PHASE III ENVIRONMENTAL SITE ASSESSMENT

Voluntary Cleanup Program No. 700

City of Houston

Heights Service Center

3602 Center Street
Houston, Texas

Prepared for:

CITY OF HOUSTON
Building Services Department
P.O. Box 1562
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Executive Summary

The Phase III environmental site assessment (ESA) at the City of Houston's Heights Service Center (Property) in Houston, Texas, was completed in accordance with the scopes of work that were prepared by Corrigan Consulting, Inc. and modified based on discussions with Malcolm Pirnie, Inc. and the Texas Natural Resource Conservation Commission (TNRCC). A Phase I and II ESA was previously completed for the Property and several recognized environmental conditions were identified. The results of the Phase I and II ESA and a Voluntary Cleanup Program (VCP) application were submitted to the TNRCC. A Phase III ESA was requested by the TNRCC to address several potential source areas that were identified in the Phase I and II ESA report.

The Phase III ESA included the collection of soil samples from four potential source areas and the collection of additional soil samples from one location (soil boring SB-4) where total petroleum hydrocarbons (TPH) was previously detected. Based on the results of the Phase II ESA, it was determined that additional investigation was necessary to determine the background concentrations of lead in soil, to determine the concentration of dissolved lead in groundwater, and to evaluate the yield of the uppermost water-bearing unit.

A statistical evaluation was performed for the background concentration of lead in soil at the site and upper tolerance limits (UTLs) of 151.6 and 181.6 mg/kg were calculated for two strata. An evaluation of the uppermost water-bearing unit was performed by analyzing groundwater samples from this zone for total dissolved solids (TDS) and by determining the maximum potential yield for this zone. According to TNRCC requirements for water-bearing units that are considered as potential sources for drinking water, the TDS must be less than 10,000 mg/l and the yield must be greater than 150 gallons per day from a four-inch well completed in these units. The TDS ranged from 672 to 685 mg/l and the yield was 25 gallons per day. Based on the results of this evaluation, the uppermost water-bearing unit is not considered to be a potential source for drinking water. In addition, no active water wells were identified within a 0.5-mile radius of the Property.

Soil samples from the potential source areas were collected and analyzed for the eight RCRA metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). With the exception of lead, chromium, and cadmium, the concentrations of metals were less than the Risk Reduction Standard No. 2 (RRS 2) standards established by the TNRCC. Using

TNRCC guidelines, soil media cleanup levels of 500 mg/kg for residential property use and 1,000 mg/kg for commercial/industrial property use were calculated for total lead. The concentrations of lead in soil ranged from 0.91 to 201 mg/kg, which are less than the media cleanup levels of 500 mg/kg (residential property use) and 1,000 (commercial/industrial property use). The leachable concentrations of cadmium (<0.005 mg/l) and chromium (0.018 mg/l) were less than TNRCC groundwater (GW) standards of 0.005 mg/kg for cadmium and 0.1 mg/kg for chromium for residential or commercial/industrial use of the property. VOCs and SVOCs were not detected in any of the samples from the potential source areas at concentrations above the quantitation limits.

Additional soil samples were collected from the soil boring B-4 area and analyzed for total petroleum hydrocarbons (TPH). Concentrations of TPH in the additional soil samples ranged from less than the quantitation limit to 14.5 mg/kg. These concentrations of TPH were less than the most conservative default TPH cleanup goal of 310 mg/kg that was established by the VCP Section of the TNRCC. M,p-xylenes and two forms of trimethylbenzene were detected in a sample from the soil boring B-4 area, but these concentrations were very low (0.010 mg/kg for m,p-xylenes and 0.005 to 0.016 mg/kg for the trimethylbenzenes). These concentrations were less than the TNRCC groundwater protective (GWP) standards of 1,000 mg/kg for xylenes and 100 mg/kg for trimethylbenzenes. Due to the very low level of VOCs and absence of SVOCs in the samples, the concentrations of TPH are believed to be associated with de minimis releases of motor oil or hydraulic oil that may have leaked from vehicles historically stored at the Property.

Groundwater samples were collected from three locations during the Phase II ESA and were analyzed for the eight RCRA metals, VOCs, and SVOCs. VOCs, SVOCs, and six of the RCRA metals were not detected in the samples at concentrations above the quantitation limits. Barium, a common inorganic constituent in clays, was detected in all of the groundwater samples at concentrations ranging from 0.138 to 1.94 mg/l, which are below the TNRCC-established GW standard of 2.0 mg/l. Lead was detected in two groundwater samples at concentrations of 0.031 mg/l, which are above the RRS 2 GW of 0.015 mg/l. The presence of barium and lead was believed to be due to the presence of suspended solids in the samples. Therefore, another groundwater sample was collected using low-flow purging and sampling techniques and the sample was analyzed for total lead. Lead was not detected in this sample at concentrations above the quantitation limits.

All identified potential sources of contaminants on the Property were evaluated during the Phase I, II, and III ESAs. Soil and groundwater samples were collected at locations within the potential source areas that were expected to contain the highest concentrations of contaminants. Based on a comparison of the analytical results for the samples to TNRCC standards and background concentrations, contaminants are not present at concentrations that exceed background concentrations, RRS 2 standards, or media cleanup levels established according to RRS 3.

A security fence was installed around the perimeter of the Property and access to the Property is limited to City of Houston personnel and other authorized personnel. No evidence of off-site contaminant migration was observed. Exposure to contaminants at the site is limited to workers at the Property. Since the contaminant concentrations do not exceed RRS 2 standards or media cleanup levels established according to RRS 3 requirements, selection of a remedy and post-closure care of the facility are not required for this facility for closure under the requirements of RRS 3.

No further assessment of soil or groundwater at the Property is required to assess the presence or extent of contamination. Existing concentrations of contaminants are less than TNRCC RRS 2 standards, media cleanup levels established according to RRS 3, TNRCC TPH standards, and/or site-specific background concentrations. Therefore, remediation is not required for the Property to be closed under the provisions of RRS 3 and a Certificate of Completion can be issued for the Property. In order to meet the requirements for closure under RRS 3, deed recordation is required to document the location, types, and concentrations of contaminants that were identified. Due to the widespread locations of the source areas, the entire Property will be included in the deed recordation document.

SECTION 1

Introduction and Background

1.1 Project Background and Objectives

Corrigan Consulting, Inc. was retained by Malcolm Pirnie, Inc. on behalf of the City of Houston to conduct a Phase III Environmental Site Assessment (ESA) of the Heights Service Center located at 3602 Center Street, Houston, Texas (herein referred to as the "Property). A Phase I and II ESA was completed for the Property and several recognized environmental conditions were identified. A Voluntary Cleanup Program (VCP) application was submitted to the Texas Natural Resource Conservation Commission (TNRCC) and a Phase III ESA was requested by the TNRCC to assess several recognized environmental conditions that were identified at the Property. The City of Houston owns the Property and intends to continue using the Property for the storage of equipment such as solid waste recycling containers.

1.2 Scope of Services

The scope of work for this ESA was specified in our proposals dated May 11, 1998, October 2, 1998, March 19, 1999, July 16, 1999, and December 4, 2001. These scopes of work were reviewed and approved by Malcolm Pirnie, Inc. and the City of Houston (see Appendix A). Major elements of the May 11, 1998 scope of work included the following items.

- Collection of shallow subsurface soil samples at four separate locations that were identified as recognized environmental conditions. These conditions included a painting and maintenance room, a paint storage room and two drum storage rooms that were located inside two buildings at the Property.

- Drilling of three soil borings and collection of subsurface soil samples to assess the extent of soil contamination at an area where elevated concentrations of total petroleum hydrocarbons (TPH) were detected during the Phase I and II ESA.

- Summarize the findings of the subsurface investigation in an ESA report.

Elevated contaminant concentrations were detected in several samples and it was determined that the TNRCC would not issue the Certificate of Completion until additional assessment and/or remediation activities were conducted. In coordination with Malcolm Pirnie, Inc., an

additional scope of work was developed as specified in our October 2, 1998 proposal (Appendix A) and outlined below:

- Preparation of scope of work for approval by the TNRCC and the City of Houston.
- Completion of a receptor survey of the area within 500 feet of the Property and review water well records for the area within a 0.5-mile radius of the Property to identify potential receptors and exposure pathways.
- Drilling of one soil boring to assess the vertical extent of TPH contamination.
- Installation and low-flow purging/sampling of one temporary monitoring well to assess the presence of total lead in groundwater. Collection and analysis of soil samples for geotechnical parameters to assess the yield of the uppermost water-bearing zone.
- Preparation of a Conceptual Environmental Assessment Model (CEAM). The CEAM was limited to a discussion of contaminant sources, a receptor survey, evaluation of receptors and exposure pathways, toxicological information for the contaminants, and an evaluation of current conditions and future use of the Property.
- Deed certification of the area of Property containing elevated contaminant concentrations. Summarize the findings of the subsurface investigations and CEAM in a report.

This scope of work was presented to Mr. Joe Bell, VCP Coordinator for the TNRCC for the Property. Mr. Bell requested several revisions that were incorporated into the March 19, 1999 proposal (Appendix A) and included the following items:

- Complete a background study of lead concentrations in shallow subsurface soils at the Property.
- Perform an informal pump test to assess the yield of the uppermost water-bearing zone. According to Mr. Bell, analysis of soil samples for geotechnical parameters was not sufficient to determine the yield of water-bearing zones.
- Provide data quality sufficient to meet the requirements outlined in the TNRCC Interoffice Memorandum "Implementation of the Existing Risk Reduction Rule" dated July 23, 1998.

- Summarize the findings of previous investigation activities into a Phase III ESA report.

Following several delays in the project, completion of the project was requested by the City of Houston. The scope of work to complete the project included the following tasks:

- Review the project files and recently issued TNRCC guidance document and identify any additional regulatory requirements.
- Incorporate the additional regulatory requirements into the Phase III ESA report.
- Prepare and submit deed recordation to the Harris County Clerk's office.
- Submit final documentation to the TNRCC.

1.3 Limitations

The scope of work for this Phase III ESA and the performance of the professional services rendered are in accordance with applicable state and federal regulations and current industry practices, as conducted by similarly-qualified practitioners in the State of Texas. The scope of work was designed to further assess recognized environmental conditions that were identified during a Phase I and II ESA. The scope of work for this assessment was limited to concerns that were previously identified, and no additional assessment was conducted during this Phase III ESA to identify other possible recognized environmental conditions.

The scope of work for this Phase III ESA did not involve a comprehensive assessment of the surface or subsurface conditions or the presence of conditions that may be present on the Property due to other recognized environmental conditions. The selection of sample locations and analytical parameters was based on previously identified, recognized environmental conditions. The scope of work for this assessment was designed to assess the presence of contaminated media, but was not designed to fully delineate the extent of contamination. This report is based on the information obtained during the limited investigations, and on the regulations in effect at the time of this assessment.

This report has been prepared for the sole use of the City of Houston to obtain a Voluntary Cleanup Program Certificate of Completion from the TNRCC, and should not be relied upon by any other party. This assessment is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the Property,

recognizing the limitations of time and cost. Corrigan Consulting, Inc. cannot guarantee that not finding indicators of hazardous substances or petroleum products means that these materials do not exist on the subject Property.

SECTION 2

Facility Background

2.1 Property Location and Surrounding Land Use

The City of Houston - Heights Service Center facility (Property) is located at 3602 Center Street, in Houston, Texas, 77007 (Property Location Map, Figure 2-1). The Property is located in the Heights area of Houston and this area is comprised of a mixture of residential, commercial, and light industrial properties. The City of Houston owns the Property and intends to continue using the Property for the storage of equipment such as solid waste recycling containers.

The Property is bounded to the north by railroad tracks and a machine shop (Site Vicinity Map, Figure 2-2). The adjacent property to the east is occupied by Admiral Linen and Uniform Service. According to a representative of this facility, no dry cleaning activities have been performed at the facility. A parking lot, Leo's Restaurant, and a Heights Boxing facility are located south of the Property. A Heights Public Storage facility and a Terra Firma Tile facility occupy the adjacent properties to the east. Based on the lack of new development at the surrounding properties, the future land use of this area appears to be same as the current land use, which is commercial and light industrial.

2.2 Property Description and Operational History

Based on historical information obtained during the Phase I Environmental Site Assessment (ESA), the one-acre Property was undeveloped in 1907. A machine shop and feed mill were present on the northern portion of the Property in 1925. By 1950, a dairy plant was present on the southern portion of the Property. The Property was acquired by the City of Houston in the early 1980s and was used as a paint and body shop and a maintenance shop for Wastewater Division vehicles and equipment.

A 10,000 square foot brick building, a 6,200 square foot metal warehouse building, and a small metal storage building are located on the Property (Site Map, Figure 2-3). Except for miscellaneous debris, the buildings are empty. Approximately 50 percent of the Property is paved with concrete and 25 percent of the Property is covered by limestone gravel. Empty metal roll-off boxes were stored on the western boundary of the Property.

2.3 Environmental Setting

2.3.1 Regional Geology

The Property is located in the Texas Coastal Plain region of the Gulf Coast where Quaternary deposits are exposed at the surface. These Quaternary deposits include Pliocene, Pleistocene, and Holocene age sediments. According to the Geologic Atlas of Texas, Houston Sheet, published by the University of Texas at Austin, Bureau of Economic Geology (BEG), the uppermost geological formation beneath the Property is the Pleistocene-age Beaumont Formation. This formation consists primarily of clays, silts, and sands, which were regionally deposited under stream channel, point-bar, natural levee, backswamp, and to a lesser extent, coastal marsh and mud-flat environments. The Beaumont Formation is mapped as barrier island and beach deposits over most of the Houston area. These near-shore and marine deposits are characterized as clays, silts, and fine-grained sand. Locally, the Beaumont Formation is described as consisting "dominantly of clays and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity" (BEG, 1982). A regional geologic map is included as Figure 2-4.

The Beaumont Formation is underlain by the Montgomery, Bentley, and Willis Formations. These formations consist of Pleistocene-age terrace deposits of silt, sand, clay, and some gravel. In the vicinity of Houston, Texas, the Willis Formation is underlain by the Pliocene-age Goliad Formation at a depth of approximately 600 feet below ground surface (bgs) (Texas Dept. of Water Resources, 1979).

Surficial soils at the Property are mapped as Urban Land which are characterized by areas of extensive development where 75 to 100 percent of the area is covered by man-made structures or fill material and the soils could not be classified (U.S. Department of Agriculture, Soil Conservation Service, 1976). The high density of development significantly limits the area of soil surface exposed to rain water infiltration and only small amounts of rainwater locally permeate to the shallow perched groundwater horizon or to lower water bearing zones. Site-specific geologic information for the Property is discussed in Section 4.1.

2.3.2 Hydrogeology and Groundwater Use

The Chicot Aquifer is the uppermost aquifer beneath the site and it consists primarily of stream channel, point bar, and backswamp deposits of the Beaumont Formation and underlying

Montgomery, Bentley, and Willis Sand Formations. The Chicot Aquifer has two main units referred to as the Upper Chicot and the Lower Chicot. The Upper Chicot, characterized by a series of discontinuous sand and clay lenses that are associated with the Beaumont and Montgomery Formations, extends to approximately 200 feet bgs in the area of the Property. The Lower Chicot, comprised of fluvial deposits of the Bentley Formation and Willis Sand, is approximately 600 feet thick in the area of the Property and extends from a depth of approximately 200 feet to approximately 800 feet bgs. The Evangeline Aquifer, also of predominantly fluvial origin, underlies the Chicot Aquifer and is about 1500 feet in thickness. The Evangeline Aquifer is considered to be part of the Miocene-age Fleming Formation and, in the Houston area, is part of the Goliad Formation (Texas Department of Water Resources, 1980).

The City of Houston provides potable water for the Heights area. Sixty-five percent of this water is obtained from Lake Houston and the remaining 35 percent is obtained from water wells that are completed in the Evangeline aquifer. The City of Houston water wells are located in the western portion of Houston. To reduce land surface subsidence, groundwater use by industry and municipalities has been limited since the early 1970s by the Harris-Galveston Coastal Subsidence District.

The groundwater flow direction in the Upper Chicot is not significantly affected by withdrawal from the lower aquifers because the regionally extensive clayey sediments of the Beaumont and Montgomery Formations serve as an aquitard between the Upper Chicot and the Lower Chicot and the Evangeline aquifers. The groundwater flow direction and gradient in the Upper Chicot (including the uppermost saturated units beneath the Property), appear to be affected more by surface water features, infiltration, and surface topography.

2.3.3 Topography

Based on review of the U.S. Geological Survey (USGS) Topographic Map (Houston Heights, Texas Quadrangle, 1982), the Property is located in an area with an elevation of approximately 60 feet above mean sea-level. The general terrain of the area is relatively flat, with small streams, creeks, and bayous. Topographically, the ground surface at the Property slopes gently to the south towards Buffalo Bayou. An excerpt from the USGS topographic map is included as Figure 2-1.

2.4 Results of Previous Investigation

A Limited Phase I and II ESA of the Property was completed in October 1997. According to the report, the Property was used by the City of Houston Wastewater Division for approximately ten years and was used as a paint and body shop and a maintenance facility. In addition, trucks, lawnmowers, cranes, bulldozers, roll-off boxes and other equipment were stored at the facility.

Pumper and sludge trucks were painted and serviced at the facility. Painting and maintenance activities were performed in the north room of the brick building. Maintenance activities included the changing of vehicle and equipment lubricants.

Small quantities of oils, hydraulic fluids, paints, and solvents were stored in drums and 1-gallon containers. Paint containers were stored in the room located in the middle of the brick building. Waste lubricant drums were stored in two storage rooms that are located in the brick and metal buildings. The locations of these rooms are included in the Site Map, Figure 2-3.

Based on historical information, the Property was developed between 1907 and 1925. A machine shop and feed mill were previously located on the northern portion of the Property. A dairy plant was previously located on the southern portion of the Property. The City of Houston acquired the Property in 1981.

