229	972-4	31-9999	9			2618	8 Sout	Falks	nburg	Rd,	River	view,	FI 3356	9 813-620-200	00						-9
Company-City Port of HSO Project Name ElPre	19400 Au viously performed at	HA XENCO	rity	'Pho		67 ite	0-2	94	v	TA'	T: 5 s typi	5h 12h cally 5	1 241 -7 W	n 4. Orkin	8h S g Day	3d 5 ys fo	5d 7 r leve	d (10 III am	21d Stand 10+ Working	Seria dard TAT is p days for levi	roject si	pecifi	c.	32	Page	3 of
Proj. Manager (PM) A COL (A) Fax Results to PM e-mail to: PM Accounting Bill to: PVAN	SS_NCA OF (SH) NDO 1 Inc. Invoice will a Her	SS Gall the Final I	a pl	Fax	A (e No: e M	O)	M ČDM ave a	7 <u>1</u>			34	8015DRO 418.1	TCLP8 13PP 23TAL	dd	. PPs				3		0	100 210	g S Highest Hit II apply)	Re	emarl	ks
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Target DLs (DW CRD		IDLE Se	e Lab PM	Atta	achec	1 Ca	1)			524			1	>	8		1	1	42			. 5d	W. Surch	bbro		
TRRP PCLs: Tier 1 Ti	er 2 Residential		Indus	trial						802	8280	1664	BRCBA	624	PAHs	Virgin		1	3			ro l	mg/L dysis (-6-E		
LPST No.:(Required)	0 6		- 1			,		_				FL-Pro			9		١.	20	7			48h	Analysis	are p		
Sampler Name Kind	rabrock	Sign	ature	W	d	la.	B	202	Z	888	8021	교	8310	8260	625	- Revised:		1	THE PARTY			24h	고			
Sample ID	Sampling Date	Time	Depth ft in* m	Matrix	Composite	# Containers	Container Size	Container Type	Preservatives	BTEX by 8021	BTEX-MTBE by	> .	Metals by 6020	8 2		_	35	344	yanid			57	Addn: PAH above Hold Disposal Ho	Sample Clean-ups		
D7	5-3+06	Valla		111		Ti	7	D	10/16	1 00	18	- 1	2 3	1>	S	u	V	7	10	+++			¥ ĭ	S		+
17	6-31-N/a	11.11	~	W	1	i	1	G	5	4		-	-	+			X	V		-	+	X	-	_		+
07	5-31-Dla	Udh		1 1	Y		2	0	11	+	-	-	+-	+	+	-	-	L	,	+	+	X	-			1
1/2	5-3106	1040		W	1	1	-	- 10	14	+	-	-	+	+	-	-		/	(\perp	X	_			
Quality to	5-3100	11040		N	Y	1	2	P	1	+		-	-	-	_	_		_	1			X				
human to	5-31-00	100		W	^	1	2	ρ	NA	4_	-		1	-	_		X					X				
Julian	2-21-04	1650		N	X		1	9	5	+			-	-	1	_		X				X				
Marian	5-31-06	luso		W	Х		2	K	Ň	-	-	1		-	-	_		1				X				
upercas	5-21-04	1600		W	7	41	5	P	A	1	-		-	-					X			X				
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								10							_	-			Standard Tem	ns and Convict	one And	he				
-					Lab:	-	W	1	2			6	1116	6 /	10	4	la				S 14 - 15		raturo			
Preservatives: Various Cont. Size: 4oz (4), 8oz	(V), HCl pH<2 (H),	H2SO4 p	DH<2 (S). H	-INO	204	200	-debc	Anida	NIO	11/0			1		U	_	-			- 0		_				

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 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. 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.B., MBA Managing Director, Texas

anaging Director, Texas

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Project Id:

Project Location: Houston

Contact: Nicole Cass

Certificate of Analysis Summary 267633

Port of Houston Authority, Houston, TX



Date Received in Lab: Jun-19-06 11:19 am

Report Date: 27-JUN-06

Project Manager: Debbie Simmons

	Lab Id:	267633-	001	267633-	002	267633-	003	267633-	004
Analysis Requested	Field Id:	A1		A2		A3		A4	
	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	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
Metals by ETA 200.8	Analyzeá:	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	0.00;
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:								
J	Analyzed:	Jun-21-06	7:04	Jun-21-06	17:06	Jun-21-06	7:08	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 1	9:20	Jun-20-06	19:22	Jun-20-06	19:24	Jun-20-06	9:26
	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 1		Jun-21-06 1	200000	Jun-21-06 1		Jun-21-06 1	7:02
	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

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Managing Director, Texas



Project Id:

Project Location: Houston

Contact: Nicole Cass

Certificate of Analysis Summary 267633

Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jun-19-06 11:19 am

Report Date: 27-JUN-06

Project Manager: Debbie Simmons

Project Location: Houston					Project Ma	lager. Deve	ole Simmons
	Lab Id:	267633-0	005	267633-0	006		
Analysis Requested	Field Id:	A5		TBT-12	2		
	Depth:						
	Matrix:	WATE	R	WATE	R		
	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		
Micials by El A 200.0	Analyzed:	Jun-20-06 1	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 1	7:12	Jun-21-06 1	7:14		
	Units/RL:	mg/L	RL	mg/L	RL		
Oil & Grease, Total Recovered		BRL	5.00	BRL	5.00		
TSS by EPA 160.2	Extracted:						
155 by El A 100.2	Analyzed:	Jun-20-06 1	9:28	Jun-20-06 I	9:30		
	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 1		Jun-21-06 1	774-525 K1		
	Units/RL:	mg/L	RL	mg/L	RL		
Cyanide, Total		BRL	0.020	BRL	0.020		400,000,000,000,000

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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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.

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Blank Spike Recovery



Project Name: CCC Grant Project

Work Order #: 267633

Project ID:

Lab Batch #: 680660 Date Analyzed: 06/20/2006 Sample: 485779-1-BKS

Matrix: Water

Date Prepared: 06/20/2006 Analyst: MCH

Ratch #- | RIANK/RIANK SPIKE RECOVERY STUDY

Reporting Units: mg/L	Batch #: 1		BLANK SPI	KE REC	COVERYS	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	0.212	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-)15	

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

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		BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY												
Oil and Grease by EPA 1664	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added [E]	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD %	Control Limits %R	Control Limits %RPD	Flag			
Analytes			[C]	[D]		Result [F]	[G]							
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 #: ! Matrix: Water

Units: mg/L		BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY											
TSS by EPA 160.2	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		
Analytes			ICI	[]		Kesun [F]	[6]						
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

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

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

Reporting Units: mg/L		M	IATRIX SPIK	E/MAT	RIX SPI	KE DUPLICA	TE REC	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY													
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										
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	Х										
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	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY													
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Sample	Spike	Duplicate Spiked Sample		RPD	Control Limits	Control Limits	Flag			
Analytes	Result [A]	Added [B]	C	%R D	Added [E]	Result [F]	%R [G]	%	%R	%RPD				
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



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 #: I
 Matrix: Water

Reporting Units: mg/L	SAMPLE	SAMPLE	DUPLIC	ATE REC	OVERY
Metals by EPA 200.8 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	2.5	
Nickel	<0.010	<0.010	NC	25	
Sclenium	<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

SAMPLE/SAMPLE DUPLICATE RECOVERY Reporting Units: mg/L Control Sample **TSS by EPA 160.2** Parent Sample RPD Result Duplicate Limits Flag Result %RPD [A] [B] Analyte TSS by EPA 160.2 < 5.00 <5.00 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	SAMPLE /	SAMPLE	DUPLIC	ATE REC	OVERY
Total Cyanide by EPA 335.4 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.

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6	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 CHILT: 7633-4

☐ 5767 N.W. 158th Street, Miami Lakes, FI 33014 305-823-8500 2618 South Falkenburg Rd, Riverview, Fl 33569 813-620-2000

Accounting Inc. Invoice with Final Report District Reviewer No. Call for a P.O.	Manager (PM)	ass v	1/11	sa	0	1 DH	41						418.1	23TAL					2				분		Remarks
Sample Clearur Revision Hold Disposal Hold D	all to: PM Juice to Accounting o: Accounting	CEE TRRP DW TRRP QAPP N 2 Residential	P.O No: UST Sta	epon Di l te Oth Lab PM	er. Atta	ched	Call	Call f	_	°.o.	602 624 (8260 624 Other	1664 8015GRO 8015DRO	BRCRA Tot Pb TCLP8 13PP	624 VOA VOH PPs TCI	PAHS BN&A TCL	Virgin					48h 3d 5d 7d 🚳 21d	mg/L W, mg/Kg S Highest	Analysis (Surcharges will are pre-approved	
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11331 Meadowglen, Sulte L, Hauston TX 77082 281-589-0692 5309 Wurzbach, Sulte 104, San Antonio, TX 78238 210-509-3334

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

5757 N.W. 158th Street, Miami Lakes, FI 33014 305-823-8500

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☐ 11078 Morrison Lans, Suite D, Dallas, TX 75229 972-481-8999 ☐ 2618 South Falkenburg Rd, Riverview, FI 33569 813-620-2000