According to Sanborn Fire Insurance maps dated 1950 and 1969, a boiler room was previously located in the brick dairy plant building and four storage tanks were previously located west of this building. The contents of the tanks were not identified on the maps. Based on a review of the legend for Sanborn Fire Insurance maps, tanks containing flammable liquids such as gasoline are labeled with the contents of the tank to identify them as fire hazards. The contents of the tanks were not identified in the maps and the tanks are believed to have contained dairy products or water that was used at the dairy plant.

Based on a review of regulatory records, a leaking petroleum storage tank (LPST) site was located on the Admiral Linen and Uniform Service facility (former Unitog Rental facility, LPST ID No. 092512) to the east. Soil contamination was identified at this site, but no groundwater contamination was documented. Four additional LPST sites and a small quantity hazardous waste generator facility were identified within a 1/8-mile radius of the Property. The

location of the Admiral Linen and Uniform Service facility is included in Figure 2-2 and the locations of the remaining LPST sites and generator facility are included in the Phase I and II ESA report.

Two soil borings and three monitoring wells were drilled and installed at the Property to assess potential impacts to soil and groundwater due to historical operations at the Property and due to documented soil contamination at the adjoining LPST site. Soil and groundwater samples were collected from the soil borings and monitoring wells and selected samples were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), and the eight RCRA metals.

TPH was detected in shallow soil samples that were collected from three sample locations. Two of these samples were collected from the northern portion of the Property. City of Houston vehicles were parked at this part of the Property during the 1980s. The third sample was collected from the southeast corner of the Property. The concentrations of TPH in the third sample were attributed to the presence of asphalt in the sample and no further assessment of this area was deemed necessary. Low concentrations of four VOCs, m- and p-xylenes, 1, 2, 4–trimethylbenzene, and 1, 3, 5-trimethylbenzene, were detected in one of these soil samples. The concentrations of the VOCs were below the Risk Reduction Standard (RRS) 2 groundwater protection standards established by the Texas Natural Resource Conservation Commission (TNRCC). Organic contaminants were not detected in the groundwater samples. The analytical results are summarized in Table 2.1.

Lead and chromium were detected in soil samples at concentrations which exceed the RRS 2 groundwater protection standards and lead was detected in two groundwater samples at concentrations which exceed the RRS 2 groundwater standard. The presence of lead in the groundwater samples was attributed to the presence of excessive sediment in the samples. The analytical results are summarized in Table 2.2 and selected portions of the Phase I and II ESA report are included in Appendix B.

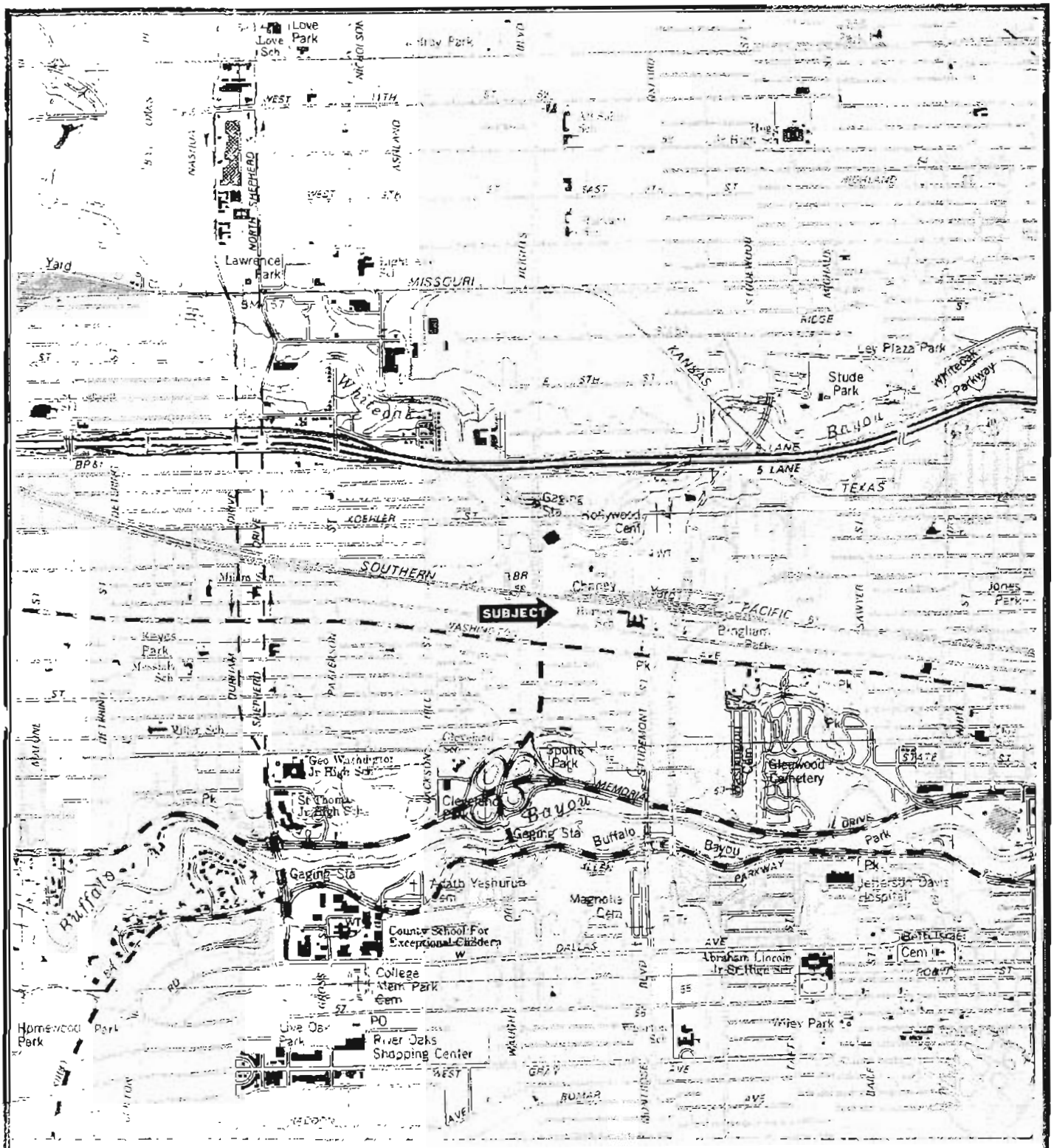
2.5 Agency Coordination

A Voluntary Cleanup Program (VCP) application was prepared for the Property and closure under RRS 2 was requested. The application and the Phase I and II ESA report were submitted to the TNRCC for review and a VCP Certificate of Completion was requested for the Property.

The VCP application and Phase I and II ESA reports were reviewed by the TNRCC, and a subsurface assessment of the following areas was requested by the TNRCC:

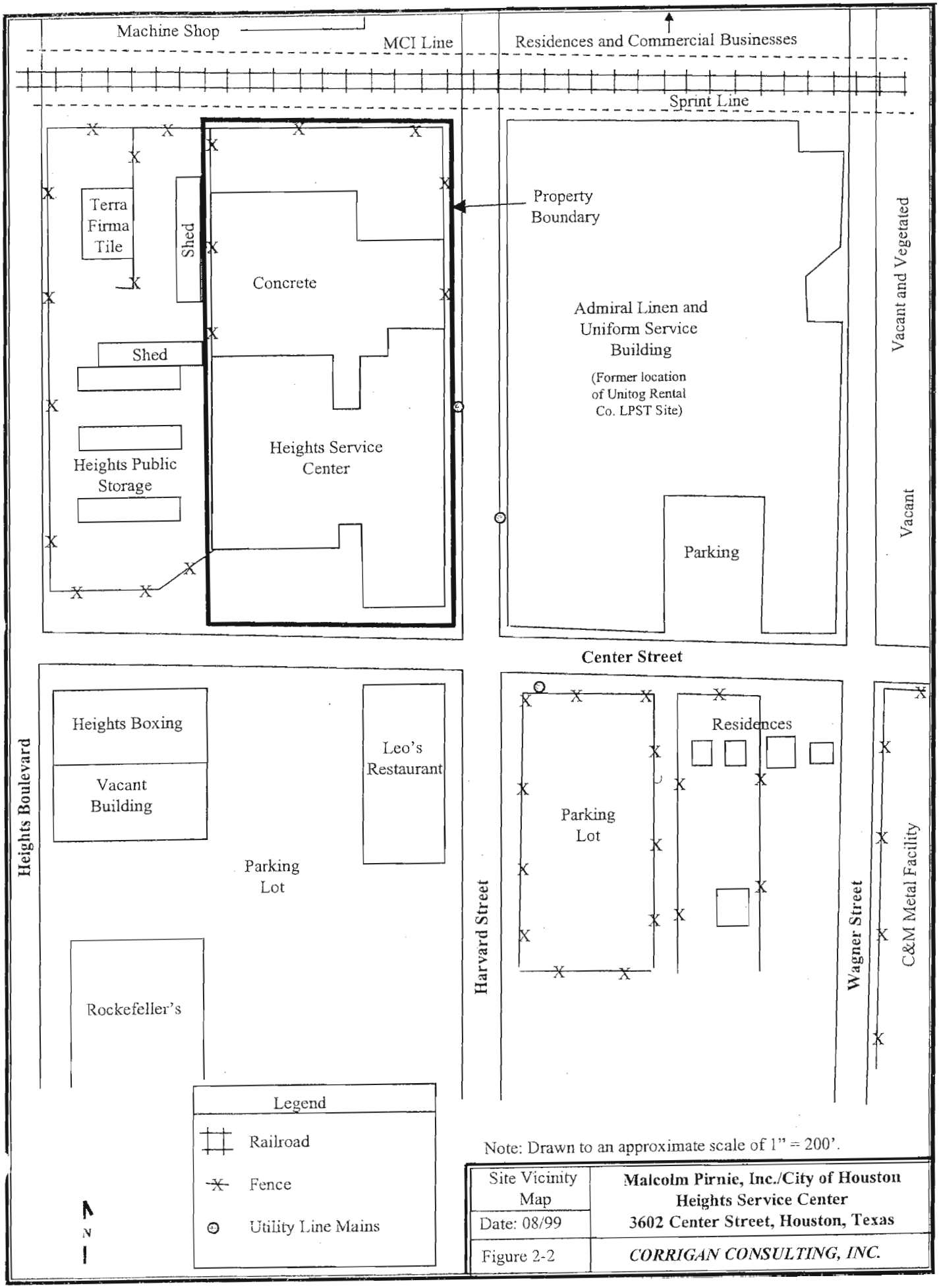
- Drum storage room in the brick building
- Paint storage room in the brick building
- Wood trough used for fluid collection in the brick building
- Drum storage room in the metal building
- Soil boring B-4A where elevated concentrations of TPH were detected

The assessment of these areas was completed in June 1998. The results of the assessment and recommendations for site closure were submitted to the TNRCC for review and comment in July 1998. Due to concentrations of lead in soil, TNRCC approval for closure under RRS 3 was requested on December 10, 1998. A new TNRCC coordinator, Mr. Joe Bell, was assigned to this VCP site in January 1999 and Mr. Bell recommended an alternative scope of work to obtain closure under RRS 2. A subsequent scope of work for this Phase III ESA was agreed upon with Mr. Bell in February 1999. On March 31, 1999, written notification of planned site investigation activities for the Phase III ESA was submitted to the Region 12 Office of the TNRCC and a request for approval to limit the receptor survey radius was submitted to Mr. Bell.



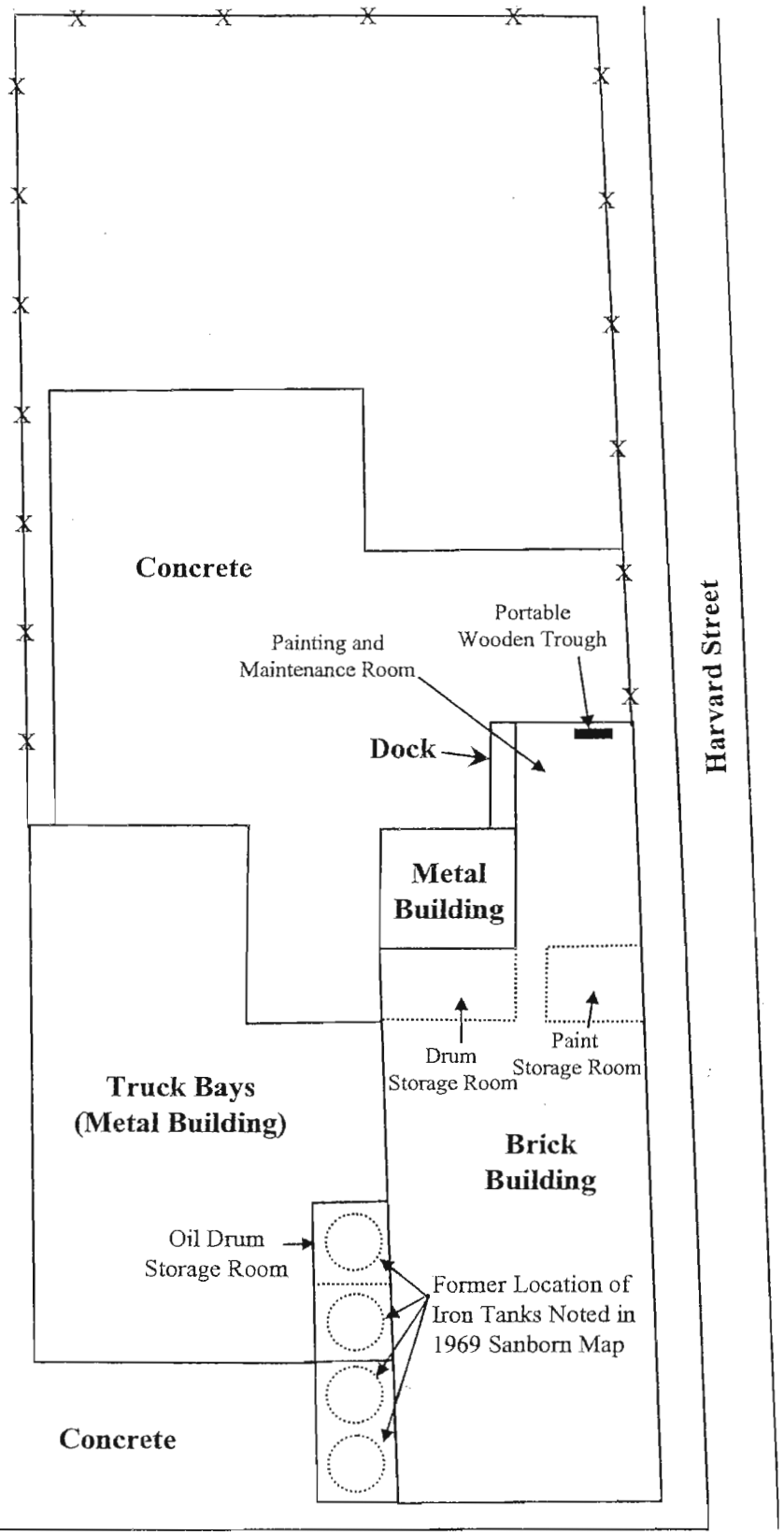
Source: U.S. Geological Survey,
7.5 Minute Quadrangle
Houston Heights, Texas 1982
Scale: 1 inch = 2000 feet

Site Location Map	Malcolm Pirnie, Inc./City of Houston Heights Service Center
Date: 08/99	3602 Center Street, Houston, Texas
Figure 2-1	*CORRIGAN CONSULTING, INC.*



Note: Drawn to an approximate scale of 1" = 200'.

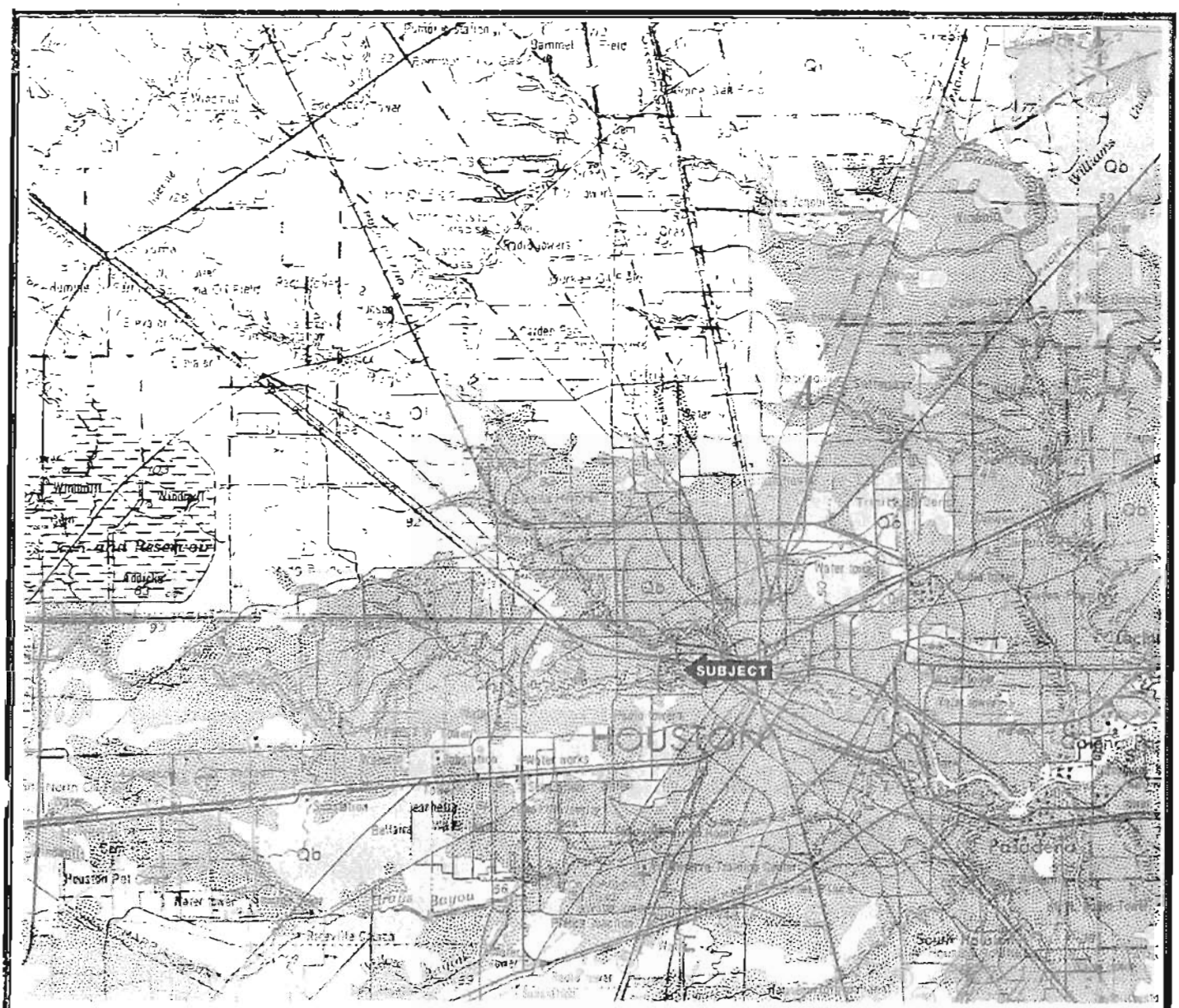
Site Vicinity Map	**Malcolm Pirnie, Inc./City of Houston**
Date: 08/99	**Heights Service Center**
	3602 Center Street, Houston, Texas
Figure 2-2	*CORRIGAN CONSULTING, INC.*