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Preservatives; Various (Cont. Size: 4oz (4), 8oz	00 UOL-U 0 00	110004	11 0 101 11	La	ID:	9	1		\rightarrow	(2/1	9/0	6	\mathcal{H}°	17	Conta	ainers Received:	O Cooler Ter	nperat	ure:	2.0	

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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, FI 33014 305-823-8500

	2618 South Falkenburg Rd, Riverview, FI 33569	813-620-20
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roject Name Previo	usly performed at	XENOS	t	UT.	4 5	te	DI	00	עדיי	/ ·· <u>~</u>	урк	-	_		1000	ayo ii	OI 10V	Projec	t ID	Orking day	TAT is projects for level III	BIO IV	uata.			
pax Results to DPM or mail to: PM or part DLa (DW CRDL RRP PCLs: Tier 1 Tier 2 PST No.:(Required)	EE TRRP DW TRRP QAPP N 2 Residential	P.O No UST St IDLs Se	ate Ot	Invo		Е] Cal		P.O.	30 602 624 Other	1 8250 524 Other	FL-Pro 1664 8015GRO 8015DRO 418.1		8 BRCHA Tot Pb TCLP8 13	5 PAH BINKA TO PPS ICL	Virgin Non-Virgin		4, 4, 50, Cd, C4, Cr, FL, Pb)	No.			48h 3d 5d 7d/10d 21d	mg/L W, mg/Kg S Highest Hit	Analysis (Surcharges will apply)	Remar	ks
Sample ID	Sampling Date	Time	eture E	Matrix	Composite	* Containers	Container Size	Container Type	Proservatives	BTEX by 8021 8260	BTEX-MTBE by 8021	X1005	8270	6020	SVOCs by 8021 8260	- Revis	75.5	520	Lyonide	2		TAT 5h 12h 24h	900	Rold Disposal Hold A		
BT/2 BT/2 BT/2 BT/2	6-19-24	0928 0928 0928 0928		W /			2125	P	NA								X	X,	X			*				
Relinquished by (Initia	als and Sign)	Dat - 9	te & Time		Re	Blingu	shed	io Lla	iliate	baec.	Sign	_		ate CG	8 Tir	ne :19		sh Chan	jes are	Pre-Appro	wed upon req	uesting	g them			1
reservatives; Various (V) ont. Size: 4oz (4), 8oz (8)	, HCl pH<2 (H), I	H2SO4 p	112167	INO	ap:	3 (N).	Astoc	Acida	iNaO)	H (4)	. Zn/	2	al	04	(Coo	1,1	All :	(ENCO ntainers None (Receive	ed: e Label (L	Cooler), Other (O), s Clear (C), F	Tempe				

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 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. 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

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Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jul-06-06 03:52 pm

Contact: Nicole Cass Project Location: Houston

Project Id:

Report Date: 18-JUL-06 Project Manager:

Debbie Simmons

	Lab Id:	268300-00	01	268300-0)2	268300-	003	268300-6	004
Analysis Requested	Field Id:	AI		Al		Al		Al	
2-11 and 10-12 a	Depth:								
	Matrix:	WATER		WATER		WATE	R	WATE	R
	Sampled:	Jul-05-06 15	5:35	Jul-05-06 1:	5:35	Jul-05-06	15:35	Jul-05-06	15:35
Metals by EPA 200.8	Extracted:					Jul-07-06	09:25		
Metals by El A 200.0	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:						_		
On and Grease by El A 1004	Analyzed:	Jul-10-06 11	:16						
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00				1		
TSS by EPA 160.2	Extracted:	-							
155 by LLA 100.2	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:								
tomi Cjamac by Di A 555.4	Analyzed:							Jul-10-06 I	5:08
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories, XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America Managing Director, Texas



Certificate of Analysis Summary 268300 Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jul-06-06 03:52 pm

Contact: Nicole Cass

Project Id:

Project Location: Houston

Report Date: Project Manager:

18-JUL-06 Debbie Simmons

	Lab 1d:	268300-00	5	268300-0	06	268300-0	007	268300-	008
Analysis Requested	Field 1d:	A2		A2		A2		A2	
	Depth:								
	Matrix:	WATER		WATER	3	WATE	R	WATE	R
	Sampled:	Jul-05-06 15	:30	Jul-05-06 1	5:30	Jul-05-06	5:30	Jul-05-06	15:30
Metals by EPA 200.8	Extracted:					Jul-07-06 (9:25		
Factors by Ex 21 20010	Analyzed:					Jul-07-06	7:47		
	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		
lron						1.55	0.200		
Lead						BRL	0.002		
Manganese					1	0.014	0.010		
Mercury			- 1			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: Units/RL:	Jul-10-06 11:	18 RL						
Oil & Grease, Total Recovered	Cinia Adi	BRL	5.00						-
TSS by EPA 160.2	Extracted: Analyzed: Units/RL:	pr 3 7 4 4 7 25		Jul-06-06 20 mg/L):32 RL				
TSS by EPA 160.2				BRL	5.00				
Total Cyanide by EPA 335.4	Extracted: Analyzed:							Jul-10-06 1	5:16
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.02

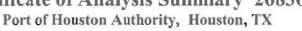
This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use.

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Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America Carlos A. Castro, Ph.D. MBA Managing Director, Texas







Project Id:

Project Location: Houston

Project Name: CCC Grant Project

Contact: Nicole Cass

Date Received in Lab: Jul-06-06 03:52 pm

Report Date: 18-JUL-06

Project Manager:

Debbie Simmons

	Lab Id:	268300-009	268300-0	10	268300-0	011	268300-0	12
Analysis Requested	Field Id:	A3	A3		.4.3		A3	
	Depth:							
	Matrix:	WATER	WATER		WATE	R	WATE	R
	Sampled:	Jul-05-06 15:25	Jul-05-06 13	5:25	Jul-05-06	15:25	Jul-05-06 1	5:25
Metals by EPA 200.8	Extracted:				Jul-07-06 (9:25		
Miciais by El A 200.0	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:							
on and Greate by Militator	Analyzed:	Jul-10-06 11:20						
	Units/RL:	mg/L RL						
Oil & Grease, Total Recovered		BRL 5.00						
TSS by EPA 160.2	Extracted:							
100 0, 21,1 10012	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 1:	5:18
	Units/RL:						mg/L	RL
Cyanide, Total							BRL	0.02

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Managing Director, Texas



Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jul-06-06 03:52 pm

18-JUL-06

Contact: Nicole Cass

Project Id:

Project Location: Houston

Report Date:

Project Manager: Debbie Simmons

	Lab Id:	268300-0	13	268300-0	14	268300-	015	268300-	016
Analysis Requested	Field Id:	A4		A4		A4		A4	
	Depth:								
	Matrix:	WATER	3	WATE	3	WATE	R	WATE	R
	Sampled:	Jul-05-06 1	5:40	Jul-05-06 1	5:40	Jul-05-06	15:40	Jul-05-06	15:40
Metals by EPA 200.8	Extracted:					Jul-07-06	09:25		
Metals by El A 200.0	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	1					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:					_			
Off and Grease by El A 1004	Analyzed:	Jul-18-06 1	1:06						
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	Extracted:								
100 09 11 11 10012	Analyzed:			Jul-06-06 2	0:36				
	Units/RL:			mg/L	RL				
TSS by EPA 160.2				BRL	5.00				
Total Cyanide by EPA 335.4	Extracted:								
a view of minute of Data octiv	Analyzed:							Jul-10-06	15:20
	Units/RL:							mg/L	RL
Cyanide, Total								BRL	0.020

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Carlos A. Castro, Ph.D. MBA

Managing Director, Texas



Port of Houston Authority, Houston, TX



Project Name: CCC Grant Project

Date Received in Lab: Jul-06-06 03:52 pm

18-JUL-06

Contact: Nicole Cass

Project Id:

Project Location: Houston

Report Date:

Project Manager: Debbie Simmons

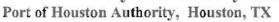
	Lab Id:	268300-0	17	268300-018	268	300-019	268300-	-020
Analysis Requested	Field Id:	A.5		A5		AS	A5	
	Depth:							
	Matrix:	WATER	2	WATER	· W	ATER	WATE	ER
	Sampled:	Jul-05-06 1	5:50	Jul-05-06 15:50	Jul-05	-06 15:50	Jul-05-06	15:50
Metals by EPA 200.8	Extracted:				Jul-07	-06 09:25		
Tractals by Earla 20010	Analyzed:				Jul-07	-06 18:10		
	Units/RL:				mg	/L RL		
Aluminum					0.	132 0,010		
Arsenic					0.0	0.002		•
Barium					0.0	0.010		
Cadmium			•		В	RL 0.001		
Chromium					В	RL 0.010		
Copper					В	RL 0.010		
Iron					1	.63 0.200		
Lead					В	RL 0.002		
Manganese					0.0	0.010		
Mercury					В	RL 0.0004		
Nickel					0.0	0.010		
Selenium					В	RL 0.010		
Silver					В	RL 0.010		
Zine					В	RL 0.010		
Oil and Grease by EPA 1664	Extracted: Analyzed: Units/RL:	Jul-18-06 1 mg/L	1:08 RL					
Oil & Grease, Total Recovered		BRL	5.00					
TSS by EPA 160.2	Extracted: Analyzed:			Jul-06-06 20:38				
	Units/RL:			mg/L R	L			
TSS by EPA 160.2				7.00 5	.00			
Total Cyanide by EPA 335.4	Extracted: Analyzed:						Jul-10-06	
C -11 T-1	Units/RL:						mg/L	RL
Cyanide, Total					j		BRL	0.02