Site Map	**Malcolm Pirnie/City of Houston Heights Service Center**
Date: 08/99	**3602 Center St., Houston, Texas**
Figure 2-3	***CORRIGAN CONSULTING, INC.***

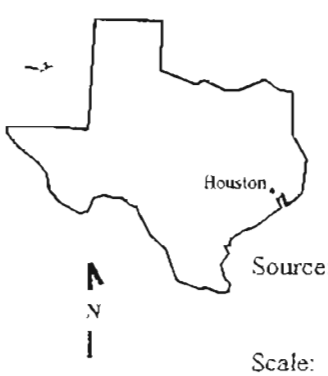
N

Approx. Scale: 1 inch = 40 feet



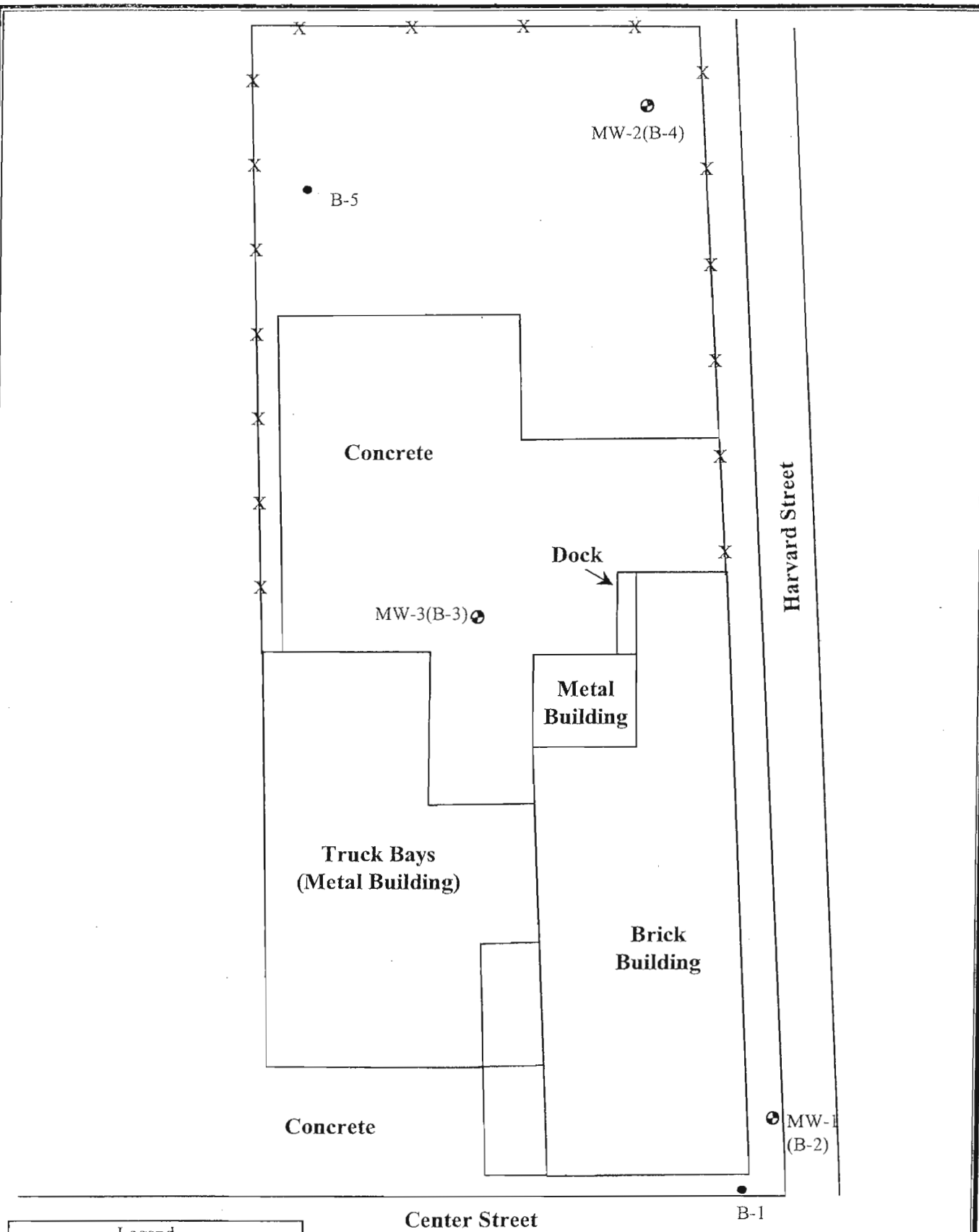
Beaumont Formation

Beaumont Formation, Qb, with barrier-island and beach deposits, Qbb, mapped separately. Beaumont Formation, Qb, mostly clay, silt, and sand, includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh, [illegible] mud-flat deposits, concretions of calcium carbonate, iron oxide, and iron-manganese oxides [illegible] almost featureless, characterized by relict river channels shown by meandering [illegible] and pimple mounds on meanderbelt ridges separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds, thickness ± 100 feet. The stippled overprint (source shown in Index to Geologic Mapping) shows areas that are "Dominantly clay and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity; geologic units include interdistributary muds, abandoned channel-fill muds, and overbank fluvial muds." The nonstippled areas are "Dominantly clayey sand and silt of moderate permeability and drainage, low to moderate compressibility and shrink-swell potential, level relief with local mounds [illegible] and high shear [illegible]; geologic units include meanderbelt, levee, crevasse splay, and distributary sands."



Source: Geologic Atlas of Texas, Houston Sheet
Bureau of Economic Geology
Scale: 1:250,000

Regional Geologic Map	Malcolm Pirnie, Inc./City of Houston Heights Service Center 3602 Center Street, Houston, Texas
Date: 08/99	
Figure 2-4	*CORRIGAN CONSULTING, INC.*



Phase I Sample Location Map	**Malcolm Pirnie/City of Houston Heights Service Center**
Date: 05/21/98	**3602 Center St., Houston, Texas**
Figure 2-5	***CORRIGAN CONSULTING, INC.***

TABLE 2.1

Phase II Investigation - Organic Analytical Results (ppm)
Malcolm Pirnie/City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)								
		Depth (feet) bgs	Total Petroleum Hydro-carbons (418.1)	m, p-Xylenes (8260)	BTEX (8020)	1,2,4-Trimethyl-benzene (8260)	1,3,5 -Trimethyl-benzene (8260)	Remaining VOCs (8260)	Polycyclic Aromatic Hydrocarbons (8270)	SVOCs (8270)
Soil Samples										
B-1A	9/17/97	0 - 2'	**26.9**	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-1B	9/17/97	14 - 16'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-2A	9/17/97	2 - 4'	**1,140**	N.A.	N.D. (0.050 ea.)	N.A.	N.A.	N.A.	N.D. (0.7 ea.)	N.A.
B-2B	9/17/97	16 - 18'	N.D. (10.0)	N.A.	N.D. (0.050 ea.)	N.A.	N.A.	N.A.	N.D. (0.07 ea.)	N.A.
B-3A	9/17/97	2 - 4'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-3B	9/17/97	16 - 18'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-4A	9/17/97	0 - 2'	**389**	**0.010**	N.A.	**0.016**	**0.005**	N.D. (0.005 ea.)	N.A.	N.D. (0.33 ea.)
B-4B	9/17/97	14 - 16'	**26.9**	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-5A	9/17/97	2 - 4'	**65.4**	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-5B	9/17/97	18 - 20'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-6 9 (Dup B3A)	9/17/97	2 - 4'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
RRS 2 Groundwater Protection Standard for Industrial Use			N.A.	1,000	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Groundwater Samples										
GW-1	9/25/97	N.A.	N.D. (0.9)	N.A.	N.A.	N.D. (0.010 ea.)	N.D. (0.010 ea.)	N.D. (0.010 ea.)	N.A.	N.D. (0.010 ea.)
GW-2	9/25/97	N.A.	N.D. (0.9)	N.A.	N.A.	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.A.	N.D. (0.010 ea.)
GW-3	9/25/97	N.A.	N.D. (0.9)	N.A.	N.A.	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.A.	N.D. (0.10 ea.)
GW-4 (Dup. GW-3)	9/25/97	N.A.	N.D. (0.9)	N.A.	N.A.	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.A.	N.D. (0.10 ea.)
Trip Blank	N.A.	N.A.	N.A.	N.A.	N.A.	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.D. (0.005 ea.)	N.A.	N.A.
RRS 2 Groundwater Standard for Industrial Use			N.A.	100	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

TABLE 2.2

Phase II Investigation - Inorganic Analytical Results (ppm)
Malcolm Pirnie/City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.) Total Arsenic (6010)	Total Barium (6010)	Total Cadmium (6010)	Total Chromium (6010)	Total Lead (6010/7421)	Total Mercury (7471)	Total Silver (6010)	Total Selenium (6010)
Soil Samples										
B-1A	09/17/97	0 - 2'	N.D. (10.0)	**16.4**	N.D. (2.00)	N.D. (5.0)	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-1B	09/17/97	14 - 16'	N.D. (10.0)	**31.2**	N.D. (2.00)	N.D. (5.0)	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-2A	09/17/97	2 - 4'	N.D. (10.0)	**63.4**	N.D. (2.00)	N.D. (5.0)	**24.5***	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-2B	09/17/97	16 - 18'	N.D. (10.0)	**25.7**	N.D. (2.00)	**37.3***	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-3A	09/17/97	2 - 4'	N.D. (10.0)	**71**	N.D. (2.00)	**7.0**	**6.6***	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-3B	09/17/97	16 - 18'	N.D. (10.0)	**171**	N.D. (2.00)	N.D. (5.0)	**38.8***	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-4A	09/17/97	0 - 2'	N.D. (10.0)	**64.8**	N.D. (2.00)	N.D. (5.0)	**47.4***	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-4B	09/17/97	14 - 16'	N.D. (10.0)	**13.6**	N.D. (2.00)	N.D. (5.0)	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-5A	09/17/97	2 - 4'	N.D. (10.0)	**88.1**	N.D. (2.00)	N.D. (5.0)	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-5B	09/17/97	18 - 20'	N.D. (10.0)	**64.1**	N.D. (2.00)	**6.7**	**11.2***	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-6 (Dup. B3A)	09/17/97	2 - 4'	N.D. (10.0)	**66.6**	N.D. (2.00)	**6.5**	N.D. (5.0)	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
RRS 2 Groundwater Protection Standard for Industrial Use			5.0	200	0.5	10	1.5	0.2	51	5.0
Groundwater Samples										
GW-1	9/25/97	N.A.	N.D. (0.050)	**0.41**	N.D. (0.005)	N.D. (0.050)	**0.031***	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-2	9/25/97	N.A.	N.D. (0.050)	**0.138**	N.D. (0.005)	N.D. (0.050)	N.D. (0.010)	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-3	9/25/97	N.A.	N.D. (0.050)	**1.94**	N.D. (0.005)	N.D. (0.050)	**0.031***	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-4 (Dup. GW-3)	9/25/97	N.A.	N.D. (0.050)	**0.96**	N.D. (0.005)	N.D. (0.050)	**0.012**	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
RRS 2 Groundwater Standard for Industrial Use			0.05	2.0	0.005	0.100	0.015	0.002	0.51	0.05

SECTION 3

Facility Investigation Procedures

3.1 Evaluation of Exposure Criteria

Human health and environmental exposure factors were evaluated, based on the current and expected future use of the Property and surrounding properties and the potential receptors that may be affected by releases at the Property.

3.1.1 Receptor Survey Setting

A preliminary receptor survey was performed during this investigation. The survey included an identification of past, current, and potential future uses of the Property; a review of available maps to identify locations of subsurface utility lines; a review of regulatory agency records to identify water wells within a 0.5-mile radius of the Property; and, a field receptor survey to determine the uses of adjacent properties and to field identify the locations of utility lines, water wells, and other sensitive receptors.

Land Use: The Property was undeveloped in 1907. The Property was used for commercial and light industrial facilities beginning in the early 1900s and continuing to the early 1990s. The Property has been unoccupied and unused since the early 1990s. In 1997, the Property was listed for sale. One potential buyer expressed interest in using the Property as a parking lot for the adjoining Admiral Linen and Uniform Service facility. According to recent plans of the City of Houston, the Property will be used for the storage of vehicles and equipment for the Solid Waste Department. Therefore, no changes from light industrial use of the Property are planned. Based on the results of the field receptor survey, the surrounding properties are used for a mixture of residential, commercial and light industrial uses.

Water Wells: One off-site water well was identified within a 0.5-mile radius of the Property. This well was located approximately 100 feet north of the Property. According to the well records, this well was installed for the Horlock Ice Company in 1925 to a depth of 340 feet below ground surface. The well was destroyed in 1968; however, no information was provided to determine whether the well was properly plugged and abandoned. The previous location of the water well is included in Figure 3-1, Water Well Map.

The Harris-Galveston Coastal Subsidence District (HGCSD) restricts the use of groundwater in Harris and Galveston counties to prevent further subsidence of these areas. The HGCSD has

divided Harris and Galveston counties into seven regulatory areas. Various restrictions on groundwater use apply to each of these areas and the restrictions are based on regulatory, economic, and technical factors. The Property and surrounding properties are located in Area Two. Groundwater withdrawals in Area Two are limited to 20 percent of the total water use of a facility. Single family wells and wells used for purposes such as livestock watering and groundwater monitoring are exempt from this restriction. Due to the restrictions, groundwater usage at the Property and surrounding properties is limited.

Utility Lines: Utility line locations were identified during the receptor survey and during a review of City of Houston records. Subsurface utility lines, including water, sewer, telephone, and gas lines, are located on roadways that adjoin the Property. These lines were installed parallel to Harvard Street, Center Street, and the adjoining railroad tracks. The locations of known subsurface utility lines are included in Figure 2-2 and in the City of Houston utility maps that are included in Appendix D.

Ground Cover: Approximately 75 percent of the ground surface at the Property and the surrounding area are covered with concrete or asphalt pavement or building foundations. The remaining 25 percent of ground surface at the Property is covered with limestone gravel. The location and extent of ground cover are shown in Figure 3-2.

Surface Water: Whiteoak Bayou is the nearest surface water body and is located approximately 1,500 feet north of the Property. Storm water runoff in the vicinity of the Property flows along road curbs and into storm sewers that empty into Whiteoak Bayou. The bayou flows from west to east and empties into Buffalo Bayou which empties into Galveston Bay.

3.1.2 Selection of Exposure Factors

Under Title 30 Texas Administrative Code (TAC) Chapter 335, Subchapter S, the TNRCC has established medium specific concentrations for soils under RRS 2 that are based on the exposure pathway and usage of the property. The exposure pathways include ingestion of groundwater that contains contaminants leached from soil, ingestion and inhalation of soil that contains contaminants, and dermal contact with contaminated media. Soil media groundwater protection standards (GWP) were established for the groundwater ingestion pathway. Soil/air and ingestion standards (SAI) were established for the soil ingestion and inhalation pathway and for dermal contact. The GWP and SAI standards are divided into two categories, "commercial/industrial" or "residential", which are based on the uses of a property.

Commercial/industrial exposure factors were selected for this Property for the following reasons:

- The Property has been used for light industrial purposes since the 1920s;
- A security fence is present around the entire Property and exposure to contaminants in subsurface soils at the Property is limited to site workers;
- The Property is located within an area of commercial, light industrial, and residential properties;
- Future land use of the Property is expected to remain light industrial;
- No residential exposure pathways were identified during the receptor survey;
- Institutional controls will be placed on the future use of the Property by deed certification documenting the presence of soil contamination.

3.1.3 Exposure Pathway Evaluation

An evaluation of dermal, ingestion, and inhalation exposure pathways was performed to identify complete pathways by which workers at the Property may be exposed. Under normal working conditions, worker contact with contaminants in the subsurface soils is limited due to the presence of limestone gravel and concrete pavement. During construction activities that require the removal of concrete and excavation of contaminated soils, workers at the Property may be exposed to contaminants via dermal, ingestion, and inhalation exposure pathways. Based on the results of the receptor survey, no complete exposure pathways have been identified for occupants of the adjoining commercial/light industrial properties.

3.2 Potential Source Areas, Media and Constituents of Concern

Based on the documented historical uses of the Property and the results of the Phase II Environmental Site Assessment (ESA), the following potential source areas were identified:

- Painting and maintenance activities in the north room of the brick building;
- A wooden trough that was used to collect lubricants and was located in the north room of the brick building;
- Paint containers stored in a storage room of the brick building;
- Waste lubricant containers that were stored in two rooms located in the brick and metal buildings;
- Iron storage tanks that were located on the southern portion of the Property between the brick and metal buildings;
- The leaking petroleum storage tank (LPST) site that was located on the adjoining Admiral Linen and Uniform Service property;
- Total petroleum hydrocarbons (TPH) that were detected in one soil sample at soil boring B-4 and may have originated from leaks of automotive fluids in this area;

- Lead and chromium (source unknown) were detected in soil samples that were collected from the central and southeast portions of the Property at concentrations that exceeded RRS 2 groundwater protection standards; and,
- Lead (source unknown) that was detected in two groundwater samples at concentrations that exceeded the RRS 2 groundwater standard.