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







Project Name: CCC Grant Project

Date Received in Lab: Jul-06-06 03:52 pm

Report Date:

18-JUL-06

Project Id: Contact: Nicole Cass

Project Location: Houston Project Manager: Debbie Simmons

	Lab Id:	268300-0	21	268300-02	22	268300-0	023	268300-	024
Analysis Requested	Field 1d:	TBT-12		TBT-12		TBT-12	2	TBT-I	2
	Depth:								
	Matrix:	WATER	3	WATER	t	WATE	R	WATE	R
	Sampled:	Jul-05-06 1	5:45	Jul-05-06 1:	5:45	Jul-05-06	15:45	Jul-05-06	15:45
Metals by EPA 200.8	Extracted:					Jul-07-06 (9:25		
Metals by El A 200.6	Analyzed:					Jul-07-06	18:13		
	Units/RL:					mg/L	RL		
Aluminum						0.153	0.010		
Arsenic						0.005	0.002		0.12
Barium					-	0.041	0.010		*
Cadmium						BRL	100.0		
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					1	BRL	0.010		
Silver	•					BRL	0.010		
Zinc			11			0.011	0.010		
Oil and Grease by EPA 1664	Extracted: Analyzed:	Jul-18-06 1	1:10						
	Units/RL:	mg/L	RL						
Oil & Grease, Total Recovered		BRL	5.00						
TSS by EPA 160.2	Extracted:								
	Analyzed:			Jul-06-06 20	0:40				
	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:							rng/L	RL
Cyanide, Total								BRL	0.020

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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.

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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

eporting Units: mg/L Batch #: 1 BLANK /BLANK SPIKE RECOVE						
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	
Zine	<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 #: BLANK/BLANK SPIKE RECOVERY STUDY Blank Spike Blank Blank Control Total Cyanide by EPA 335.4 Flags Result Added Spike Spike Limits [B] Result %R %R A Analytes [C] DI < 0.020 0.200 0.166 80-120 Cyanide, Total

 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 #:	BLANK /	BLANK SP	IKE REC	COVERYS	TUDY
Total Cyanide by EPA 335.4	Blank Result	Spike Added	Blank Spike Result	Blank Spike %R	Control Limits %R	Flags
Analytes	[A]	[B]	[C]	[D]	7aR	
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 Analyst: AMB

Date Prepared: 07/10/2006

Batch #: 1

Project ID: Date Analyzed: 07/10/2006

Lab Batch ID: 681268

Sample: 681268-1-BKS

Matrix: Water

Units:	mg/L

	BLANI	K/BLANK	SPIKE / E	BLANK S	PIKE DUPI	LICATE F	RECOVI	ERY STUL	ΟY	
Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Black Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
25.00	20.0	23.0	120	20	23.6	119	2	70.130	20	

Analyst: AMB

Analytes Oil & Grease, Total Recovered

Oil and Grease by EPA 1664

Date Prepared:

07/18/2006

94

1000

Date Analyzed: 07/18/2006

Lab Ratch ID: 681710

Sample: 681710-1-BKS

Blank

[A]

< 5.00

<5.00

Batch #:

Matrix: Water

Units: mg/L		BLAN	K/BLANK	SPJKE / E	BLANK S	PIKE DUPI	LICATE 1	RECOVI	ERY STUL	ŊΥ	
Oil and Grease by EPA 1664	Blank Sample Result	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added (E)	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag
Analytes	1.3		[C]	D	1-1	Result [F]	[G]			1.55	
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

935

Date Analyzed: 07/06/2006

Lab Batch ID: 681165

TSS by EPA 160.2

Sample: 681165-1-BKS

Batch #: 1

1000

Matrix: Water

2

80-120

20

Units: mg/L

Analytes

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY Blank Blk. Spk Spike Blank Blank Control Control Spike Sample Result Added Spike Spike Spike Dup. RPD Limits Limits Added Flag Result %R Duplicate %R % %RPD [B] (E) %R [C] |a|Result [F] [G]

921

92

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

TSS by EPA 160.2



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 #:

Matrix: Water

Date Analyzed: 07/07/2006

Reporting Units: mg/

Date Prepared: 07/07/2006

Analyst:

MCH

MATDLY SPIKE / MATDLY SPIKE DUPLICATE RECOVERY STUDY

teporting Units: mg/L	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY						MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY STUDY					
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	Fla	
Aluminum	0.039	0.200	0.154	58	0.200	0.139	50	15	75-125	25	Х	
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	Х	
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	Х	
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 #:

Matrix: Water

Date Analyzed: 07/10/2006

Date Prepared: 07/10/2006

Reporting Units: mg/I

Analyst: AMB

eporting Units: mg/L		N	IATRIX SPIK	E/MAT	RIX SPI	KE DUPLICA	TE REC	OVERY	STUDY		
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Sample	Spike	Duplicate Spiked Sample	Spiked Dup.	RPD	Control Limits	Control Limits	Flag
Analytes	Result [A]	Added [B]	[C]	%R [D]	Added [E]	Result [F]	%R [G]	%	%R	%RPD	
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 Relative Percent Difference RPD = 200*(D-G)/(D+G) Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E



Form 3 - MS / MSD Recoveries

nelad

Project Name: CCC Grant Project

Work Order #: 268300

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

Date Analyzed: 07/11/2006 Analyst: AMB

Reporting Units: mg/L		N	IATRIX SPIK	E/MAT	RIX SPI	KE DUPLICA	TE REC	OVERY	STUDY		
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Spiked Sample		Duplicate Spiked Sample	Spiked Dup.	RPD	Control Limits	Control Limits	Flag
Analytes	Result [A]	Added [B]	{C]	%R D	Added [E]	Result [F]	%R [G]	9/0	%R	%RPD	
Cyanide, Total	< 0.020	0.200	0.189	95	0.200	0.189	95	0	80-120	20	



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 SAMPLE / SAMPLE DUPLICATE						
Metals by EPA 200.8 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 1D: 268228-001 D
 Batch #: I
 Matrix: Water

Reporting Units: mg/L SAMPLE DUPLICATE RECOVERY

Acporting country and a						
TSS by EPA 160.2	Parent Sample, Result	Sample Duplicate	RPD	Control Limits %RPD	Flag	
Analyte	[A]	Result [B]		76RPD		
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 SAMPLE / SAMPLE DUPLICATE RECOVERY TSS by EPA 160.2 Parent Sample Sample Control Duplicate RPD Limits Result Flag Result %RPD [A] [B] Analyte TSS by EPA 160.2 5.00 5.00 20



Sample Duplicate Recovery



Project Name: CCC Grant Project

Work Order #: 268300

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

Reporting Units: mg/L SAMPLE / SAMPLE DUPLICATE RECOVERY

Total Cyanide by EPA 335.4 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 Prepared: 07/11/2006 Date Analyzed: 07/11/2006 Analyst: AMB Batch #: Matrix: Water QC- Sample ID: 268300-024 D

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

	G
6	90
	16
	9
	3

company-City Phone Previously performed at XENCO CC Grant Project Phone CC Grant Project Phone CC Grant Project	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
ax Results to PM or Fax No: -mail to: PM or RSHCINDE GO OF Throice must have a P ill to: PVOVIA HEVICIONO: -mail to: PVOVIA HEVICIONO: Call -mail to: PVOVIA HEVICIONO: Call -mail to: PONO: Call -mail to: PONO: Call -mail to: PONO: Call	24 Other 8015GRO 8015DRO 418.1 Tot Pb TCLP8 13PP 23TAL VOA VOH PPs TCL N&A TCL PP6 Non-Virgin Fd 7d (10d) 21d mg/Kg S Highest Hit richarges will apply) Proved Make TCL PP6 Non-Virgin
Arget DLs (DW CRDL TRRP QAPP MDLs See Lab PM Attached Call) RRP PCLs: Tier 1 Tier 2 Residential Industrial PST No.: (Required) ampler Name	### Preservatives Mail BTEX by 8021 8260 602 6 ETEX-MTBE by 8021 8260
7.5-04 5.35 W X 1 1 2 1 3 2 1 3 2 1 3 2 1 3 3 3 3 3 3 3 3 3	S X X X X X X X X X X X X X X X X X X X

Lab: 7006 1955 Containers Received: Cooler Temperature:

Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH 2 (N), Asbc Acid&NaOH (A), ZnAceNaOH (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 CD01 (2) Cont. Type: Glass Amb (A), Glass Clear (C), Plastic (P), Other (O)

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11.0 Appendix C

11.1 Planting Plan

By: Benchmark Ecological Services, Inc

Coastal Coordination Council Phytoremediation Project Planting Plan

1.0 Introduction

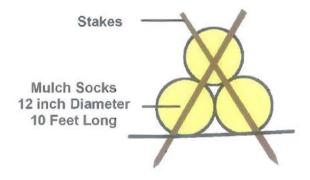
This document is to provide the planting strategy for the Coastal Coordination Council (CCC) Grant Project – Storm Water Phytoremediation Study being conducted by the Port of Houston Authority (PHA). The goal of the project is to establish wetland plants which, in conjunction with physical and biological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