The painting and maintenance activities were performed inside the brick building on a concrete foundation. Several small areas of inlayed brick were observed in low areas of the foundation in the north room. The paint and waste lubricant containers were stored inside the brick building on a concrete foundation. Floor drains were observed in the paint storage room. According to historical records, the iron tanks were located on the concrete foundation of the brick building. Based on this knowledge of the potential source areas, soil contamination was identified as the primary media of concern in these areas. Since lead was the only constituent that was detected in groundwater during the Phase II ESA, the Phase III ESA evaluation of groundwater was limited to total lead.

Typical constituents of paints include volatile organic compounds (VOCs) and metals. Waste lubricants typically contain VOCs, metals and petroleum compounds with a carbon range of C15 and greater. Benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), and TPH are typically detected at LPST sites. As discussed in Section 2.4, the contents of the iron tanks were not documented in the historical records and may have contained dairy products or water for the boilers.

The source of the TPH is believed to be associated with motor oil, hydraulic oil, or other types of vehicle lubricants. This is based on the historical use of this area as a parking lot and vehicle maintenance facility for City of Houston equipment. Contaminants that are typically associated with lubricants include VOCs, semi-volatile organic compounds (SVOCs), TPH, and metals. During the Phase II ESA, the sample from the northeast corner of the Property that was reported to contain TPH was also analyzed for VOCs, SVOCs and metals. Very low concentrations of two trimethylbenzenes were detected and no SVOCs were detected. No additional organic analysis of this area was deemed necessary.

3.3 Selection of Sampling Locations and Objectives

Based on the results of the Phase I and II ESA, the TNRCC requested investigation of four potential source areas and additional investigation of one area containing TPH. A background study was also conducted at the Property to assess background concentrations of lead. During the Phase III ESA, a temporary monitoring well was installed at the previous location of

monitoring well MW-1 to assess the presence of total lead in groundwater. The results of the Phase II ESA were considered sufficient to assess potential contamination from the adjoining LPST site.

3.3.1 Investigation of Potential Source Areas

The four potential source areas were located inside of the brick and metal buildings. In order to assess the presence of contamination at these areas, the concrete foundation at each area was cored and one soil sample was collected from soil/fill material located beneath the foundation. The objective of this sampling event was to assess the highest contaminant concentrations that may be present in each potential source area.

In order to meet the sampling objective, the sample from the painting and maintenance room was collected from a low-lying area where inlayed brick was present. For the paint storage room, the sample was collected adjacent to a floor drain that was located in a low area of the building foundation. The samples from the two drum storage rooms were collected from the middle of the rooms where staining was observed.

The drum storage room in the metal building is located in the same approximate location as the former iron tanks. The soil sample from this location was analyzed to assess potential impacts associated with the drum storage room and the former iron tanks.

During this portion of the Phase III ESA, it was determined that the wooden collection trough was not a permanent structure within the foundation. Apparently, this trough was used as a moveable fluid collection pan in the painting and maintenance room. The sample collected from this room was considered sufficient to assess fluid collection activities associated with maintenance of vehicles. The sample locations are included in Figure 3-2.

During the collection of samples beneath the building, a second concrete foundation was observed at a depth of approximately three to four feet below the upper foundation. The initial sampling was limited to the fill material located between the foundations. Since the sampling was limited, sample screening was not performed and one sample from beneath the foundation was considered sufficient to determine whether a release had occurred at each potential source area.

Samples from each of these areas were submitted to the laboratory for analysis of VOCs according to EPA Method 8260 and SVOCs according to EPA Method 8270. Samples were analyzed for TPH by EPA Method 418.1 to assess the presence of petroleum compounds that

may not be detected by EPA Methods 8260 and 8270. Due to the presence of metals in automotive paints and fluids, the samples were also analyzed for the eight RCRA metals according to the 6000 and 7000 series of EPA methods.

Samples containing contaminant concentrations above the groundwater protection standards of RRS 2 were also analyzed for those contaminants using the Synthetic Precipitation Leaching Procedure (SPLP) extraction method and the appropriate analytical method. These analyses were performed to assess the potential of these contaminants to impact groundwater at the Property.

3.3.2 Investigation of TPH Area

The TPH area is located on the northeast boundary of the Property at soil boring B-4. In order to assess the type and extent of contamination at this area, a replicate sample was collected from the same location as the initial or Phase II sample that contained TPH. To assess the vertical extent of contamination at this location, a soil boring was drilled to a depth of 12 feet at soil boring B-4 and a sample was collected from six to eight feet below ground surface. To delineate the horizontal extent of TPH contaminated soils, three soil borings were drilled around B-4 and one soil sample was collected from each boring from a depth of three to four feet. All of these samples were analyzed for TPH. During the planning phase of this project, the replicate sample was to be analyzed for TPH using the Massachusetts Method to differentiate the different types of petroleum compounds and analyzed using the SPLP extraction procedure to determine the concentration of TPH that can be leached from the soil. Due to the low concentrations of TPH that were detected with EPA Method 418.1, the Massachusetts Method and SPLP analyses were not performed. The sample locations are included in Figure 3-2.

3.3.3 Background Study and Groundwater Assessment

During the Phase II ESA, lead was detected in several soil samples at concentrations that exceeded the RRS 2 GWP standard of 1.5 parts per million (ppm). The presence of lead in soils can be attributed to several sources other than a release. These sources include naturally occurring lead and lead from automotive exhaust emissions associated with the combustion of leaded gasoline. For these reasons, a background study was conducted to assess the concentrations of lead in soils that were unaffected by historical operations at the Property. During the background study, elevated concentrations of lead were detected at one background sampling location. In order to assess the presence and extent of lead in this area, a replicate

sample was collected from this sample location and delineation samples were collected from three soil borings that were drilled around this location.

Chromium was detected in one soil sample from the southeast corner of the Property at concentrations that exceeded the GWP of 10 ppm. A replicate sample was collected from this location to confirm the presence and concentration of chromium. This sample was also analyzed for chromium using the SPLP method to determine the concentrations of chromium that will leach into groundwater.

During the Phase II ESA, total lead was detected in two groundwater samples at concentrations that exceeded TNRCC RRS 2 groundwater standards. As described in the Phase I and II ESA report, the lead may be attributed to the suspended solids that were observed in the sample. In order to assess the presence of total lead in groundwater, low-flow purging and sampling of groundwater was performed at the previous location of temporary monitoring well MW-1.

3.3.4 Data Quality Assurance and Reporting Limits

Documented, valid data is required to evaluate the level and extent of contaminants at the facility. This data is then used to determine whether the contaminant concentrations exceed health-based exposure levels established by the TNRCC. Data quality indicators include precision, accuracy, representativeness, comparability, and completeness. The methods used for measuring these indicators are described below:

Precision – Precision is calculated as the relative percent difference (RPD) for laboratory duplicate samples which include matrix duplicates (for metals analyses), matrix spike (MS) and matrix spike duplicate (MSD) samples (for organic analyses). One matrix duplicate and one set of MS and MSD samples are analyzed for each batch of 20 samples. The RPD for each set is calculated and compared to acceptance criteria.

Accuracy – Accuracy is determined by analysis of spiked laboratory control samples (LCS), post-digestion spiked samples, MS samples, and MSD samples. The analytical results for the spiked LCS samples and the post-digestion spiked samples are compared to acceptance criteria and are evaluated to determine the accuracy of the analyses without the effects of matrix interference. The analytical results for the MS and MSD samples are compared to acceptance criteria and evaluated for matrix interferences that may mask the actual concentrations of an analyte.

Representativeness – Representativeness for the source areas is assured by collecting a sufficient number of samples from each area and analyzing the samples for contaminants that are suspected to be present in the source area. Representativeness for the background study is assured by collecting and analyzing a statistically significant number of samples and by collecting the samples from random locations.

Completeness – To meet the data quality objectives for this project, all of the samples must be collected and analyzed.

Comparability – Comparability will be addressed by using common and accepted sampling and analysis procedures and by performing these procedures in a consistent manner.

Analytical reporting limits for samples collected prior to April 1999 were established to evaluate whether contaminant concentrations exceeded TNRCC RRS 2 standards. Data quality for these samples was based on minimum acceptable standards established by Corrigan Consulting, Inc. and generally accepted within the industry. These standards include collection, management, and analysis of samples using appropriate methods and proper cleaning of sampling equipment to avoid cross-contamination of samples. As directed by the TNRCC, data quality and analytical reporting limits for samples collected after April 1999 were based on the requirements of the TNRCC Interoffice Memorandum "Implementation of Existing Risk Reduction Rule," dated July 23, 1998.

3.4 Soil Investigation Procedures

Three field deployments were conducted to assess the nature of contamination, to complete the background study, and to evaluate elevated lead concentrations at a background soil boring. Soil investigation procedures are described below. The initial deployment included the completion of soil borings and the collection of surface and shallow subsurface soil samples. The second and third deployments included the completion of soil borings, installation of a temporary monitoring well, and collection of soil and groundwater samples.

3.4.1 Soil Boring Procedures

Drilling services for the Phase III ESA were provided by HVJ Associates, Inc. and Bandy and Associates, Inc., using State of Texas licensed water well drillers. Soil borings and the temporary monitoring well were completed using conventional hollow stem and solid flight augers. The soil borings and monitoring well installations were completed in accordance with Texas Water Drillers Association (TWDA) standards.

After completion of soil sampling activities, soil borings were grouted to surface with a cement/bentonite grout mixture. Shallow soil borings that were drilled to a depth of four feet or less were plugged with hydrated bentonite pellets. Soil borings drilled through asphalt or concrete were capped with a minimum of six inches of 3,000 psi strength Portland concrete cement mixture. After groundwater sampling and evaluation of the uppermost water-bearing zone, the casing and screen of the temporary monitoring well were removed and the boring was grouted to surface with a cement/bentonite grout mixture.

3.4.2 Soil Sampling Procedures

Surface and shallow subsurface soil samples were collected from four areas (sample locations SB-1, SB-2, SB-3, and SB-4) beneath the foundation of the brick building and from three sample locations (SB-5, SB-6, and SB-7) that are located around soil boring B-4. The samples were collected with a clean stainless steel trowel or hand auger. The soil samples were placed into clean, laboratory-supplied glass containers, packed to minimize headspace, separately labeled, sealed in a plastic bag, and placed into an ice-filled cooler to preserve the samples at 4 degrees Celsius (°C).

Soil samples from the temporary monitoring well and the background soil borings were continuously collected using Shelby tube and split spoon samplers. Following sample retrieval, the outer skin of the soil core was carefully removed using a decontaminated stainless steel knife to expose undisturbed soil. A representative portion of the soil core was placed into a clean, laboratory-supplied glass jar, packed to minimize headspace, separately labeled, sealed in a plastic bag, and placed into an ice-filled cooler to preserve the sample at 4 degrees Celsius (°C). Each soil core was described by the field geologist according to the Unified Soil Classification System to document soil classification, texture, color, stiffness, plasticity, structure, moisture, and any visual indications of contamination, such as staining or sheen. Boring logs for each soil boring are included in Appendix G.

Soil samples selected for laboratory analysis were labeled to reflect the date and time of sample collection; the unique sample number and location; the sample media, preservative, requested analyses; and, the initials of the sampling team member. Upon the conclusion of soil sampling activities, soil samples were submitted for laboratory analysis. Waste soil cuttings were placed into 55-gallon drums and the drums were sealed, labeled and staged for disposal.

3.5 Groundwater Investigation

One temporary monitoring well was completed to evaluate the presence of lead in groundwater and to evaluate the groundwater yield of the uppermost water-bearing zone. The well installation, sampling, and water-bearing zone evaluation procedures are described below.

3.5.1 Monitoring Well Installation

Upon completion of the soil boring, a temporary monitoring well was installed and completed in the uppermost water-bearing unit. The monitoring well was constructed using two-inch inside diameter, flush-threaded, Schedule 40 PVC casing, and 0.010-inch mill-slotted PVC well screen. The screened interval was selected to fully penetrate the uppermost water-bearing unit.

A filter pack sand, appropriately sized to match the grain texture of the water-bearing formation, was installed from the total depth of the boring to a level approximately two feet above the top of the well screen. Based on monitoring well construction records provided in previous investigations and direct field observation, a 20-40 grade, high silica, filter pack sand was selected. The well was gently surge-blocked to settle the filter pack sand and additional sand was added as needed to bring the level of the sand back to a position two feet above the top of the screened interval.

A well seal comprised of 3/8-inch bentonite chips was installed to a thickness of five feet above the top of the filter pack sand. The bentonite seal was saturated using potable water and allowed to hydrate.

3.5.2 Monitoring Well Development

The temporary monitoring well was developed to restore the hydraulic properties of the saturated unit. Prior to development, the water level in the well was measured using an electronic gauge. The total depth of the well was also measured by lowering the gauge probe to the well bottom to facilitate calculation of the volume of fluid contained in the well and assess sediment accumulation in the well.

Well development was accomplished using a bail and surge technique. During development, the development water was monitored for temperature, specific conductance, pH, and turbidity. Well development continued until field parameters stabilized within 5% for three consecutive readings. A minimum of five casing volumes were removed from the monitoring well to assure

adequate development was achieved. Field notes concerning monitoring well installation and development activities are included in Appendix E.

3.5.3 Well Purging and Groundwater Sample Collection

Prior to groundwater sample collection, the well was gauged to determine the depth to static groundwater and the depth to the bottom of the well. Purging and sampling of the temporary monitoring well was conducted in accordance with the low-flow protocols as described by R. W. Puls and M. J. Barcelona in their publication "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA/540/S-95/504." A Fultz gear-driven submersible pump was used to purge stagnant groundwater and collect groundwater samples from the well.

The pump inlet was placed at the approximate mid-point of the screened interval approximately two feet above any sediment accumulation in the well to minimize the potential for mobilization of particulate matter. The submersible pump and line leads were introduced slowly into the well to minimize agitation and disturbance of the natural groundwater flow equilibrium in the well. Purging activities were initiated after the groundwater level in the well equilibrated to within 0.1 feet of the static level.

The pump was started at the lowest speed and slowly increased until discharge was observed at the flow-through cell. The water level was monitored and the pump speed was adjusted to sustain minimal drawdown in the level of groundwater. The target discharge rate was between 0.1 to 0.5 liters/minute. The operational goal in employing the low-flow purge and sampling protocol is to discharge water at a rate equal to or less than the natural ability of the formation to recharge the well. A drop in water level in the well greater than 0.5 feet signals the point at which the natural recharge rate has been exceeded. Records of water levels in the well and the pump discharge rate were recorded every 3 to 5 minutes during the purging process.

The discharge line from the pump was routed through an in-line flow-through cell containing an array of sensors. The sensors were connected to the Q.E.D. MicroPurge® Flow Cell Water Analyzer, which continuously monitors water temperature (T), pH, specific conductance (Cond), dissolved oxygen (DO), total dissolved solids (TDS) and oxidation-reduction potential (ORP). Tubidity was measured at the established intervals using a HACH Pocket Turbidimeter. The analyzer was set to automatically record data at time intervals appropriate to document water quality and the data was also manually recorded at the prescribed monitoring intervals. Field notes concerning low-flow purging and sampling activities are included in Appendix E.

After the field parameters stabilized for three successive 3 to 5-minute monitoring events, the well was considered adequately purged and the discharged water was considered to be representative of groundwater from the water-bearing zone. Stability of the parameters was confirmed when each parameter was within the ranges shown below:

Field Parameter Stability Standards

Parameter	Stability Standard
Temperature	+/- 1 degree F
pH	+/- 0.1 standard units
Specific Conductance	+/- 3 %
Oxidation-Reduction Potential	+/- 10 millivolts
Dissolved Oxygen	+/- 10 %
Turbidity	+/- 10 %

The groundwater sample was collected into a clean, laboratory-prepared sampling container, labeled to reflect the date and time of sample collection, the sampling location, the preservative, the required chemical analysis and the initials of the sampling team member responsible for collecting the sample. The sample container was placed into an ice-filled chest to preserve the sample at 4° C for later shipment to the analytical laboratory with a completed chain-of-custody form.

3.5.4 Evaluation of Water-Bearing Zone

In order to determine the yield of the uppermost water-bearing zone, an informal pump test was performed as suggested by Mr. Joe Bell of the TNRCC. The test included two phases: the monitoring of groundwater flow and water level changes during the low-flow purging and sampling; and, measurement of rising water levels following the completion of low-flow purging and sampling of the temporary monitoring well. Groundwater flow and water level changes were measured at three to five minute intervals during the low-flow purging and sampling of the temporary monitoring well. In the second phase, the pump was removed from the well and groundwater recovery in the well was monitored. Water levels were measured at ten second intervals for the first minute, at 20 second intervals for the second minute, at 30 second intervals for the third and fourth minutes, at one minute intervals for the next six minutes and five minute intervals thereafter.

3.6 Field Quality Assurance/Quality Control

Corrigan Consulting, Inc. employs a field quality assurance/quality control program to ensure that required standards are routinely met. This program involves established Standard Operating Procedures for sample handling and sampling equipment decontamination. Prior to handling each sample, the field geologist donned a clean, new pair of nitrile gloves. After the collection of each sample, all reusable sample collection equipment (stainless steel knives, trowels, Shelby tubes, and split spoons) was decontaminated by washing in a potable water and non-phosphate detergent (Liquinox) wash, followed by a distilled-deionized water rinse, and final deionized water rinse. Sampling equipment was then air-dried and covered in plastic prior to re-use.

3.7 Data Verification Procedures

Prior to publication of the TNRCC Interoffice Memorandum "Implementation of the Existing Risk Reduction Rule", Corrigan Consulting, Inc. established minimum acceptable standards for all data that was provided by laboratories. These standards were based on industry established standards for data quality and include:

- Inclusion of sufficient information in the laboratory report to assess data quality;
- Evaluation of proper management of samples;
- Preparation and analysis of samples within the required holding times and according to EPA and industry established methods;
- Evaluation of the analytical results for laboratory quality assurance/quality control samples;
- Evaluation of reporting limits (detection limits) to ensure that the limits meet regulatory or project requirements; and,
- Evaluation of data for field QA/QC samples.

Analytical data obtained prior to April 1999 were reviewed to verify that the data meets minimum standards of data quality as outlined above and outlined in *"RCRA Corrective Action Program Data Review Guidance Manual"*. Analytical data obtained after April 1999 were reviewed for compliance with the data quality requirements of the TNRCC Interoffice Memorandum.

Data verification is a systematic procedure for reviewing a body of data against a set of known criteria to verify its validity prior to its intended use. Data validity may be influenced by sampling procedures, sample shipment documentation, analytical methods, analytical procedures, and data reporting. Verification procedures included the following:

- Review of field documentation and verification of chain-of-custody documentation;
- Verification of sample preparation and analysis dates with respect to sample holding times;
- Verification of sample preparation and analysis methods;
- Review of analytical results to ensure that results for soil samples were reported on a dry weight basis;
- Verification that reported quantitation limits meet regulatory requirements of TNRCC Interoffice Memorandum;
- Comparison of blank values to sample values (laboratory-prepared blanks and method blanks);
- Evaluation of data for matrix duplicate, matrix spike and matrix spike duplicate samples;
- Evaluation of laboratory control and post-digestion spike samples;
- Review and evaluation of case narrative and data flags;
- Review of sample receipt log, initial calibration summary data and sample run logs; and,
- Documentation of data that do not meet pre-established verification criteria.

Field and Chain-of-Custody Documentation: Field documentation was checked to assess whether analytical results appeared reasonable and consistent with sampling locations, field observations, and the results of field screening. Chain-of-Custody documentation was reviewed to verify that strict chain-of-custody procedures were followed beginning with sampling activities in the field and ending with sample receipt at the laboratory. Documentation included sample identification, sample collector and sample custodian identification, sample container types, sample preservatives, required analytical methodologies, sample volume, and the arriving temperature and condition of the samples.

Holding Times: Analytical methods require sample preparation and sample analysis within a specified period of time from the date of collection. In the case of Method 8260, soil and groundwater samples must be analyzed within two weeks of the collection date. For Method 6010, sample preparation and analysis are required within six months of collection.

Sample preparation and analysis dates were reviewed to determine whether the samples were processed within established holding time requirements. Samples analyzed outside the

allowable holding times required for a specific analytical method are considered usable, but unconfirmed.

Laboratory Methods: Laboratory extraction and analysis methods were reviewed to ensure that the appropriate methods were implemented.

Lab Control Measures: Laboratory control measures were evaluated and measures included method blanks, matrix spike and matrix spike duplicates, matrix duplicates, laboratory control samples, post-digestion spike samples, and surrogate recoveries. Method blanks are carried through the entire analytical procedure with the samples. They are used to determine the potential presence of laboratory background contamination.

Matrix spikes consist of an aliquot of sample matrix (soil or water) and known quantities of specific compounds that are subjected to the entire analytical procedure in order to evaluate the appropriateness of the method for the matrix by measuring recovery. A matrix spike duplicate is also run to determine the precision of the method. Matrix duplicates are composed of a portion of the submitted sample or sample extract. The purpose of the laboratory duplicate is to measure the intra-laboratory precision. Surrogates are compounds added to every blank, sample, matrix spike and duplicate, and standard, and are used to evaluate analytical efficiency by measuring recovery.

Analytical procedures are influenced by the sample medium and concentration of specific compounds. Surrogate recoveries evaluate analytical effectiveness, and poor recoveries (recoveries outside of laboratory control standards) may be attributed to matrix interference. Matrix interference, in and of itself, does not affect the usability of the data.

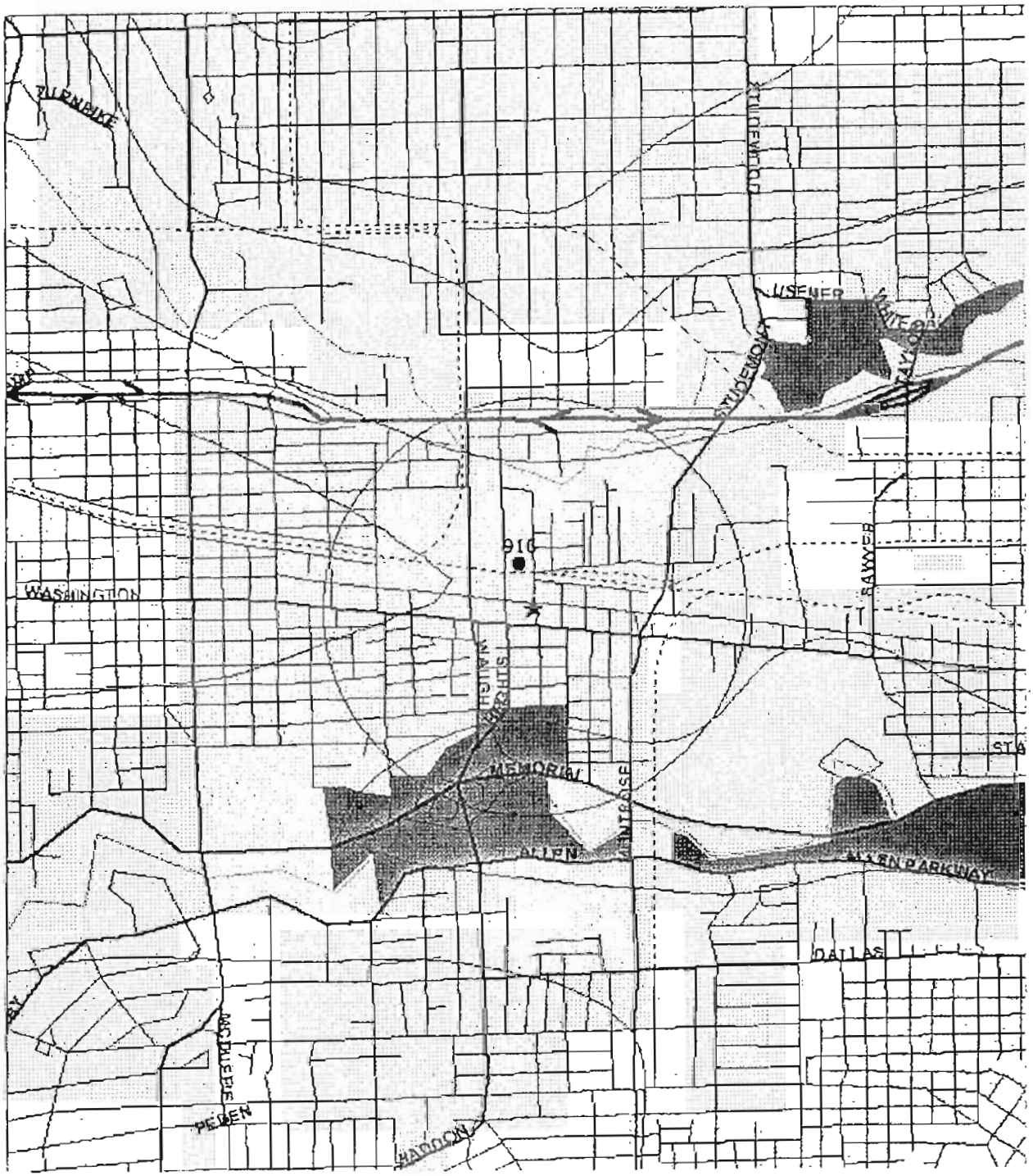
Detection Limits: Analytical methods have method quantitation limits that are based on method detection limits. Elevated concentrations of various compounds within the sample can cause matrix interferences that do not allow the quantification of some compounds at the set detection limits. The sample may require dilution, which correspondingly, may raise the quantitation limit for that sample. Dilution rates were reviewed to identify potential over-dilution evidenced by raised detection limits.

Case Narrative and Data Flags: The case narrative was reviewed to identify any deviations from the laboratory's standard operating procedures and anomalies in the data that may affect the quality of the data. Data flags were reviewed to identify any limitations or conditions that may affect the usability of the data.

Sample Management and Instrument Calibration: Sample receipt logs were reviewed to determine whether the laboratory received properly preserved and labeled samples of sufficient quantity that would allow the laboratory to analyze the samples in accordance with the requested preparation and analytical methods. Sample run logs were reviewed to ensure that the samples were analyzed as represented and to identify the sample batches. Initial calibration summary data were reviewed to ensure that the analytical instruments were calibrated in accordance with analytical method and standard operating procedure requirements.

3.8 Investigation Derived Wastes

All soil cuttings and wastewater from monitoring well development and purging were containerized in sealed 55-gallon drums. The drums were labeled and temporarily stored at the site pending laboratory analysis of the waste characterization samples. The drums of soil cuttings were shipped for off-site disposal as a non-hazardous waste and the drums were shipped on April 13, 2000 to the Waste Management - Coastal Plains facility (TNRCC Permit No. H1721) in Alvin, Texas. The drum of wastewater was shipped off-site for disposal as a non-hazardous waste on April 13, 2000. The drum of wastewater was shipped to the ChemSep, Inc. facility (TNRCC Permit No. A85602) located in La Porte, Texas. Completed waste disposal manifests are included as Appendix F.

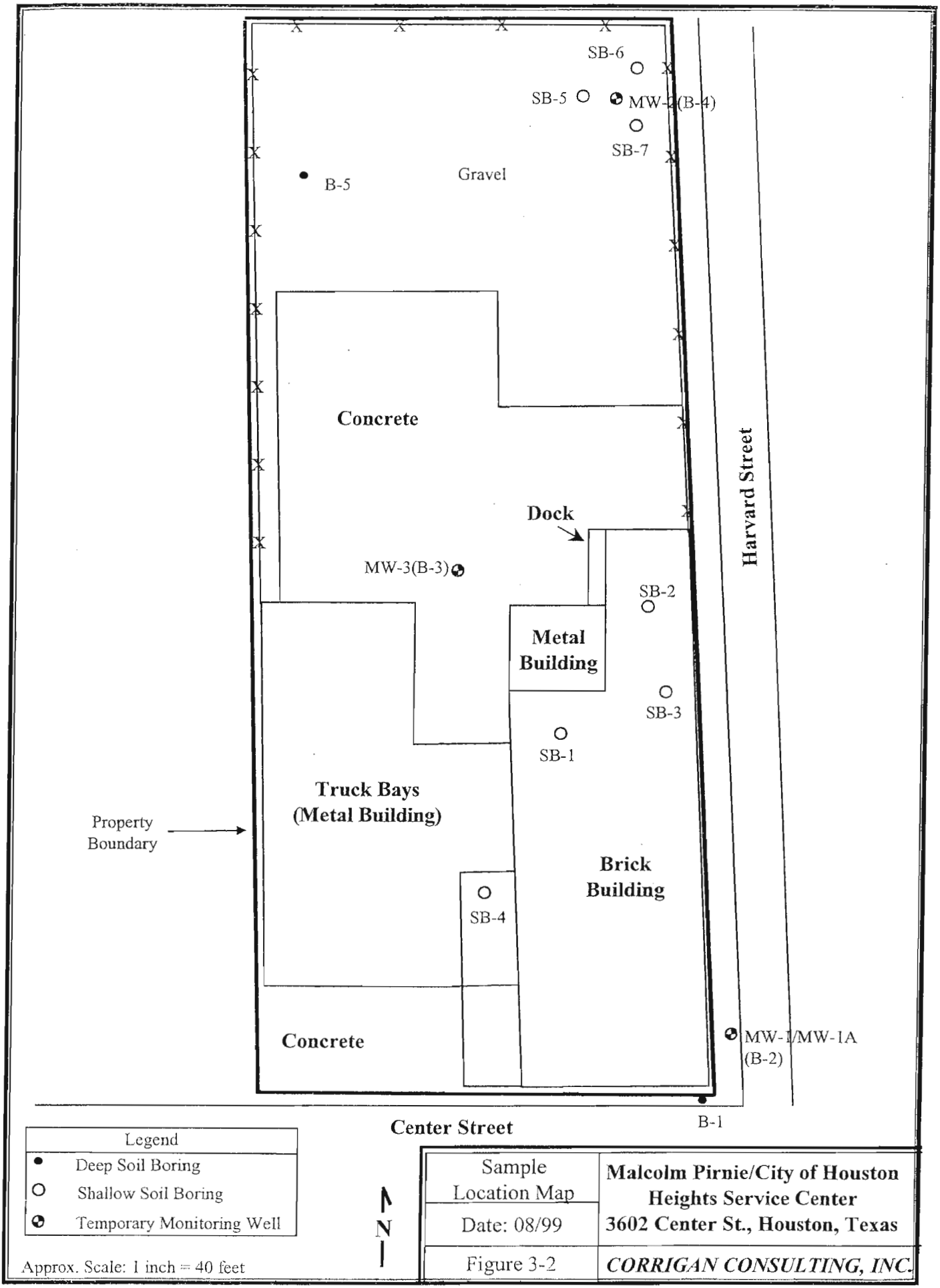


Legend	
★	Site
● 916	Water Well

N

Source: Environmental Data Resources, Inc.
Scale: 1 inch = 0.5 miles

Water Well Map	Malcolm Pirnie, Inc./City of Houston Heights Service Center
Date: 04/99	3602 Center Street, Houston, Texas
Figure 3-1	*CORRIGAN CONSULTING, INC.*


SB-6
SB-5
MW-2(B-4)
SB-7
B-5
Gravel
Concrete
Dock
Harvard Street
MW-3(B-3)
SB-2
Metal Building
SB-3
SB-1
Truck Bays (Metal Building)
Property Boundary
Brick Building
SB-4
Concrete
MW-1/MW-1A (B-2)
B-1
Center Street
Legend
Deep Soil Boring
Shallow Soil Boring
Temporary Monitoring Well
N
Approx. Scale: 1 inch = 40 feet
Sample Location Map
Malcolm Pirnie/City of Houston Heights Service Center
Date: 08/99
3602 Center St., Houston, Texas
Figure 3-2
CORRIGAN CONSULTING, INC.

SECTION 4

Facility Investigation Results

4.1 Site Specific Geology and Hydrogeology

Soil samples from the Property were described and classified according to the Unified Soil Classification System. Based on the results of the previous Phase II ESA and this Phase III ESA, the site stratigraphy can be divided into four (4) strata as described below.

Stratum I: Stratum I consists primarily of fill material composed of a heterogeneous mixture of clay, sand, and gravel. Stratum I extends from the surface to depths of one to two feet below ground surface (bgs) at the Property.

Stratum II: Stratum II, part of the Beaumont Formation, consists of clay, silty clay, and clayey silt deposits with a thickness of 20 feet. Stratum II clays are typically gray, red or brown. The clays are typically stiff, damp, and plastic. Locally, calcareous or ferruginous nodules are observed.

Stratum III: Stratum III, also a part of the Beaumont Formation, consists of an interbedded sand, clay, and silty clay unit. The sand sub-unit is a silty, fine-grained sand unit that comprises the uppermost water-bearing zone at the Property. The clay sub-unit is plastic and very stiff with a trace of calcium carbonate nodules. The silty clay sub-unit is red and brown in color, very fine-grained, and non-plastic. Stratum III is approximately 4.5 feet in thickness.

Stratum IV: Stratum IV, also part of the Beaumont Formation clay, consists of a red and gray clay that is very stiff and plastic. The top of Stratum IV was encountered at a depth of 24.5 feet bgs in soil boring MW-1A. The total thickness of Stratum IV was not determined.

Based on geologic interpretations of the boring logs and knowledge of the geology for the Heights area, the stratigraphic section appears to be consistent with geologic deposits from a fluvial environment (low-energy stream, overbank, and back channel deposits). Geologic cross-sections were not prepared for the Property due to the limited number of soil borings that extend to a sufficient depth and the lack of subsurface soil contamination that extends beyond two feet bgs.

4.2 Background Study

A background study was conducted at the Property to establish a background Upper Tolerance Limit (UTL) for total lead in soils. The UTLs were then compared to the analytical results for soil samples collected at potential source areas of the Property to identify areas of elevated lead concentrations that may be attributed to operations at the Property or adjoining properties.

Soil samples were analyzed for total lead using EPA Methods 7421 and 6020. The results of the background investigation for total lead are discussed below and included in Table 4.1. The locations of samples for the background study are shown in Figure 4-1, Background Sample Location Map. The derivation of the UTLs is discussed in Appendix I and laboratory reports for the background samples are included in Appendix H.

4.2.1 Sample Population

Background concentrations of inorganic constituents in soil can vary for several reasons. Surficial soils may contain fill material, anthropogenic contamination, and natural background concentrations of total lead. The chemistry of soils may also be different at different depths due to textural variation, changes in source material, or the variable affects of groundwater chemistry. Therefore, separate background UTLs were established for Strata I and II. For Stratum I, background samples were collected from the depth interval of 0 to 0.5 feet below ground surface (bgs). For Stratum II, the background samples were collected from the depth interval of 1.0 to 2.0 feet bgs.

To help ensure the statistical validity of the background study, a total of 12 Stratum I samples and 14 Stratum II samples were collected. These sample sets were included in two separate background sample populations selected to represent each of the two soil types encountered at the site.

4.2.2 Results of Background Soil Investigation

Soil samples collected from the Stratum II soil borings were selected to represent local background concentrations of total lead in native soils at the Heights Service Center property. The background soil boring locations were distributed using a judgement strategy to effectively cover the undeveloped area of the property and avoid areas believed to be potentially affected by historical use of the Property. The concentration of total lead in samples from Stratum I ranged from 5.9 to 154 mg/kg. The concentration of total lead in samples from Stratum II ranged from 4.4 to 201 mg/kg.

4.2.3 Determination of Background UTLs

Statistical evaluation of the analytical results for background soil samples was performed to establish an upper limit for background concentrations for total lead using EPA-approved statistical techniques (EPA, 1989 and 1992). The statistical evaluation involved computation of a UTL based on the parametric Tolerance Interval Method. Separate UTLs were calculated for total lead for Stratum I (surficial soils/fill material) and Stratum II (subsurface native clay soils).