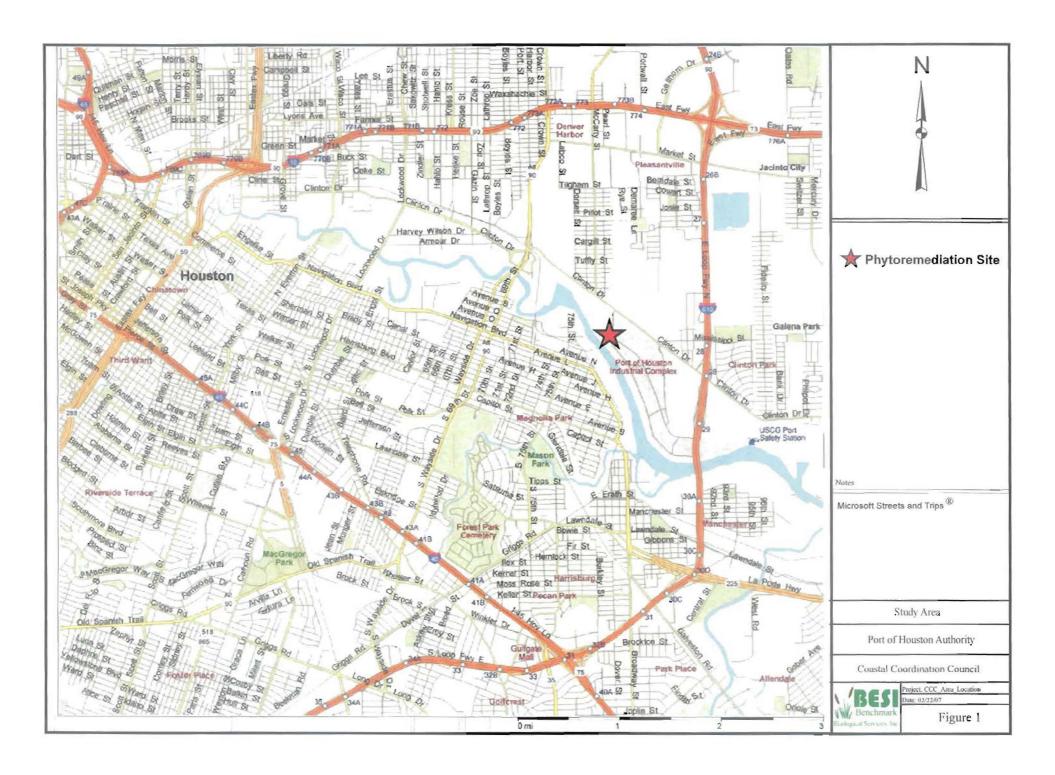
2.0 Site Preparation

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.



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.



12.0 Appendix D

12.1 Site Photographs



Installation of Mulch Socks



Mulch Socks and Rope Barricade



Mulch Socks



Rope Barricade and Sign



PHA-CCC

Phytoremedition

A-I











Phytoremedition PHA-CCC



Study Area 3/12/2007



Study Area 7/18/2007



Study Area 6/12/2007



Study Area 7/18/2007



PHA-CCC

Phytoremedition

A-3



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



Water Sampling



Irrigation of the Study Area



Sample Area A



PHA-CCC Phytoremedition

A-4

13.0 Appendix E

13.1 Sampling Forms



Event Description:

STORMWATER SAMPLING EVENT DATA FORM

1st event Phytoremediation	Study
Fill this out when sampling is conducted. This is an intern- shows how your sample collection is compliant with the sti	
Time since the last measurable rainfall event (i.e., the most recent one that occurred <u>before</u> 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:	V- (C) 5-1-1
 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 outfareverse side of this sheet if necessary) Sampled 8 of the 10 samples	all conditions as they may influence your sample results! Continue on
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

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Preservatives: Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO3 pH<2 (N), Asto Acid&NaOH (A), ZriAc&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)

Event Description: 2nd event



STORMWATER SAMPLING EVENT DATA FORM

Phytoremed aton Study

Fill this out when sampling is conducted. This is an international shows how your sample collection is compliant with the ste	
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)	7 72 hours
Name of sampler:	Mengen Attenson, Brett Soutar
Date of sampling:	5/22/07
Time at which rainfall began:	~ 0400
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? 	Yes / No Explain
Are odors present?	Yes / (No) Explain
Other notes and observations (it is important to record all outfareverse side of this sheet if necessary)	all conditions as they may influence your sample results! Continue on
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

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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)

Relinquished to (Initials and Sign)

Relinquished by (Initials and Sign)

Date & Time

Instructions:

Rush Charges are Pre-Approved upon requesting them.

All XENCO Standard Terms and Conditions Apply.

Date & Time



Event Description:

STORMWATER SAMPLING EVENT DATA FORM

Fill this out when sampling is conducted. This is an international shows how your sample collection is compliant with the state.	
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)	
Name of sampler:	Neil Hentlorne
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? Are odors present?	Yes / No Explain Explain
Other notes and observations (it is important to record all outfineverse side of this sheet if necessary) The water coming on the of the pip water coming from AI + A4 +	
Laboratory where samples delivered 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)	Xenco 8-16-07 (Yes) / No

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ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD LAB ONLY:

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

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PRS-0031	8-16-00	1236	_ <u>0</u> ≥:	×	0 0	V Z	0		0	00	F	0.	Σ	5	(C)	II.			V	X	Ey	-	-			F	A	I	(0)	+
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Preservatives: Various (*) Cont. Size: 4oz (4), 8oz (*)	8), 32oz (32), 40	ml VOA	(V), 1L (1)	50	Oml (5). Tec	llar Bac	(B). W	lipe (V	M). C	Other	DEFT E	7712	7. (C									ner (C),		stic (p) (Othe	r(O)	-

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





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





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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Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX



Project Id:

Project Name: PHA Phytoremediation Study

Date Received in Lab: Mar-12-07 04:22 pm

Contact:	Nicole Cass	Report Date:	28-MAR-07
Project Location:	PHA	Project Manager:	Debbie Simmons

	Lab Id:	278924-6	100	278924-0	002	278924-	003	278924-	004
Analysis Requested	Field Id:	PRS-00	10	PRS-00	02	PRS-00	03	PRS-00	04
	Depth;								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	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
Wittais by Elift 200.0	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
Zine		0.019	0.010	0.012	0.010	0.025	0.010	0.052	0.010
Oil and Grease by EPA 1664	Extracted:								
on and Greate by Erry 1001	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:								
100 05 2111 10012	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:								
- James of Maria Court	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

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America Carlos A. Castro, Ph.D. MBA

Managing Director, Texas



Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX





Project Id:

Project Location: PHA

Contact: Nicole Cass

Date Received in Lab: Mar-12-07 04:22 pm

Report Date: Project Manager:

28-MAR-07 Debbie Simmons

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	Lab Id:	278924-0		278924-0		278924-		278924-	
Analysis Requested	Field Id:	PRS-00	05	PRS-00)6	PRS-00	07	PRS-00	08
	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	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
INDICATE BY ELLIE MOOIO	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	010.0	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	36	0.037	0.010	BRL	0.010	BRL	0.010	BRL	0.010
Oil and Grease by EPA 1664	Extracted:								-
On and Grease by Ex A 1004	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:								•
100 by E174 100.2	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:								
Total Cjamac of Mara 555.4	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

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories, XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Carlos A. Castro, Ph.D. MBA

Managing Director, Texas



Project Id:

Project Location: PHA

Contact: Nicole Cass

Certificate of Analysis Summary 278924

Port of Houston Authority, Houston, TX



Project Name: PHA Phytoremediation Study

Date Received in Lab: Mar-12-07 04:22 pm

Report Date:

28-MAR-07

Project Manager:

Debbie Simmons

	Lab Id:	278924-0)09	
Analysis Requested	Field 1d:	PRS-000	19	
	Depth:			
	Matrix:	WATE	R	
	Sampled:	Mar-12-07	12:43	
Metals by EPA 200.8	Extracted:	Mar-19-07	11:40	
initials by El A 200,0	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	100,0	
Chromium		BRL	0.010	
Copper		BRL	0.010	
Iron		0.280	0.200	
Lead		BRL	0.002	
Manganese		0.025	0.010	i i
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:			
On and O. (200 b) 2111 1001	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.

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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 #:	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	110.0	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



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 #:	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	0.196	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				
Zine	<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 BLANK /BLANK SPIKE RECOVERY STUDY Batch #: Blank Spike Blank Blank Control Total Cyanide by EPA 335.4 Spike Result Added Splke Limits Flags [A] [B] Result %R %R Analytes [D] [C]Cyanide, Total < 0.020 0.200 0.197 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 Analyst: AMB

Date Prepared: 03/16/2007

Date Analyzed: 03/16/2007

Project ID:

Lab Batch ID: 693470

Sample: 693470-1-BKS

Batch #: 1

Matrix: Water

Units: mg/L

Oil and Grease by EPA 1664

	BLAN	K/BLANK	SPIKE / E	BLANK S	SPIKE DUP	LICATE I	RECOV	ERY STUI	ŊΥ	
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
<5.00	40.0	36.3	91	40.0	31.5	79	14	70-130	20	

Analyst: AMB

Analytes Oil & Grease, Total Recovered

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	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added [E]	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag
Analytes			[C]	וטן		Result [F]	[G]				
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 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 Lab Batch ID: 693519

QC-Sample ID: 279246-003 S

Batch #:

Matrix: Water

Date Analyzed: 03/19/2007

Project TD:

Date Prepared: 03/19/2007

Analyst: MCH

Reporting Units: mg/L		M	IATRIX SPIK	E/MAT	RIX SPI	KE DUPLICA	TE REC	OVERY	STUDY
Metals by EPA 200.8	Parent Sample Result	Spike	Spiked Sample Result	Spiked Sample		Duplicate Spiked Sample Result [F]	Spiked Dup.	RPD	Control Limits

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
Aluminum	0.036	0.200	0.295	130	0.200	0.291	128	2	75-125	25	Х
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	



Form 3 - MS / MSD Recoveries

nelad

Project Name: PHA Phytoremediation Study

Work Order #: 278924 Project TO:

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	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
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
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	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY														
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Sample		Duplicate Spiked Sample	Spiked Dup.	RPD	Control Limits	Control Limits	Flag				
Analytes	Result [A]	Added [B]	[C]	%R [D]	Added [E]	Result [F]	%R [G]	%	%R	%RPD					
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



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
 03/19/2007
 Analyst: MCH

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

Reporting Units: mg/L	SAMPLE	SAMPLE	DUPLIC	ATE REC	OVERY
Metals by EPA 200.8 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	



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 SAMPLE SAMPLE DUPLICATE RECOVERY

Reporting Units: mg/L	SAMPLE	SAMPLE	DUPLIC	ATE REC	OVERY
Metals by EPA 200.8 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 SAMPLE / SAMPLE DUPLICATE RECOVERY

reporting ours. mg 2	SALVII DE	S/IIII) DD	DOI D.C	ALE KEC	O I LIKI
Oil and Grease by EPA 1664	Parent Sample Result	Sample Duplicate Result	RPD	Control Limits %RPD	Flag
Analyte	[A]	[B]		70KLD	
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 SAMPLE / SAMPLE DUPLICATE RECOVERY TSS by EPA 160.2 Sample Control Parent Sample Duplicate RPD Result Limits Flag Result %RPD [A] [B] Analyte 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 Prepared: 03/15/2007

1

Analyst: KHM

Date Analyzed: 03/15/2007 QC- Sample ID: 278924-009 D

Batch #:

Matrix: Water

Reporting Units: mg/L	SAMPLE /	SAMPLE	DUPLIC	ATE REC	OVERY
TSS by EPA 160.2	Parent Sample Result [A]	Sample Duplicate Result	RPD	Control Limits %RPD	Flag
Analyte		[B]			
TSS by EPA 160.2	17,0	16.0	6	20	

Lab Batch #: 693521

Date Analyzed: 03/16/2007 QC- Sample ID: 278896-001 D Date Prepared: 03/16/2007

Analyst: MAB

mple ID: 278896-001 D Batch #:

Matrix: Water

Reporting Units: mg/L	SAMPLE /	SAMPLE	DUPLIC	ATE REC	OVERY
Total Cyanide by EPA 335.4	Parent Sample Result [A]	Sample Duplicate Result	RPD	Control Limits %RPD	Flag
Analyte		[8]			
Cyanidé, Total	< 0.020	< 0.020	NC	20	

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11381	Meadowglen, Suite	e L. Houston.	TX 77082	281-589-0692
5309 \	Nurzbach, Suite 10	4. San Anto	nio, TX 782	38 210-509-3334

9700 Harry Hines Blvd., Dallas, TX 75220 972-902-0300

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

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	3016 US Highway 301 N., Suite 900, Tampa, Fl 3361	9 813-620-2000

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t Checklist			
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Yes	No	N/A	1-8.0
Yes	No	None	
Yes	No	N/A	Blue/Water
Yes	No	NVA	
Yes	No.		
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ocumentati	on		
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	Yes	Yes No	Yes No N/A Yes No None Yes No N/A Yes No N/A Yes No N/A Yes No

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





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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

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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: Report Date:

May-22-07 11:22 am 04-JUN-07

Project Manager:

Debbie Simmons

Analysis Requested	Lab Id:	282953-001		282953-002		282953-003		282953-004	
	Field Id:	PRS-0010		PRS-001		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:								
on and drease by Er A 1004	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:								_
135 by DI A 100.2	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:					•			
Total Cyamide by D. A. 555.4	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

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented, Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Since 1990 Houston - Dallas - San Antonio - Austin - Tampa - Miami - Latin America Carlos A. Castro, Ph.D. MBA Managing Director, Texas



Certificate of Analysis Summary 282953

Port of Houston Authority, Houston, TX



Date Received in Lab: May-22-07 11:22 am

Report Date:

04-JUN-07

Contact: Nicole Cass

Project Id:

Project Location: PHA

Project Manager: Debbie Simmons

	Lab 1d:	282953-0	005	282953-	006	282953-	007	282953=	300
Analysis Requested	Field Id:	PRS-00	16	PRS-00	17	PRS-00	18	PRS-00	19
399	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	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
Metals by El A 200.0	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	100.0	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:								
on and Grease by 2111 1004	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:								
100 05 2212 20012	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

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Certificate of Analysis Summary 282953





Project Id:

Project Location: PHA

Project Name: PHA Phytoremediation Study

Report Date: 04-JUN-07

Date Received in Lab: May-22-07 11:22 am

Contact: Nicole Cass

Project Manager:

Debbie Simmons

	Lab Id:	282953-0	009		
Analysis Requested	Field Id:	PRS-002	20		
	Depth:				
	Matrix:	WATE	R		
	Sampled:	May-22-07	10:03		
Metals by EPA 200.8	Extracted:	May-23-07	09:45		
Wiciais by El A 200.6	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:				
on and Grease by Exit 1001	Analyzed:	May-24-07	09:10		
	Units/RL:	mg/L	RL		
Oil & Grease, Total Recovered		BRL	5.00		
TSS by EPA 160.2	Extracted:				
and of mark about	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:				
Toma Of white by Date Double	Analyzed:	May-24-07	15:26		
	Units/RL:	mg/L	RL		
Cyanide, Total		BRL	0.020		

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Carlos A. Castro, Ph.D. MBA



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.

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3016 U.S. HWY 301 North - Suite 900, Tampa, FL 33619	(813) 620-2000	(813) 620-2033
5757 NW 158th St, Miami Lakes, FL 33014	(305) 823-8500	(305) 823-8555



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

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

Analytes Oil & Grease, Total Recovered

		BLANI	K/BLANK	SPIKE / 1	BLANK S	PIKE DUP	LICATE I	RECOV	ERY STUI	ŊΥ	
Sar	Blank nple 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
+	<5.00	40.0	35.4	89	40.0	33.9	85	5	70-130	20	

Analyst: CRU

Oil and Grease by EPA 1664

Date Prepared: 05/23/2007

Date Analyzed: 05/23/2007

Lab Batch ID: 697264

Sample: 697264-1-BKS

Batch #:

Matrix: Water

Units: mg/L		BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
TSS by EPA 160.2	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result	Blank Spike %R	Spike Added [E]	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag	
Analytes	1-4	1-1	[C]	[D]	1~1	Result [F]	{G}			,,,,,,,		
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

nelad

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

eporting Units: mg/L	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
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
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	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Spiked Sample	Spike	Duplicate Spiked Sample	Spiked Dup.	RPD	Control Limits	Control Limits	Flag
Analytes	Result [A]	Added [B]	[C]	%R [D]	Added [E]	Result [F]	%R [G]	%	%R	%RPD	
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 Relative Percent Difference RPD = 200*(D-G)/(D+G) Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E



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	oorting Units: mg/L SAMPLE DUPLICATE RECO					
Metals by EPA 200.8 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	1.1	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 1D: 282953-001 D
 Batch #: 1
 Matrix: Water

Reporting Units: mg/L SAMPLE DUPLICATE RECOVERY

Parent Sample Result	Sample Duplicate Result	RPD	Control Limits %RPD	Flag				
lei lei	[B]		7,111.2					
12.0	12.0	0	20					
	Parent Sample Result [A]	Parent Sample Result [A] Sample Duplicate Result [B]	Parent Sample Result [A] Sample Duplicate Result [B]	Result Duplicate RPD Limits [A] Result %RPD [B]				