The computed UTL serves as the upper limit for the background concentration of total lead for the medium evaluated. If total lead concentrations reported for a compliance soil sample exceed the corresponding UTL for total lead, that soil sample is flagged as potentially contaminated. The calculated UTLs for total lead Stratum I and Stratum II are 151.6 mg/kg and 181.6 mg/kg, respectively. The derivation of each UTL, statistical calculations, and detailed worksheets are included in Appendix I.

4.3 Evaluation of Water-Bearing Unit

The TNRCC has established the following criteria for Risk Reduction Standard 3 in Title 30 TAC Section 335.563 to classify a water-bearing unit as a potential source of drinking water for purposes of establishing cleanup levels:

- Groundwater must have a TDS content less than or equal to 10,000 mg/l; and
- The saturated unit must be capable of transmitting water to a pumping well in usable quantities (generally taken to mean 150 gallons per day sustainable yield from a 4-inch well).

The TDS content of the groundwater was determined during the low-flow purging of the temporary well and TDS concentrations ranged from 672 to 685 mg/l. Based on these results, groundwater in the uppermost water-bearing zone can be considered as fresh water. The TDS results are documented in the field notes in Appendix E.

During the low-flow purging and sampling of the temporary well, maximum discharge from the two-inch well was measured at 50 milliliters/minute (ml/min). When pumping at this discharge rate, a steady decline in water levels was observed in the temporary monitoring well and this discharge rate was determined to exceed the maximum potential yield of the well. With a discharge rate of 50 ml/min, a daily yield of approximately 20 gallons per day was calculated for the two-inch well.

Groundwater levels were pumped down to a maximum depth of 27.31 feet bgs following low-flow purging and sampling of the well. Subsequently, recovery of water levels in the well were monitored and recorded. A qualitative evaluation of the recovery data was performed to assess the potential yield of Stratum III. Based on this evaluation of the recovery data, the yield is consistent with the yield that was measured during low-flow purging and sampling activities. Water level recovery records are included in Appendix E.

According to *Groundwater Hydrology* by Todd, a four-inch well in the same saturated unit will produce approximately ten percent more groundwater than a two-inch well. Therefore, a four-inch well completed in Stratum III would be expected to produce approximately 22 to 25 gallons per day which is well below the TNRCC established yield of 150 gallons per day. This yield is consistent with expected yields from Stratum III which is comprised of very fine-grained sand and silty clay with a thickness of three feet. Based on this evaluation, the uppermost water bearing zone is not classified as a potential source of drinking water under TNRCC rules.

4.4 Determination of Media Cleanup Levels

Under Title 30 TAC Sections 335.558 and 335.559, the TNRCC has established medium-specific standards, requirements for use of the standards, and allowable adjustments for the medium-specific standards for Risk Reduction Standard (RRS) 2. The RRS 2 standards include standards for specific contaminants such as benzene, but do not include standards for parameters such as total petroleum hydrocarbons (TPH).

In cases where site closure under RRS 2 can not be obtained, the requirements of RRS 3 can be applied. The TNRCC has established requirements for attainment of RRS 3 under Title 30 TAC Sections 335.561 through 335.566. These requirements include evaluation of alternative remedies to ensure that an appropriate remedy is selected to meet RRS 3 requirements; determination of media cleanup levels for soil, groundwater, surface water, and air media; post-closure care requirements; and deed recordation requirements. The determination of applicable media cleanup levels are discussed below for soil and groundwater media.

4.4.1 Media Cleanup Levels for Soil

The RRS 2 standards include groundwater protection (GWP) standards and soil/air ingestion standards (SAI) for soil media. These standards are divided into residential and industrial standards to account for the differences in property usage. If the calculated background upper

tolerance limits (UTLs) for inorganic constituents exceed the GWP or SAI, the UTLs can be used in lieu of the GWP or SAI to determine action levels for which further corrective action may be required. Due to variations in the contaminant retention of soils, the TNRCC also allows the analysis of soil samples using the Synthetic Precipitation Leaching Procedure (SPLP) as an alternative for determining action levels. The SPLP method is used to determine the concentrations of contaminants that will leach from soils and the analytical result is compared to the groundwater standard (GW).

The concentrations of lead in two samples from the background study exceeded the calculated UTLs. Although these concentrations appear to represent background concentrations and could not be attributed to historical operations at the facility, closure under RRS 3 was evaluated as an alternative. Under the RRS 3 standards, the media cleanup levels must be calculated using sound scientific principles such as fate and transport evaluations of contaminant migration. In order to evaluate the concentration of lead that could be leached to groundwater, a Soil Attenuation Model (SAM) was used. The SAM consists of several calculations and a SAM spreadsheet was provided by Mr. Bell of TNRCC for calculation of the media cleanup levels. Site-specific and default parameters are input into the SAM to calculate an acceptable concentration of a contaminant in soil that will not impact groundwater at concentrations above groundwater media cleanup levels.

Input parameters were inserted into the SAM and a soil media cleanup level was calculated for lead. As discussed in Sections 4.3 and 4.4.2, the TNRCC allows the use of a GW that is elevated by two orders of magnitude when the saturated zone at a site is not considered as a potential source of drinking water. As demonstrated previously, the shallow saturated unit at the site does not produce groundwater in usable quantities and this zone is not classified as a potential source of drinking water. Therefore, the GW was increased from 0.015 to 1.5 mg/l and this elevated GW was input into the SAM. Using this GW and default parameters that were selected using knowledge of soils at the facility, a GWP of 2,764 mg/kg was calculated for lead. Since this GWP exceeds the RRS 2 SAI of 1,000 mg/kg for lead at commercial/industrial facilities, the SAI was established as the media cleanup standard for this site. The SAIs and GWPs for the remaining inorganic constituents are listed in Table 4.3 and the calculations are included in Appendix E.

According to a November 3, 1995 TNRCC Interoffice Memorandum titled "*Baseline TPH Cleanup Using the Massachusetts Surrogate Approach*", site-specific cleanup goals can be calculated using analytical data that is obtained from the Massachusetts Method for TPH

analysis. This analytical method provides analytical results for alkanes, cycloalkanes, aromatics, and alkenes and the results are reported at specified carbon chain ranges. In this memorandum, the TNRCC has calculated conservative cleanup goals for soil and groundwater at industrial and residential facilities. These cleanup goals are based on the conservative assumption that the entire volume of TPH is comprised of pyrene. For soils at industrial facilities, a default GWP of 310 mg/kg and a SAI of 950 mg/kg were established for TPH by the TNRCC.

4.4.2 Media Cleanup Levels for Groundwater

The GW standards are divided into residential and industrial standards to account for the differences in property usage. In the case of many contaminants, the GW standard is the same as the maximum contaminant level (MCL).

Due to the potential for groundwater impacts at the Property, hydrogeologic properties of the uppermost water-bearing unit were evaluated to determine whether this unit could be classified as a potential source of drinking water. This evaluation was performed in accordance with guidance that was provided by Mr. Bell with the Voluntary Cleanup Program of the TNRCC. As discussed in Section 4.3, the uppermost water-bearing unit is not classified as a potential source of drinking water. Therefore, the GW for constituents of concern can be elevated by a factor of 100 and the GW for lead was increased from 0.015 to 1.5 mg/l. No other constituents of concern were detected in groundwater samples or by SPLP analysis of soil samples at concentrations that exceeded RRS 2 standards.

4.5 Soil Investigation

No physical evidence of soil contamination was observed during field investigation activities completed at the Property. Based on reported analytical results for the Phase II ESA, total petroleum hydrocarbons (TPH) were detected in soil samples from three areas of the Property and three inorganic constituents, lead, cadmium and chromium, were detected in soil samples at concentrations that exceeded the TNRCC established GWP of RRS 2.

The results of the Phase III ESA soil investigation are discussed below. The analytical results, for the organic constituents are summarized in Table 4.2. The analytical results, GWPs, SAIs, UTLs, and GW for each of the inorganic constituents are summarized in Table 4.3. Laboratory reports are included in Appendix H.

4.5.1 Inorganic Constituents

Lead: A total of 7 soil samples were collected and analyzed for total lead. The quantitation limit was 2.5 mg/kg for EPA Method 6010 and 0.5 mg/kg for EPA Method 7421. Concentrations of total lead ranged from 0.91 to 117 mg/kg in the source area samples and lead was detected at concentrations of 154 and 201 mg/kg in two samples from background sampling locations. The sample containing lead at a concentration of 117 mg/kg was also analyzed using the SPLP method and 0.032 mg/l of leachable lead was detected in the sample.

The concentrations of lead in the soil samples from source area and background area were less than the SAI of 1,000 mg/kg. The SPLP concentration of lead was less than the GW of 1.5 mg/l.

Cadmium: Under RRS 2, a GWP of 0.5 mg/kg and a SAI of 410 mg/kg were established for cadmium by the TNRCC. A total of 4 soil samples were collected and analyzed for total cadmium using EPA Method 6010. The quantitation limit for this method is 0.5 mg/kg. Concentrations of total cadmium ranged from 0.60 to 2.58 mg/kg. The sample containing the highest concentration of total cadmium was also analyzed using the SPLP method. Cadmium was not detected at concentrations above the quantitation limit and GW of 0.005 mg/l in the SPLP leachate.

Chromium: A GWP of 10 mg/kg and a SAI of 230,000 mg/kg were established for trivalent chromium by the TNRCC. A GWP of 10 mg/kg and a SAI of 1,200 mg/kg was established for hexavalent chromium. Since the analytical results were not reported for each form of chromium, the more conservative GWP for hexavalent chromium was adopted as the action level.

A total of 4 soil samples were collected and analyzed for total chromium using EPA Method 6010. The quantitation limit for this method is 2.5 mg/kg. Concentrations of total chromium ranged from 2.7 to 13.8 mg/kg. The sample with the highest concentration of total chromium was also analyzed using the SPLP method and an estimated concentration (concentration was below method quantitation limit) of 0.018 mg/kg of leachable chromium was detected in the sample. This concentration is less than the GW of 0.1 mg/l.

4.5.2 Organic Compounds

Potential Source Areas: Concentrations of TPH ranged from 14.5 to 210 mg/kg. TPH was detected in two soil samples that were collected from the painting and maintenance room and from the paint storage room. No VOCs or semi-volatile organic compounds (SVOCs) were detected in the samples at concentrations above the quantitation limits. The highest concentrations of TPH are less than the default TNRCC GWP of 310 mg/kg. Therefore, no further corrective action is recommended for these areas.

TPH Area at Soil Boring B-4: During the Phase II ESA, TPH was detected in a surface soil sample from soil boring B-4 at a concentration of 389 mg/kg. This TPH appears to be associated with a release of lubricants and the concentration is greater than the TPH GWP of 310 mg/kg and less than the Petroleum Storage Tank Division screening level of 500 mg/kg for middle distillate releases. M,p-xylenes were detected in this sample at 0.010 mg/kg. Two VOCs, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene, were detected at concentrations of 0.016 and 0.005 mg/kg, respectively. SVOCs were not detected in this sample. A replicate sample was collected from this same location and TPH was detected at a concentration of 25.3 mg/kg. Due to the low TPH concentration in this sample, the sample was not further analyzed for TPH using the Massachusetts Method or the SPLP procedure.

Three soil borings were drilled around B-4 for delineation purposes and concentrations of TPH in these samples ranged from less than the quantitation limits to 14.5 mg/kg. Since the highest TPH concentration could not be duplicated and the analytical results for the remaining samples were well below the GWP of 310 mg/kg, no further corrective action is recommended for this area. Due to the very low level or absence of VOCs and SVOCs in the samples, the TPH is believed to be associated with de minimis releases of motor oil or hydraulic oil that may have leaked from vehicles historically stored at the Property.

4.6 Groundwater Investigation

Elevated concentrations of lead were detected in two groundwater samples collected during the Phase II ESA. These concentrations are believed to be associated with suspended solids that were observed in the groundwater samples. Low flow purging and sampling of the groundwater was recommended to assess whether lead is present in the groundwater.

One groundwater sample was collected and analyzed during the Phase III ESA to assess the presence of total lead in groundwater at the Property. Lead was not detected in the sample at

concentrations above the quantitation limit of 0.010 mg/l. The analytical results for the Phase III ESA are summarized in Table 4.3 and the laboratory reports are included in Appendix H.

Several groundwater quality parameters were continuously monitored during low-flow purging activities. These parameters include dissolved oxygen (DO), oxidation-reduction potential (ORP), turbidity, pH, conductivity, and total dissolved solids (TDS). The monitoring well purging records are included in Appendix E and the results are summarized below.

Field Parameter	Range of Values from Temporary Monitoring Well
Dissolved oxygen (mg/l)	9.33 to 9.95
Oxidation-reduction potential (mV)	266.5 to 288.2
Turbidity (NTUs)	1.2 to 9.7
pH (s.u.)	7.03 to 7.21
Conductivity (micromhos/cm)	1034 to 1085
TDS (mg/l)	672 to 685

4.7 Data Verification Results

Field and Chain-of-Custody Documentation: No deficiencies in sample management or chain-of-custody documentation were identified. The sample management and shipping procedures were considered to be acceptable.

Holding Times: Preparation and analysis of soil and groundwater samples were performed within the required holding times established for each of the methods.

Laboratory Methods: Sample extractions and analyses were performed using the proper methods.

Laboratory Control Measures: With the exception of several laboratory QA/QC samples for inorganic analyses and one QA/QC sample for 4-nitrophenol, data for percent recovery and relative percent difference for matrix spikes and matrix spike duplicates were within acceptable ranges. No compounds were detected above standard method detection limits in any of the method blanks. Surrogate recoveries were within acceptable limits established by the laboratory.

The matrix spike recoveries for silver and selenium were below the lower acceptable limits. The post-digestion spike recovery data for silver and selenium were within acceptable limits and the low matrix spike recoveries were attributed to matrix interference. The relative percent differences (RPDs) for chromium and lead were outside of acceptable ranges and this was attributed to sample heterogeneity. 4-nitrophenol was not recovered in one QA/QC sample and this was attributed to sample matrix interference.

Detection Limits: The target detection limits were achieved for all soil samples.

Case Narrative and Data Flags: One deficiency was identified in the case narratives of the laboratory reports. The sample interval depths that were listed on two sample containers did not match the sample interval depths listed on the chain-of-custody. The field geologist that collected the samples reviewed this information and determined that the sample interval depths on the chain-of-custody were correct.

Several inorganic analytical results were flagged with a "J" to indicate that the reported concentrations were estimated concentrations. These results were reported as estimated since the concentrations are between the method quantitation limit and the method detection limit. These analytical results were considered usable approximations of the actual results.

4.8 Extent of Soil Contamination

Soil samples from the four potential source areas were analyzed for eight RCRA metals, TPH, VOCs and SVOCs. These samples were collected at locations that were expected to contain the highest concentrations of contaminants. The concentrations of total lead were less than the SAIs. The leachable concentrations of cadmium and chromium as determined by the SPLP method were less than GW standards established by the TNRCC. Concentrations of TPH were less than the most conservative default TPH cleanup goals that were established by the VCP Section of the TNRCC. VOCs and SVOCs were not detected in any of the samples at concentrations above the quantitation limits. Based on this comparison of the analytical results

to TNRCC standards and background concentrations, no further corrective action is required for these areas and the areas can be closed under the provisions of RRS 3.

Soil samples from the B-4 area were analyzed for TPH. A replicate sample was collected from soil boring B-4 and was submitted to the laboratory for TPH analysis by EPA Method 418.1 and by the Massachusetts Method. The previously detected TPH concentration of 389 mg/kg could not be replicated and the Massachusetts Method was not performed. The concentrations of TPH in the B-4 soil samples that were collected during the Phase III ESA were well below the most conservative default TPH cleanup goals established by the VCP Section. Therefore, no further corrective is required for this area and this area can be closed under the provisions of RRS 2 or 3.

4.9 Extent of Groundwater Contamination

Groundwater samples were collected from three locations during the Phase II ESA and were analyzed for the eight RCRA metals, VOCs, and SVOCs. VOCs, SVOCs, and six of the RCRA metals were not detected in the samples at concentrations above the quantitation limits. Barium, a common inorganic constituent in clays, was detected in all of the groundwater samples at concentrations below the GW of 2.0 mg/l. Lead was detected in two groundwater samples. The presence of barium and lead was attributed to the presence of suspended solids in the samples. Another groundwater sample was collected using low-flow purging and sampling techniques and the sample was analyzed for total lead. Total lead was not detected in the sample. Based on these analytical results, no evidence of groundwater contamination has been detected. Therefore, no further corrective action is required for groundwater.

4.10 Selection of Remedy Standards and Post-Closure Care

According to Title 30 TAC Section 335.561(d), a remedy standard must achieve the media cleanup standards that are established pursuant to Title 30 TAC Section 335.563. The concentrations of contaminants at this site do not exceed the media cleanup levels that have been established in accordance with Title 30 TAC Sections 335.561 to 335.566. Therefore, no remedy standards are recommended for this site.

According to Title 30 TAC Section 335.564, post-closure care is not required when engineering and/or institutional remedies are not necessary to protect human health and the environment. Since the concentrations of contaminants do not exceed the media cleanup levels, post-closure care is not required for this facility.