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

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Company-City Benchmi	ark Ecol	osica	l Se	Phon	e 15		1-934	- 103			5h 1a ically												d TAT	is pro	oject :	speci	ific.	P	HA	ST	d.	
Project Name L	oremously performed oremudias otherwall	d at XENCO	rdy		Site	<u>_</u>	'HA				418.1		23TAL	,				Proje	ct II)		3		T		Γ	I Hit		F	Remai	rks	
e-mail to: nhe i Invoice to □ Accour Bill to: PHA	n-thorne (_	8015DRO		BRCRA Tot Pb TCLP8 13PP	PPs TCL	. PPs				mich.	3	Z	Lenis				10d 21d	(0)	03				
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Reg Program: CLP	AFCEE TRAP D	W UST S	tate (Other:					7 1	624	8015GRO		o to	VOA	BN8A	Non-Virgin			Ů	Ó	.60	-	-			pg		charg	rove			
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TRRP PCLs: Tier 1	Tier 2 Residenti	al	Indi	ustrial					602	8260	1664		BRC	624	PAHs	Virgin	2		Barium	o poer	2	. J	3	1		DE 0	0	ysis	pre-			
LPST No.:(Require	ed)					-			8		FL-Pro	8310	200.8	0			A		7	3	7	2	2,		1	48h		Anal				
Sampler Name AA	engan Atk	in Sp. 8jgr	ature	m		a	نسبين	9	8260	8021		83		8260	625	vised	3		5	3	2	7	6			24h	Ф	Hold	sdn			1 1
Sample ID	Samplin Date	g Time	Depth ft' lo* m	Matrix	Grab	# Containers	Container Size	Preservatives	BTEX by 8021	BTEX-MTBE by		PAHs by 8270	Metals by 6020	VOCs by 8021	SVOCs by 8270	FL Prebum · Revised:	P.1+ G	755	Arsenic,	Chronium	1000	Mercoy	Silver			TAT 5h 12h	PAH:	isposal	_ C			8
PRS-001	0 5/22	107 0930			X			SN	_		Ť		1				X	K	X	X	X	X	X		1	T						1.0
1-001		093		1	X	3		Ĭ			1						X	X		X	X	X	X									2
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- 0011	1	0148			X	3		It		1		\vdash					X	1	X	X	x	X	V		1				1			5
- 001		0951	1		V	3	-	1	+	-	+-	+	-	1	-		V	V	Y	X	X	X	X	1	+	+	1	1			1	6
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	(Initials and Sign		ate & Ti		Rel	linquis	shed to (I	nitials	s and	Sig	n)	-	Dat	e &	Tim	е				s are	Pre	-Ap	prove	d upor	requ	uestir	ng th	iem.				-
MARZ	U.	5/22	(0)	127	^					_		-	_				-	ructio		anda	rd Te	mrs	and C	Conditio	ons A	woolv.						
				L	.ab:	M	IW T					5	122	M	11	20		ntaine	10000	-			27	1		Tem	pera	dure:	-	2.5]

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) _____

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

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



Project Name: PHA Phytoremediation Study

Project Id: Date Received in Lab: Aug-16-07 02:40 pm

Contact: Nicole Cass Report Date: 27-AUG-07

Project Location: Houston Project Manager: Debbie Simmons

	Lab 1d:	288057-0	001	288057-0	002	288057-4	003	288057-0	004
Analysis Requested	Field 1d:	PRS-002	21	PR\$-00	22	PRS-003	23	PRS-007	24
	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	Sampled:	Ang-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
Metals by El A 200.6	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	0.00
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:								
On and Grease by Et A 1004	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:								
155 07 2271 100.2	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:								
Total Cyanide of Di A 555.4	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

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the heat judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

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Carlos A. Castro, Ph.D., MBA



Project Id:

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



Project Name: PHA Phytoremediation Study

Date Received in Lab: Aug-16-07 02:40 pm

Contact: Nicole Cass Report Date: 27-AUG-07

Project Location: Houston Project Manager: Debbie Simmons

	Lab 1d:	288057-0	005	288057-	006	288057-	007	288057-0	008
Analysis Requested	Field Id:	PRS-003	25	PRS-00	26	PRS-00	27	PRS-002	28
	Depth:								
	Matrix:	WATE	R	WATE	R	WATE	R	WATE	R
	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
Metals by LI A 200.0	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:								
On and Grease by Et A 1004	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:								_
155 by E1 A 100.2	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:					-		_	
- Vine Clause of Data Cools	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

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



Project Name: PHA Phytoremediation Study

Project Id: Date Received in Lab: Aug-16-07 02:40 pm

Contact: Nicole Cass Report Date: 27-AUG-07

Project Location: Houston Project Manager: Debbie Simmons

		ENTER ON VICE OF		7 M 7 M 7 M 7 M 7 M 1 M 1 M			
	Lab Id:	288057-0		288057-0		288057-	
Analysis Requested	Field Id:	PRS-003	29	PRS-00.	3.0	PRS-00.	31
	Depth:						
	Matrix:	WATE	R	WATE	R	WATE	R
	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	00:80	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		800.0	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
Zine		0.060	0.003	0.056	0.003	0.060	0.003
Oil and Grease by EPA 1664	Extracted:						
On and October by Di A 1004	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:						
100 bj E174 100.2	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:						
total Cyanide by El A 555.4	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
Cvanide, Total		BRL	0.020	BRL	0.020	BRL	0.020

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Carlos A. Castro, Ph.D., MBA

XENCO Laboratories

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.

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Blank Spike Recovery



Project Name: PHA Phytoremediation Study

Work Order #: 288057

Project ID:

Lab Batch #: 702983 Date Analyzed: 08/24/2007 Sample: 498516-1-BKS

Matrix: Water

Date Prepared: 08/20/2007

Analyst: HAT

Reporting Units: mg/L	Batch #:	BLANK /	BLANK SPI	Spike Limits %R	OVERY S	TUDY
Metals by EPA 200.8 Analytes	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Spike %R	100000000000000000000000000000000000000	Flags
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	< 0.00]	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	Н
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 Datc Analyzed: 08/24/2007 Sample: 703063-1-BKS

Matrix: Water

Date Prepared: 08/24/2007

Analyst: AMB

Reporting Units: mg/L	Batch #: 1	BLANK /	BLANK SP	IKE REC	COVERYS	STUDY
Total Cyanide by EPA 335.4	Blank Result	Spike Added	Blank Spike	Blank Spike	Control Limits	Flags
Analytes	[A]	[B]	Result [C]	%R [D]	%R	
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

Analyst: AMB

Project ID:

Date Analyzed: 08/20/2007

Lab Batch ID: 702645

Sample: 702645-1-BKS

Date Prepared: 08/20/2007 Batch #: 1

Matrix: Water

Units: mg/L		BLANK	(BLANK	SPIKE / E	BLANK S	PIKE DUPI	LICATE I	RECOVI	ERY STUD	Υ	
Oil and Grease by EPA 1664	Blank Sample Result [A]	Spike Added	Blank Spike Result	Blank Spike %R	Spike Added	Blank Spike Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag
Analytes		[B]	(C)	[D]	(E)	Result [F]	[G]				
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	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

Lab Batch ID: 702689

Sample: 702689-1-BKS

Date Prepared: 08/20/2007

Date Analyzed: 08/20/2007

Matrix: Water

Batch #: 1

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY Units: mg/L

TSS by EPA 160.2	Blank Sample Result [A]	Spike Added	Blank Spike Result	Blank Spike %R	Spike Added	Blank Splke Duplicate	Blk. Spk Dup. %R	RPD	Control Limits %R	Control Limits %RPD	Flag
Analytes		[B]	[C]	[D]	(E)	Result [F]	[G]				
TSS by EPA 160.2	<5.00	1000	921	92	1000	929	93	1	80-120	20	



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 #:

Matrix: Water

Date Analyzed: 08/24/2007

Date Prepared: 08/20/2007

Analyst:

HAT

Reporting Units: mg/L		N	IATRIX SPIK	E/MATI	RIX SPI	KE DUPLICA	TE REC	OVERY.	STUDY		- 7
Metals by EPA 200.8 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]		Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked	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	Х
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	Х
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	Х

Lab Batch ID: 703063

QC-Sample ID: 288271-002 S

Batch #:

Matrix: Water

Date Analyzed: 08/24/2007

Date Prepared: 08/24/2007

Analyst: AMB

Reporting Units: mg/L		M	IATRIX SPIK	E / MAT	RIX SPI	KE DUPLICA	TE REC	OVERY	STUDY		
Total Cyanide by EPA 335.4	Parent Sample	Spike	Spiked Sample Result	Spiked Sample		Duplicate Spiked Sample	Spiked Dup.	RPD	Control Limits	Control Limits	Flag
Analytes	Result [A]	Added [B]	[C]	%R [D]	Added [E]	Result [F]	%R [G]	%	%R	%RPD	
Cyanide, Total	< 0.020	0.200	0.227	114	0.200	0.228	114	0	80-120	20	



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	SAMPLE	SAMPLE	DUPLIC	ATE REC	OVERY
Metals by EPA 200.8 Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Alumiaum	<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	
Zine	<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 SAMPLE / SAMPLE DUPLICATE RECOVERY

Keporing Ontes, ingre	SAMIT LE	GAMII LE	DUILLIC	ALE NEC	OVER
Oil and Grease by EPA 1664	Parent Sample Result	Sample Duplicate Result	RPD	Control Limits %RPD	Flag
Analyte	[A]	[B]		78RFD	
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	SAMPLE /	SAMPLE	DUPLIC	ATE REC	OVERY
TSS by EPA 160.2 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
 O8/24/2007
 Analyst: AMB

 QC- Sample ID: 288271-002 D
 Batch #: I
 Matrix: Water

Reporting Units: mg/L	SAMPLE /	SAMPLE	DUPLIC	ATE REC	OVERY
Total Cyanide by EPA 335.4 Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Cyanide, Total	<0.020	< 0.020	NC	20	

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Sample ID	Sampling	71			9	9 8	Container Size	Container Type	Preservatives	8021	BTEX-MTBE	TX1005	8270	× 60	8021	8	Ę	Gred SP	3	200	23			42	Addn: PAH above	Disposal	ciean-ups	1
Sample ID	Date	Time	£ .	ж	Composite	Grab # Containers	aine	alne	Irval	by by	N-	þ	s by	Metals by	VOCs by	SVOCs by	FL Prebum -	9 5	R	12	12			5	PA	Disp	Sample	- 1
			Depth ff' in*	Matrix	LO.	Grab # Con	Sont	out	rese	BTEX	STE)	TPH	PAHS	Aeta	8	0 N	ية	75	0	1	1			TAT	ddn.	Hold	100	(
PRS-0031	8-16-07	1235		(1)		x 3		1	SW	1	<u> </u>	-	1	-		4)	-	XX	7	C7	X	++	1	J	۹.	TO	2	- .`
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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)



Check all that Apply:

	Prelogin/Nonconformance F	Report- Samp	ole Log-l	n	
Clier	Do 1+				
Cher	6/1				
Date	/ Time: 8/16/7				
Lab	ID#: 233057-17				
Initia	le:				
initia	is.				
	Sample Recei	pt Checklis	t		
#1	Temperature of container/ cooler?	- Yes	No	N/A	1/1/00
#2	Shipping container in good condition?	Tes	No	None	
	Samples received on ice?	Yes	No	N/A	Blue/Water
#4	Custody Seals intact on shipping container/ cooler?	Yes	(ND)	N/A	
#5	Custody Seals intact on sample bottles/ container?	Yes	MO		
#6	Chain of Custody present?	X es	No		
#7	Sample instructions complete of Chain of Custody?	Vês	No		
#8	Any missing/extra samples?	Yes	No		
#9	Chain of Custody signed when relinquished/ received?	Tes	No		
#10	Chain of Custody agrees with sample label(s)?	(es)	No		
#11 (Container label(s) legible and intact?	Xes	No		
#12 3	Sample matrix/ properties agree with Chain of Custody?	y es	No		
	Samples in proper container/ bottle?	YES	No		
#14 5	Samples properly preserved?	Yes	No	N/A	
#15	Sample container intact?	Xes	No		
#16 5	Sufficient sample amount for indicated test(s)?	Yes	No_		
#17 /	All samples received within sufficient hold time?	es	No		
#18 5	Subcontract of sample(s)?	Yes	No	N/A	
#19 \	VOC samples have zero headspace?	Yes	No	NA	
	Nonconformance E	ocumentati	on		
Conta	ct: Contacted by:			Date/_	ime:
Regard	ding:				
Correc	tive Action Taken:				
	,°				

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.

Ameliata (mail)	Benchmark	Pitts Study	Pitts Study	Report Limit		Sample Station									
Analyte (mg/L)	Value	Average	Medians	Report Limit	A1	A2	A3	A4	BI	D2					
Aluminum	0.75	-	***	0.01	1.01	0.897	6.83	0.785	0.73	0.643					
Arsenic	200	0.0057	0.003	0.002	0.002	0.002	0.002	0.011	0.002	0.002					
Barium		in the same of		0.01	0.022	0.023	0.238	0.049	0.035	0.03					
Cadmium		0.01589	0.001	100.0	0.001	0.001	0.001	100 0	0.001	0.00					
Chromium		0.01135	0.007	0.01	0.01	0.01	0.031	0.01	0.01	0.03					
Copper	-	0.03069	0.016	10.0	BRL	BRL	0.34	BRL	BRL	0.01					
Cyanide	246.0	0.01625	0.005	0.02	***	***		***	***	***					
Irou	1	4,07654	1.955	0.2	0.587	0.624	5.83	0.997	1.070	1.02					
Lead	0.0816	0.0386	0.016	0.002	0.009	0.008	0.057	0.005	0.0000	0.00					
Manganese			- man	0.01	0.08	0.057	0.414	0.062	(0.09)	0.09					
Mercury		0,00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	0.000					
Nickel		0.01478	0.008	0.01	BRL.	BRL	BRL	BRL	BRL	0.07					
Oil & Grense	ania .	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRI					
Selenium	-	***	-	0.01	0.01	0.01	0.01	0.01	10.0	0.01					
Silver		N/And		0.01	0.01	0.01	0.01	0.01	10,0	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	0.04					

Table 2: Analytical results from the storm water event on 5/31/2006.

Analyte (mg/L)	Benchmark	Pitts Study	Pitts Study	Report Limit			Sample	Station		
Analyte (mg/L)	Value	Average	Medians	Report Linut -	Al	A2	A3	A4	B1	D2
Aluminum	0.75	400	***	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	0.01
Barium	and .	letter.	***	0.01	0.043	0.083	0.021	0.112	D.099	0.10
Cadmium	***	0.01589	0.001	0.001	BRL	BRL	BRL	BRL	BRL	BR
Chromium		0,01135	0.007	0.01	0.013	BRL	BRL	0.01	0.013	BR
Copper		0.03069	0.016	0.01	BRL	BRL	BRL	BRL	BRL	BR
Cyanide	***	0.01625	0.005	0.02	BRL	BRL	BRL	BRL	BRL	BR
Iron	1	4.07654	1.955	0.2	0.22	BRL	BRL	0.21	0.94	BR
Lead	0.0816	0.0386	0.016	0.002	BRL	BRL	BRL.	0.21	0.005	BR
Manganese	***	***	***	10.0	0,017	BRL	BRL	BRL	0.057	BR
Mercury	eve	0,00033	0.0002	0,0004	BRL	BRL	BRL	BRL	BRL	BR
Nickel		0.01478	0.008	0.01	BRL	BRL	BRL	BR1.	BRL	BR
Oil & Grease		31.77	4	5	BRL	BRL	BRL	BRL	BRL	BR
Selenium	***		***	0.01	BRL	BRL	BRL	BRL	BRL	BR
Silver	***	and.		0.01	BRL	BRL	BRL	BRL	BRL	BRI
TSS		123.05	58	5	13	BRL	BRL	14	36	BRI
Zinc	0.117	0.2348	0.1163	0.01	0.190	BRL	BRL	BRL	BRL	BRI

Table 3: Analytical results from the storm water event on 6/19/2006.

Analyte (mg/L)	Benchmark	Pitts Study	Pitts Study	Report Limit	Limit Sample Station							
	Value	Average	Medians	The port and the	A1	A2	A3	A4	B1	D2		
Aluminom	0.75	***		0.01	0.0221	0.137	0.139	0.139	0.149	0.12		
Arsenie	been	0.0057	0.003	0.002	0.005	10.0	0.139	0.013	0.007	0.00		
Banun	***	***	***	0.01	0.022	0.027	0.022	0.035	0.022	0.02		
Cadmium	***	0.01589	0.001	0.061	BRL	BRL	BRL	BRL	BRL	BRI		
Chromium	***	0.01135	0.007	0.01	BRL	BRL	BRL	BRL	BRL	BRI		
Copper	100	0.03069	0.016	0.01	BRL	BRL	BRL.	BRL	BRL	BRI		
Cyanide	lees .	0.01625	0.005	0,02	BRL	BRL	BRL	BRL	BRL	BRI		
Iron	1	4.07654	1.955	0.2	BRL	BRL	BRL	BRL	BRL	BRI		
Lend	0.0816	0,0386	0.016	0.002	BRL	BRL	BR1.	BRL	0.004	BRI		
Manganeso	-	***	-	0.01	BRL	BRL	BRL	BRL	0.016	BRI		
Morcury	P4-0	0.00033	0.0002	0.0004	BRL	BRL	BRL	BRL	BRL	BRI		
Nickel	2000	0.01478	0.008	0,01	BRL	BRL	BRL	BRL	BRL	BRI		
Oil & Grease	***	31.77	4	5	BRL	BRL	BRL	BRL	BRL	BRI		
Selemium	-	***		0.01	BRL	BRL.	BRL	BRL	BRL	BRI		
Silver	***	400	-	0,01	BRL	BRL	BRL	BRL	BRL	BRI		
TSS		123,05	58	-5	BRL	BRL	BRL	BRL	BRL	BRI		
Zinc	0.117	0.2348	0.1163	0.01	BRL	BRL	BRL	BRL	BRL	BRI		

Table 4: Analytical results from the storm water event on 5/51/2006.