TABLE 4.1

Analytical Results for Lead
in Background Soil Samples (in ppm)
Malcolm Pirnie/City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	Moisture Content (percent) ASTM 2216-71	Total Lead (6020/7421)
Surficial Fill Material (Stratum I)				
BG-1A	04/13/99	0.0 - 0.5	5.6	201
BG-2A	04/13/99	0.0 - 0.5	4.2	4.8
BG-3A	04/13/99	0.0 - 0.5	1.5	24.0
BG-4A	04/13/99	0.0 - 0.5	4.2	12.7
BG-5A	04/13/99	0.0 - 0.5	8.2	28.8
BG-6A	04/13/99	0.0 - 0.5	3.5	31.0
BG-7A	04/13/99	0.0 - 0.5	4.8	4.4
BG-8A	04/13/99	0.0 - 0.5	4.3	9.2
BG-9A	04/13/99	0.0 - 0.5	4.1	9.2
BG-10A	04/13/99	0.0 - 0.5	2.5	44.4
BG-11A	04/13/99	0.0 - 0.5	7.8	11.1
BG-12A	04/13/99	0.0 - 0.5	9.0	6.4
BG-1AA	07/30/99	0.0 - 0.5	6.64	42.1
Native Surficial Soils (Stratum II)				
BG-1B	04/13/99	1.0 - 1.5	10.7	154
BG-2B	04/13/99	1.5 - 2.0	6.7	77.6
BG-3B	04/13/99	1.0 - 1.5	13.5	7.6
BG-4B	04/13/99	1.0 - 1.5	13.5	12.0
BG-5B	04/13/99	1.0 - 1.5	2.9	17.6
BG-6B	04/13/99	1.0 - 1.5	9.7	32.7
BG-7B	04/13/99	1.0 - 1.5	6.3	75.9
BG-8B	04/13/99	1.0 - 1.5	11.6	16.6
BG-9B	04/13/99	1.0 - 1.5	15.4	6.1
BG-10B	04/13/99	1.0 - 1.5	12.7	15.9
BG-11B	04/13/99	1.0 - 1.5	12.7	58.1
BG-12B	04/13/99	1.0 - 1.5	15.1	5.9
BG-13	07/30/99	1.0 - 1.5	16.1	9.05
BG-14	07/30/99	2.0 - 2.5	16.5	15.4
BG-1BA	07/30/99	1.0 - 1.5	16.4	43.0

TABLE 4.2

Organic Analytical Results for Soil Samples (ppm)
Malcolm Pirnie/City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)				
			Moisture Content (percent) ASTM 2216-71	Total Petroleum Hydro-carbons (418.1)	BTEX (8020)	Volatile Organic Compounds (8260)	SVOCs (8270)
SB-1A	05/21/1998	1 - 2'	N.A.	**210**	N.A.	N.D. (0.005 ea.)	N.D. (0.33 ea.)
SB-2A	05/21/1998	1 - 2'	N.A.	**72.3**	N.A.	N.D. (0.005 ea.)	N.D. (0.33 ea.)
SB-3A	05/21/1998	1 - 2'	N.A.	**21.7**	N.A.	N.D. (0.005 ea.)	N.D. (0.33 ea.)
SB-4A	05/21/1998	1 - 2'	N.A.	**14.5**	N.A.	N.D. (0.005 ea.)	N.D. (0.33 ea.)
SB-5A	05/21/1998	3 - 4'	N.A.	**14.5**	N.A.	N.A.	N.A.
SB-6A	05/21/1998	3 - 4'	N.A.	N.D. (10.4)	N.A.	N.A.	N.A.
SB-7A	05/21/1998	3 - 4'	N.A.	N.D. (10.0)	N.A.	N.A.	N.A.
B4-A	04/13/1999	0 - 2'	12.6	**25.3**	N.A.	N.A.	N.A.
B4-B	04/13/1999	6 - 8'	17.4	<6.1	N.A.	N.A.	N.A.
WS-1	04/13/1999	N/A	9.2	**220**	<0.030	N.A.	N.A.
WS-073099	07/30/1999	N/A	18.3	N.D. (61.2)	N.D. (0.366)	N.A.	N.A.

N.D. = Not Detected (Practical Quantitation Limit in ppm) N/A - Not Applicable N.A. = Not Analyzed

TABLE 4.3

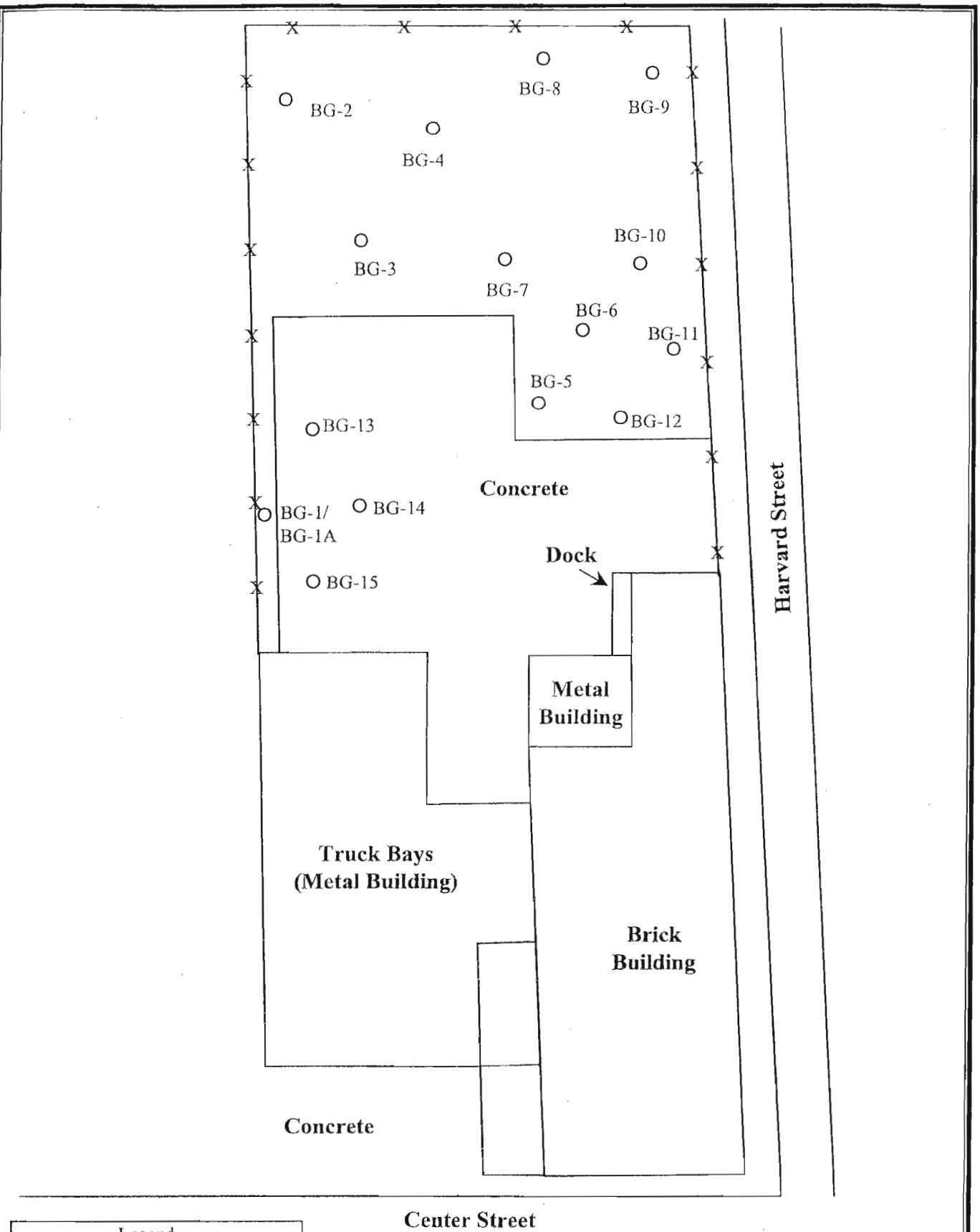
Inorganic Analytical Results (ppm)
City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.) Moisture Content (percent) ASTM 2216-71	Total Arsenic (6010)	Total Barium (6010)	Total Cadmium (6010)	SPLP Cadmium (1312/6010)	Total Chromium (6010)	SPLP Chromium (1312/6010)	Total Lead (6010/7421)	SPLP Lead (1312/239.2)
Soil Samples											
SB-1A	05/21/98	1 - 2'	N.A.	N.D. (5.0)	**29.5**	**2.58***	N.D. (0.005)	**4.8**	N.A.	**117***	**0.032***
SB-2A	05/21/98	1 - 2'	N.A.	N.D. (5.0)	**79.3**	**2.28***	N.A.	**5.4**	N.A.	**99.1***	N.A.
SB-3A	05/21/98	1 - 2'	N.A.	N.D. (5.0)	**31.8**	**0.60***	N.A.	**2.7**	N.A.	**31.6***	N.A.
SB-4A	05/21/98	1 - 2'	N.A.	N.D. (5.0)	**12.8**	N.D. (0.50)	N.A.	N.D. (2.5)	N.A.	**0.91**	N.A.
SB-5A	05/21/98	3 - 4'	N.A.	N.D. (5.0)	N.A.	N.A.	N.A.	N.A.	N.A.	**9.3***	N.A.
SB-5B	05/21/98	5 - 6'	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	**5.62***	N.A.
SB-6A	05/21/98	3 - 4'	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	**3.2***	N.A.
SB-7A	05/21/98	3 - 4'	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	**4.62***	N.A.
MW-1A	04/13/99	16 - 18'	14.4	N.A.	N.A.	N.A.	N.A.	**13.8***	**0.018J**	N.A.	N.A.
WS-1	04/13/99	N.A.	9.2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	**23.4***	N.A.
Upper Tolerance Limit				N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	151/181	N.E.
RRS 2 Groundwater Protection Standard for Industrial Use				5.0	200	0.5	0.005	10	0.1	1.5	0.015
RRS 2 Soil/Air Ingestion Standard for Industrial Use				200	58,000	410	N/A	23,000	N/A	1000.000	N/A
Groundwater Samples											
TW-1	04/15/1999	N/A	N/A	N.A.	N.A.	N.A.	N/A	N.A.	N/A	<0.010	N/A
RRS 2 Groundwater Standard for Industrial Use				0.05	2.0	0.005	N/A	0.010	N/A	0.015	N/A

N.D. = Not Detected (Practical Quantitation Limit in ppm) N/A - Not Applicable N.A. = Not Analyzed J = Estimated Value N.E. - Not Established

*Note: These concentrations are above the following TNRCC Risk Reduction No. 2 standards.

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.) Moisture Content (percent) ASTM 2216-71	TCLP Arsenic (6020)	TCLP Barium (6020)	TCLP Cadmium (6020)	TCLP Chromium (6020)	TCLP Lead (6020)	TCLP Selenium (6020)	TCLP Silver (6020)	TCLP Mercury (7471)
WS-073099	07/30/99	N.A.	18.3	0.044	1.99	0.017	0.039	0.107	0.05	**0.061**	N.D. (0.010)



Background Sample Location Map	**Malcolm Pirnie/City of Houston Heights Service Center**
Date: 04/99	**3602 Center St., Houston, Texas**
Figure 4-1	***CORRIGAN CONSULTING, INC.***

SECTION 5

Summary, Conclusions, and Recommendations

5.1 Summary of Investigation

The Phase III ESA at the City of Houston's Heights Service Center (Property) in Houston, Texas has been completed in accordance with the scopes of work that were prepared by Corrigan Consulting, Inc. and modified by Malcolm Pirnie, Inc. and the Texas Natural Resource Conservation Commission (TNRCC). A Phase I and II ESA was completed for the Property and several recognized environmental conditions were identified. The results of the Phase I and II ESA and a Voluntary Cleanup Program application were submitted to the TNRCC. A Phase III ESA was requested by the TNRCC to address several potential source areas that were identified in the Phase I ESA report.

This Phase III ESA included the collection of soil samples from four potential source areas and the collection of additional soil samples from the soil boring B-4 location. Based on the results for these samples, it was determined that additional investigation was necessary to determine the background concentrations of lead, to determine the concentration of dissolved lead in groundwater, and to evaluate the yield of the uppermost water-bearing unit.

A statistical evaluation was performed for the background soil samples and upper tolerance limits (UTLs) of 151.6 and 181.6 mg/kg were calculated for two strata. The evaluation of the uppermost water-bearing unit was performed by analyzing groundwater samples from this unit for total dissolved solids (TDS) and by determining the maximum potential yield for this unit. Based on the results of this evaluation, the uppermost water-bearing unit is not classified as a potential source for drinking water because of the low yield of the unit.

Soil samples from the potential source areas were collected and analyzed for the eight RCRA metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). With the exception of lead, chromium, and cadmium, the concentrations of metals were less than the RRS 2 standards established by the TNRCC. A UTL and a soil media cleanup level were calculated for total lead. The concentrations of lead in soil were less than the media cleanup level. The leachable concentrations of cadmium and chromium were less than GW

standards established by the TNRCC. VOCs and SVOCs were not detected in any of the samples from the potential source areas at concentrations above the quantitation limits.

Samples from the soil boring B-4 area were collected and analyzed for total petroleum hydrocarbons (TPH). Concentrations of TPH were less than the most conservative default TPH cleanup goals that were established by the VCP Section of the TNRCC. M,p-xylenes and two forms of trimethylbenzene were detected in a sample from the soil boring B-4 area, but these concentrations were very low (0.010 mg/kg for m,p-xylenes and 0.005 to 0.016 mg/kg for the trimethylbenzenes). The detected concentrations of m,p-xylenes were less than the RRS 2 standards that have been established for these organic compounds.

Groundwater samples were collected from three locations during the Phase II ESA and were analyzed for the eight RCRA metals, VOCs, and SVOCs. VOCs, SVOCs, and six of the RCRA metals were not detected in the samples at concentrations above the quantitation limits. Barium, a common inorganic constituent in clays, was detected in all of the groundwater samples at concentrations below the GW of 2.0 mg/l. Lead was detected in two groundwater samples at concentrations above the RRS 2 GW of 0.015 mg/l. The presence of barium and lead was believed to be due to the presence of suspended solids in the samples. Therefore, another groundwater sample was collected using low-flow purging and sampling techniques and the sample was analyzed for total lead. Lead was not detected in this sample at concentrations above the quantitation limits.

5.2 Conclusions

All identified potential sources on the Property were evaluated during the Phase I, II, and III ESAs. Soil samples were collected at locations within the potential source areas that were expected to contain the highest concentrations of contaminants. Based on a comparison of the analytical results for the soil samples to TNRCC standards and background concentrations, contaminants are not present in the soil at concentrations that exceed background concentrations, RRS 2 standards or media cleanup levels established according to RRS 3.

TPH was detected in one of the potential source area samples and one sample from B-4 area. Due to the very low level or absence of VOCs and SVOCs in the samples, the TPH is believed to be associated with de minimis releases of motor oil or hydraulic oil that leaked from vehicles historically stored at the Property.

Groundwater contamination was not detected in groundwater samples that were collected at the Property. An informal evaluation of the yield of the uppermost water-bearing zone was performed and an estimated yield of 25 gallons per day was calculated. This yield is significantly less than the minimum yield of 150 gallons per day for drinking water aquifers that was established by the TNRCC. Therefore, the uppermost water-bearing zone is not classified as a source for drinking water. No active water wells were identified within a 0.5-mile radius of the Property.

A security fence was installed around the perimeter of the Property and access to the Property is limited to City of Houston personnel and other authorized personnel. No evidence of off-site contaminant migration was observed. Exposure to contaminants at the site is limited to workers at the Property. Since the contaminant concentrations do not exceed RRS 2 standards or media cleanup levels established according to RRS 3 requirements, selection of a remedy and post-closure care of the facility are not required for this facility for closure under the requirements of RRS 3.

5.3 Recommendations

No further assessment of soil or groundwater at the Property is required to assess the presence or extent of contamination. Existing concentrations of contaminants are less than TNRCC RRS 2 standards, media cleanup levels established according to RRS 3, TNRCC TPH standards, and/or site-specific background concentrations. Therefore, remediation is not required for the Property to be closed under the provisions of RRS 3 and a Certificate of Completion can be issued for the Property. In order to meet the requirements for closure under RRS 3, deed certification is required to document the location, types, and concentrations of contaminants that were identified. Due to the locations of the source areas throughout the Property, the entire Property should be included in the deed certification. Upon TNRCC approval of the recommendations, the deed certification will be completed and filed in accordance with Title 30 TAC Section 335.560.

APPENDIX A

Scope of Work, Agreement, and Qualifications

CORRIGAN CONSULTING, INC.

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May 11, 1998

Mr. John P. Sparks, P.E.
Associate
Malcolm Pirnie, Inc.
1700 West Loop South
Houston, TX 77027

Re: Additional Site Investigation Services Revised
City of Houston; Heights Service Center
Voluntary Cleanup Program Application No. 700

Dear Mr. Sparks:

As requested, Corrigan Consulting, Inc. is pleased to provide a scope and cost estimate to obtain additional information in order to supplement the Voluntary Cleanup Program (VCP) Application for the Heights Service Center. This scope of work was prepared in response to comments prepared by the Texas Natural Resource Conservation Commission (TNRCC) on April 1, 1998 (Attachment A). The TNRCC has requested the additional information within 90 days, or by July 1, 1998.

Background

In September 1997, Corrigan Consulting, Inc. was tasked by the City of Houston to prepare a combination Phase I and Phase II Environmental Site Assessment Report for the Heights Service Center, located at 3602 Center Street. The scope of the work included a review of database records, site reconnaissance, and sampling of surface and subsurface media suspected of containing hazardous substances. This included a survey for asbestos-containing materials and lead-based paint. The report was prepared in October 1997. Following review of the report, the City of Houston tasked Corrigan Consulting, Inc. to prepare a VCP application.

The Heights Service Center has been used by the City of Houston as an equipment storage and maintenance facility since its acquisition in 1981. Prior to that time, the site was occupied by a machine shop, a feed mill, and a dairy plant. Consequently, during the initial investigation, soil and groundwater samples were collected and analyzed for heavy metals and total petroleum hydrocarbons (TPH), with volatile and semivolatile speciation of the sample with the highest concentration of TPH.

In response to the VCP Application, TNRCC is requesting the following information:

1. Brick building: Collect soil samples beneath the floor in the drum storage and paint room areas to determine potential impact to soil. Sample locations should be in the proximity of visible staining on the floor, and parameters should be consistent with the types of materials used at the facility.
2. Brick building: Collect soil samples beneath a wooden trough. Parameters should be consistent with the types of materials used at the facility.

3. Metal building: Collect soil samples beneath the floor in the drum storage and paint room areas to determine potential impact to soil. Sample locations should be in the proximity of visible staining on the floor, and parameters should be consistent with the types of materials used at the facility.