Analyte (mg/L)	Benchmark	Pitts Study	Pitts Study Medians	Report Limit	Sample Station								
	Value	Average		report Limit	A1	A2	A3	A4	B1	D2			
Aluminum	0.75	-		10.0	0.084	0.11	0.231	0.096	0 132	0.15.			
Arsenic	***	0.0057	0.003	0,012	0.005	0.015	BRL	0.011	0.031	0.00			
Barium	200	-		0.01	0.043	0,046	0.031	0.048	0.046	0.04			
Cadmium	ine	0.01589	0.001	100,0	BRL	BRL	BRL	BRL	BRL	BRL			
Chronium	***	0.01135	0.007	0.01	0.057	BRL	BRL	BRL	BRL	BRL			
Copper	www.	0.03069	0.016	0.01	BRL	BRL	BRL	BRL	BRL	BRL			
Cyanide		0.01625	0.005	0.62	BRL	BRL	BRL	BRL	BRL	BRI			
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	***	Total Control	***	0.01	BRL	0.014	0.026	0.013	0.014	0.01			
Mercury	***	0.00033	0.0002	0.0004	0.0011	BRL	BRL	BRL	BRL	BRI			
Nickel	200	0.01478	0.008	0.01	0.055	0.042	0.028	0.046	0.043	0.033			
Oil & Grease	98W	31,77	4	5	BRL	BRL	BRL	BRL	BRL	BRI			
Selenium		200	1.00	0.01	BRL	BRL	BRL	BRL	BRL	BRL			
Silver	50-4	-	-	0.61	BRL	BRL	BRL	BRL	BRL	BRL			
TSS	***	123,05	38	5	BRL	BRL	14	BRL	7	. 5			
Zinc	0.117	0.2348	0.1163	0.01	BRL	BRL.	0.013	BRL	BRL	BRL			

Table 5: Analytical results from the stormwater event on 3/12/2007

Analyte (mg/L)	***************************************	Witness Steam Com-	Wise Co. A.	Report Limit	Sample ID/(Station ID)												
	Benchmark	Pitts Study	Pitts Study		PRS-0001	PRS-0002			PRS-0003	PRS-0004	PR\$-0005	PRS-0006	PRS-0007	PRS-0008	PRS-0009		
	Value	Average	Medians		Al	A2	A.3	A-4	B1	B2	CI	C2	DI	D2	B1*		
Aluminum	0.75	ins.	***	0.01	0.108	0.100			0.262	0.150	0.47	0.415	0.391	0420	0.229		
Arsenic	non-	0.0057	D.003	0.002	0.009	D.019			0.008	BRL	BRL	BRL	BRL	BRL	BRL		
Barium	***	(699)	444	0.01	0.072	0.083			0.064	0.056	0.036	BRL	BRL	BRL	0.033		
Cadmium	From.	0.01589	0.001	0.001	BRJ.	BRI.			BRL	BRL	BR1.	ERI	BRL	BRL	DRI.		
Chromium	(two	0.01135	0.007	0.01	0.017	BRL			BRL	0.010	BRJ	EIR1.	BRL	BRL	BR1.		
Copper	***	0.03069	0.016	0.01	0.010	0.014			0.015	0.011	BRI.	BRL	BRL	BRL	HR1.		
Cyanide	hes	0.01625	0.005	0.02	BRI.	BRL			BRL	BRI.	BRL	BRL	BRL	BRL	BRI.		
Iron	-1	4.07654	1.955	0.2	0.793	0.56			0.680	1.30	0.789	0.390	0.310	0350	0.280		
Lead	0.0816	0.0386	0.016	0.002	0.002	BRL			0.003	0.009	0.005	BRI	BRL	BRL.	BRL		
Manganese.		200	pag.	0.01	0.021	0.015			0.042	0.095	0.048	0.036	0.017	0.019	0.025		
Mercury	200	0.00033	0.0002	0.0004	BRJ.	BRL			BRL	BRL	BRI	TIRL.	BRL	DRL	[11]		
Nickel	140	0.01478	0.008	0.01	BRI.	BRL			BRL.	BR1.	BRU	BRI	BRL	BRL.	BRL.		
Oil & Greate	Page 1	31.77	4	5	BRL	BRL			BRL	BRL	BRI	BRL.	BRL	BRL	5.33		
Selenium	cas	***	***	0.01	BRI.	BRI.			BRL	BRI.	BRIL	SRL	BRL	BRL.	BRL		
Silver	139	***	***	6.01	BRL.	BRL			BRL	BRL	BRL	BRI.	BRL	BRL.	BRL		
788	500	123.05	58	3	21:0	12.0			13.0	50.0	19.0	27.0	23.0	18,0	17.15		
Zinc	0.117	0.2348	0.1165	0.01	0.019	0.012			0.025	0.052	0.035	SRL	BRL	BRI.	BRL.		

Duplicate Sample Collected from Station B1
Bolded cells are Below Report Limit (BRL)
Samples were not taken at Station ID A3 and A4 (no to lack of water at the sampling event

Table 6: Analytical results from the stormwater event on 5/22/2007.

Analyte (nig/L)	an order over	Dist. Co. L.	The Car Ac		Sample ID/(Station ID)												
	Benchmark	Pitts Study	Pitts Study	Report Limit	PRS-0010	PRS-0011			PRS-0014	PRS-0015	PRS-0016	PRS-0017	PRS-0018	PRS-0019	PRS-0020		
	Value	Average	Medians		AI	A2	A3	A-4	B1	B2	Cl	C2	D1	D2	B1^		
Aluminum	0.75	***	***	0.010	0 124	1.23			1.24	1.37	2.00	1.08	9.49	0.774	1.21		
Arrenic	940	0.0057	0.003	0.002	0.004	0.006			0.003	0.004	0.007	0.008	0.008	0.007	0.003		
Barlam		***	949	0.0to	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								
Chromium	***	0.01135	0.007	0.010	BRL	BRL			BRL	BRL.	0.012	BRL	BRL	BRL	BRL		
Copper	200	0.03069	0.016	0.010	BRL	BRL			BRL.	BRL	0.011	BRL	BRU	BRL.	BRL		
Cyanide	240	0.01625	0.005	0.020	BRI.	BRL.			BRL	BRL.	BRL	BRL	BRL	BRI.	BRL		
Iron	1	4.07654	1.955	0.200	0,260	1.01			1.22	1.36	2.56	1.16	1.01	0770	1 13		
Lead	0.0816	0.0386	0.016	0.002	BRL	0.004			0.006	0.008	0.026	0.004	0.004	0002	0.005		
Manganese	***	***	***	0.010	0.010	0.082			0.079	0.113	0.319	0.239	0.077	0.060	0.067		
Mercury	844	0.00033	0.0002	0.0004	BRL	BRL			BRL	BRL.	BRL	BRL	BRL	BRL	BRL		
Nickel	640	0.01478	0.008	0.010	0.016	0.018			0.010	0.015	0.035	0.030	0.016	0.022	0.019		
Oll & Grease	F10	31.77	4	5,00	BRI.	BRL			BRL.	BRL	BRL	BRL	BRL	BRI.	BRL		
Selenium	***	***	***	10.0	BRL.	BRL			BRL	BRL	BRL	BRL	BRL	BRL	BRI.		
Silver	***	***	ens	0.010	BRL.	BRL			BRL	BRL	BRL.	BRL	BRL.	BRI.	BRI.		
TSS	***	123,05	38	5.00	12.0	175			127	80.0	978	341	52.9	37.D	160		
Zinc	0.117	0.2348	0.1163	0.010	BRL	0.014			0.031	0.037	0.067	0.019	0.013	ERL	0.030		

*Duplicate Sample Collected from Station BI
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)		Pins Study Average		Report Limit	Sample ID/(Station ID)												
	Benchmark Value		Pitts Study Medians		PR3-0041	PRS-0022	PRS-0024	PRS-0023	PRS-0025	PRS-0027	PRS-0028	PRS-0029	PRS-0030	PR\$-0031	*PRS-0026		
					Al	A2	A3	A4	B1	B2	C1	C2	DI	D2			
Aluminum	0.75		78,800	0.01	0.149	0.265	110	0.299	11.6	6.00	6.15	6.51	6.00	6.08	0.4		
Amenic	740	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	944	440	***	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	100.0	BRL	BRL	BRL	BRL	BRL	BRL	BRL	BRL.	BRL	BRL	BRL		
Chromium	276	0.01135	0.007	0.003	6.003	0.004	0.016	0.004	0.043	0.015	0.017	0.017	0.015	0.016	0.039		
Copper	net	0.03069	0.016	0.003	BRL	BRL	11.021	BRI.	0.025	0.014	0.014	0.017	0.013	0015	11.024		
Cyanide	800	0,01625	0.005	0.02	BRL.	BRL	BRL	BRI.	BRL	BRL	BRL	BRL	BRL	BRL	BRL		
Iron		4.07654	1.955	0.15	0.150	0.270	9,47	0.360	72.0	5.93	0.12	5.35	5.81	5040	10.900		
Lexil	0.0816	0.0386	0.016	0.002	0.004	0.005	0.277	0.004	0.245	0.350	0.159	0.159	0.142	0.147	0.240		
Manganese	*45	***	-in-	0.003	0.033	0.041	0.408	0.040	0.686	0.323	0.337	0.337	0.312	0.332	0.671		
Mercury	and .	0.00033	0.0002	0.0004	BRL	BRL.	BRL	BRL	BRL	BRL	BRL	BRI.	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		
Oll & Grease	444	31.77	4	5	BRL	BRI.	BRL.	BRL	BRL.	BRL	BRC	BRI.	BRL.	BRL	BRL		
Selenium	Axio	120		0.003	BRL	BRL	BRL	BRL.	BRJ.	BRL	BRL	BRG	BRL	BRL	BRL		
Silver	200	***	. ***	0.002	BRL.	BRL.	DRL	BRL.	BRL	BRL	HRU.	BRL.	BRL.	BRL.	BRL		
TSS	-	123.05	58	5	11:0	19,0	680	(10)	633	477	417	407	433	110	620		
Zine	0.117	0.2348	0.3163	0.003	0.015	0.016	0.069	0.015	0.118	0.058	8,060	0.060	0.056	UDeo	111/11		