4. Boring B-4A: Collect samples to determine the horizontal and vertical extent of TPH contamination. Utilize the default concentration of 310 mg/kg or develop an alternate concentration limit strategy and site-specific cleanup standard for review by TNRCC prior to its implementation.

Scope of Work

The following items will be completed in order to accomplish the investigation objectives in accordance with the TNRCC letter of April 1, 1998. Because of the July 1 deadline, we plan to collect additional samples and hold them in the laboratory pending the results of the initial samples. This approach should minimize delays and the costs to re-mobilize.

Item 1 Field Investigation

We will coordinate with the City of Houston to obtain access to the brick and metal buildings. We will revise the Sampling/Analysis and Health and Safety Plans, as appropriate to complete the additional scope of work. To access the underlying soil, the concrete slabs will be cored in four locations (paint area, drum storage area, and two locations in the wooden trough) by Holes, Inc., as a direct subcontractor to Malcolm Pirnie, Inc. Corrigan Consulting, Inc. personnel will then hand-auger and collect samples of the soil beneath the concrete slab. Soil samples will be collected from the 1-2 foot interval below the slab, in accordance with EPA Publication SW-846, "Test Methods for Evaluating Solid Waste." The four samples will be analyzed by XENCO Laboratories for the following:

Inorganic parameters:	barium, cadmium, chromium, and lead. If the GWP standard is exceeded for any of the metals, the sample will be analyzed for that metal using the SPLP (EPA Method 1312);
Organic parameters:	TPH (on a 24 hour turnaround basis), will be speciated for volatile and semivolatile constituents, and for TPH greater than 310 ppm, will be analyzed by SPLP (Method 1312) for TPH.

In addition, a contingency sample will be collected from each cored location at the 3-4 foot interval, but will be held at the laboratory pending the results from the shallower interval.

In the vicinity of SB-4 (MW-2), Corrigan Consulting, Inc. personnel will advance three soil borings to a depth of approximately 6 feet below ground surface. Soil samples will be collected at the 3-4 foot interval (just above the native clay), in accordance with EPA Publication SW-846, "Test Methods for Evaluating Solid Waste." The samples will be analyzed by XENCO Laboratories for the following:

Inorganic parameters:	None
Organic parameters:	TPH (on a 24 hour turnaround basis), and if TPH is greater than 310 ppm. will be speciated for volatile and semivolatile constituents, and analyzed by SPLP (Method 1312) for TPH.

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In addition, samples will be collected at the 5-6 foot interval in each boring, and will be held at the laboratory pending the initial analytical results. Six additional contingency samples will be collected from an additional step-out ring of three additional boring locations. If any of the results are significantly above the previously detected concentration of 390 ppm for TPH, it may also be necessary to speciate for volatile and semivolatile constituents. Contingency samples will be held pending the results of the basic program described above.

At the conclusion of field activities, borings will be backfilled, and repairs will be made to the concrete slabs using a cement/bentonite mix. Pending receipt of results, investigation-derived wastes will be collected, characterized, and transported to an appropriate disposal site.

Item 2 Contingency for Additional Delineation

Upon receipt of the initial analytical data, we will determine whether further delineation is necessary. If additional samples should be analyzed to delineate the nature and extent of contamination (i.e., from the 3-4 foot interval below each slab, or from the 5-6 foot interval in the exterior soil borings), or if further speciation is considered appropriate, we will notify you and request concurrence prior to requesting the additional analysis. A cost estimate for these additional analysis, including unit costs, is provided in Attachment B.

Item 3 Report

All data will be reviewed for appropriate laboratory quality assurance and quality control. We will then prepare a report, as a supplement to the original Phase I&II Environmental Site Assessment. The report will be formatted so as to address each of TNRCC's comments, and will include photographs, field documentation, chain-of-custody forms, laboratory reports, a detailed description of the procedures used to carry out the investigation, and a discussion of the results. We will also update or modify the VCP Application, as appropriate, and include it as an attachment, so that the TNRCC can proceed with their administrative review process.

This report will be prepared in anticipation of meeting the requirements for TNRCC Risk Reduction Standard No. 2 and obtaining a Certificate of Completion. Therefore, a scope of work and estimated cost for preparing a Conceptual Environmental Assessment Model (CEAM) and a Response Action Work Plan (RAWP) are not included in this proposal. Following the completion of the field investigation, the analytical data will be evaluated to determine whether the TNRCC criteria for Risk Reduction Standard No. 2 can be met without further corrective action. If these criteria cannot be met, we will coordinate with representatives of Malcolm Pirnie, Inc. and the City of Houston to identify the next appropriate action which may include the preparation of a CEAM and/or a RAWP.

Cost and Schedule

The estimated cost to execute the above scope of work is provided in Attachment B. We are prepared to initiate field investigation activities within one week of authorization, and will submit the complete report within 6 weeks of authorization.

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We appreciate this opportunity to gather the additional data needed for the TNRCC to complete processing of the VCP Application. If there area any questions regarding the enclosed application, please contact Mr. John Herrmann, P.E., Senior Project Manager or me at (281) 474-7455.

Sincerely,

Gail A. Corrigan
President

GAC/dc
Enclosures

P.O. Box 99 • Seabrook, Texas 77586-0099 • (281) 474-7455

CORRIGAN CONSULTING, INC.

1909 Capri Lane
P.O. Box 99, Seabrook, Texas 77586-0099
(281) 474-7455 • Fax (281) 474-4501

October 2, 1998

Mr. Barry Daniels, P.E.
Malcolm Pirnie, Inc.
1700 West Loop South, Suite 950
Houston, Texas 77027-3006

Re: Revised Scope of Work for Site Closure
Heights Service Center
3602 Center Street, Houston

Dear Mr. Daniels:

As requested, Corrigan Consulting, Inc. has completed a site investigation at the above-referenced facility on behalf of Malcolm Pirnie, Inc. and the City of Houston. This investigation was performed to supplement a Phase I/II Environmental Site Assessment performed in September 1997. The results of the investigation and a proposed scope of work for additional investigation were summarized in a July 27, 1998 report.

Based on our conversations with yourself and Mr. John Sparks, we understand that an alternative approach is being requested by Malcolm Pirnie, Inc. to obtain Texas Natural Resource Conservation Commission (TNRCC) approval for closure of the site. Prior to implementing this approach, we recommend that the approach be presented to and approved by the TNRCC. The revised scope of work is described below and the estimated cost is attached.

Scope of Work

Item 1: Project Coordination and Records Review

Prior to implementing the scope of work outlined below, we will prepare a summary of the proposed scope of work which can be submitted to the City of Houston and the TNRCC. The scope of work will include Items 2 through 6 listed below and will be submitted to the TNRCC. We will schedule a teleconference with the TNRCC to discuss the scope of work. If TNRCC approval is received, we will implement the scope of work as outlined below. If the TNRCC does not approve the scope of work, we will coordinate with Malcolm Pirnie, Inc. to revise the scope of work.

Prior to the start of field investigation activities, a water well records inventory will be completed for the area within a 0.5 mile radius of the facility. Water well records will be reviewed and available records for the wells will be obtained from the TNRCC. These records will be evaluated for potential exposure points. In order to evaluate potential groundwater exposure pathways, we will coordinate with the Harris-Galveston Subsidence District and the City of Houston to identify ordinances which restrict the use of groundwater in the area of the facility.

We will coordinate with the City of Houston to obtain access to the facility. We will revise the Sampling/Analysis and Health and Safety Plans, as appropriate to complete the additional scope of work.

Item 2: Field Investigation

During field investigation activities, a field receptor survey will be performed to identify potential receptors and migration pathways within 500 feet of the facility. Potential receptors include water wells, schools, hospitals, residences, day care centers, nursing homes, parks, recreational areas, wildlife sanctuaries, businesses, and potential wetlands. Migration pathways will be identified by obtaining and reviewing utility maps from the City of Houston and by visual inspecting the area within 500 feet of the facility.

Elevated concentrations of total petroleum hydrocarbons (TPH) were detected in a surface soil sample from soil boring B-4. In order to delineate the vertical extent of soil contamination in this area, a soil boring will be drilled to a maximum depth of 12 feet below ground surface (bgs) and continuous soil samples will be collected from the boring. The samples will be screened for volatile organic compounds and the sample with the highest screening results and the sample from the total depth of the boring will be submitted for laboratory analysis using Method TX 1005.

During previous assessment activities, total lead was detected in two groundwater samples at concentrations which exceeded the RRS No. 2 default standard of 0.015 ppm. According to the Phase I/II ESA report, these samples also contained suspended solids which may have affected the analytical results for total lead. Therefore, a temporary monitoring well and low flow purging/sampling of the well are recommended to determine whether total lead concentrations in groundwater are artifacts due to suspended solids or are due to contamination from past activities at the site.

Under proposed guidelines from the TNRCC dated December 1996, the extent of required risk assessment and remediation is based on the potential uses of groundwater from a water-bearing zone. If a water-bearing zone produces less than 150 gallons of groundwater in one day, the zone is considered to be a low yield zone and the requirements for risk assessment and remediation are reduced. In order to determine the yield of the water-bearing zone at the Heights facility, the thickness of the uppermost water bearing zone must be determined. A soil boring will be drilled to a maximum depth of 45 feet bgs to determine this thickness. In order to accurately determine the Unified Soil Classification System (USCS) classification and calculate the hydraulic conductivity of the water bearing zone, two soil samples will be collected which are representative of this zone. The samples will be analyzed for Atterberg limits and for particle size distribution in accordance with current TNRCC requirements. A temporary monitoring well will be installed in the boring and the well will be developed.

Following development, the well will be purged using the low flow purging method. The pump will be positioned at the approximate mid-point of the screened interval and water will be pumped at a rate that approximates the natural recharge of the well. Temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity will be monitored

during the purging of the well. Once these parameters have stabilized, a groundwater sample will be collected from the well and submitted to a laboratory for analysis of total lead and total dissolved solids.

Item 3: Waste Management

Soil cuttings, development water, and purged water from the temporary monitoring well will be temporarily stored onsite in drums. A composite soil sample and a composite water sample will be collected from the drums and submitted to a laboratory for analysis. The samples will be analyzed for reactivity, corrosivity, and ignitability (RCI). The samples will also be analyzed for eight RCRA metals using the Toxicity Characteristic Leaching Procedure. Based on the analytical results of soil and groundwater samples, the waste should be classified as a Class II nonhazardous waste.

Following the laboratory analysis, a one-time waste shipment code request will be prepared and submitted to the TNRCC. A waste characterization profile will be prepared for the soil cuttings waste and submitted to USA Waste or BFI for acceptance. Waste manifests will be prepared and submitted to Malcolm Pirnie, Inc. or the City of Houston for signature. The waste soil cuttings will be subsequently transported to a USA Waste or BFI landfill. The development and purged water will be transported by U.S. Filter, Inc. to their facility for subsequent treatment and disposal.

Item 4: Conceptual Environmental Assessment Model

Since closure under RRS Standard No. 2 is not feasible, a preliminary Conceptual Environmental Assessment Model (CEAM) will be prepared and included in the assessment report. The CEAM will be limited to a discussion of the contaminant sources, the receptor survey, an evaluation of receptors and exposure pathways for contaminated soils, a limited discussion of toxicological information for the contaminants of concern and an evaluation of current conditions and potential future uses of the facility. The evaluation of contaminated soils exposure pathways will be based in part on the partitioning of contaminants using the equilibrium partition model presented in the 1994 TNRCC guidance document "Risk-based Corrective Action for Leaking Petroleum Storage Tank Sites".

Due to the low to moderate levels of soil contamination, the location of the facility within an industrial area, and the limited exposure pathways for contaminant exposure, a full CEAM is deemed unnecessary at this time. The costs for the CEAM are based on the assumption that the water-bearing zone will produce less than 150 gallons per day of groundwater and an evaluation of groundwater receptors and exposure pathways will not be required. The CEAM does not include a hydrogeologic evaluation of groundwater, or an evaluation of receptors and exposure pathways for surface water and air. The costs for these elements are not included in the project cost estimate.

Item 5: Report

In order to meet the deed certification requirements for closure under Risk Reduction Standard No. 3 (30 TAC Section 335.566), the area of the Property containing elevated concentrations of contaminants will be surveyed and a metes and bounds description of this area will be prepared by a professional land surveyor. Following the receipt and review of this information, a deed certification will be prepared which meets the requirements of 30 TAC Section 335.566. The deed certification may include institutional control measures and property use restrictions. Recommended deed certification language and survey documentation will be included in the draft report which will be submitted to Malcolm Pirnie, Inc. and the City of Houston for review.

Final laboratory reports will be reviewed and laboratory quality assurance/quality control procedures will be evaluated. Results of Massachusetts Method TPH analyses will be used to calculate a site-specific groundwater protection standard for TPH. A report will be prepared which summarizes the assessment activities performed in May 1998, the assessment activities outlined in this proposal, and the CEAM. The report will also include waste disposition records, photographs, field documentation, laboratory reports, a description of assessment procedures, and a discussion of the analytical results. Three copies of the draft report will be provided to Malcolm Pirnie, Inc. for review and comment. Three copies of the final report will be prepared and submitted to Malcolm Pirnie, Inc. following the receipt of any comments.

Cost and Schedule

The estimated cost to complete this scope of work is provided in Attachment A. The project will be started within one week of receiving authorization from Malcolm Pirnie, Inc. and the draft report will be submitted within 6 weeks of receiving this authorization. The final report will be completed within one week of receiving comments from Malcolm Pirnie, Inc. and the City of Houston.

Limitations

The scope of work outlined above was developed to obtain site closure under RRS No. 3. Based on the results of previous assessment activities and the expected results for the proposed assessment activities, closure of the site should be obtained without the completion of a full CEAM or a Response Action Work Plan (RAWP). If the actual results of the proposed assessment activities do not match the expected results (i.e., the uppermost water-bearing zone produces more than 150 gallons per day), additional activities, such as slug or aquifer tests, a full CEAM and/or a RAWP, may be necessary to obtain closure for the site.

If there are any questions regarding the authorized representatives or the requested extension, please contact Mr. Wendall Honeycutt, P.G., Senior Project Geologist at (281) 474-7455.

Sincerely,

Gary L. Kratochvil, P.G.
Senior Project Manager

GLK/WBH/dc

Jobs\Malcolm Pirnie\98S-128\Correspondence\Investig. Sum-Add. Svcs Ltr. Report Rev. 2

CORRIGAN CONSULTING, INC.

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March 19, 1999

Mr. Barry Daniels, P.E.
Malcolm Pirnie, Inc.
1700 West Loop South, Suite 950
Houston, Texas 77027-3006

Re: Revised Scope of Work per TNRCC Recommendations
City of Houston
Heights Service Center
3602 Center Street, Houston

Dear Mr. Daniels:

As you are aware, Corrigan Consulting, Inc. conducted a teleconference with yourself and Mr. Joe Bell of the Voluntary Cleanup Program at the Texas Natural Resource Conservation Commission. This teleconference was conducted to discuss the Work Plan that was submitted to the TNRCC in December 1998. The Work Plan was discussed to ensure that the proposed scope of work in the Work Plan would be sufficient to obtain TNRCC approval for closure of the site (assuming that the analytical results of samples are less than applicable Risk Reduction Standards established by the TNRCC in Title 30 TAC Chapter 335 Subchapter S). Subsequent to the teleconference, Mr. Bell issued a letter to document the decisions made during the teleconference.

Based on our conversations during the teleconference and comments in the letter from Mr. Bell, several additions and modifications to the Work Plan scope of work were recommended by Mr. Bell. These additions and modifications were recommended in an effort to facilitate meeting the closure criteria of Risk Reduction Standard No. 2 and to eliminate the need to complete a Conceptual Exposure Assessment Model as required under Risk Reduction Standard No. 3. The additions and modifications to the scope of work are described below and the estimated cost is attached.

Scope of Work

Item 1: Background Study for Lead

Mr. Bell suggested a background study for lead in the belief that the detected concentrations of lead may be within the range of background concentrations. In order to perform the background study, we will collect twelve soil samples from the 0 to 0.5-foot interval from on-site locations that are believed to contain background levels of lead. The samples will be submitted to XENCO Laboratories for analysis of lead using EPA Method 6010 or 7000 series.

Upon receipt of the analytical results, a statistical evaluation of the analytical results will be performed. Using the Tolerance Interval Method, 95 percent confidence upper tolerance limit (UTL) will be calculated for lead in the 0 to 0.5-foot interval.

Item 2: Elevated TPH at Soil Boring B-4

Another soil sample will be collected from the surface at the location of soil boring B-4. The sample will be analyzed for total petroleum hydrocarbons (TPH) by EPA Method 418.1 and for Synthetic Precipitation Leaching Procedure (SPLP) by EPA Methods 1311 and 418.1.

Item 3: Informal Pump Test

According to Mr. Bell's letter, hydraulic conductivity estimates based on geotechnical testing are not acceptable to the TNRCC. Unless directed otherwise by Malcolm Pirnie, Inc. or the City of Houston, the geotechnical testing will be deleted from the original scope of work and will not be performed during the completion of field activities.

As requested by Mr. Bell, we will perform an informal pump test to assess the yield of the shallow saturated zone at the facility. This test will be performed using low-flow purge techniques to pump approximately 0.1 gallons per minute of groundwater from the well. The purpose of this test is to provide a qualitative evaluation of the yield of the shallow saturated zone. Therefore, the test will not be performed in accordance with standard industry practices for pumping tests and saturated zone parameters will not be calculated.

The test will be performed for approximately one hour following the development of the well. The depth to groundwater in the well will be measured frequently during the first ten minutes of the test and at five-minute intervals thereafter until one hour has expired. A qualitative evaluation of the drawdown in the well will be performed, and an assessment of the potential yield of this zone will be completed.

Item 4: Location of Off-site Sources of Contamination

During the walking receptor survey of the area that surrounds the facility, we will confirm the locations of off-site sources, such as the Unitog Rental Services facility that was listed as a Leaking Petroleum Storage Tank site in the Phase I & II Environmental Site Assessment Report dated October 1997.

Item 5: Compliance with Consistency Document

In the letter from Mr. Bell, Comment #6 requires that the site investigation and report be completed in accordance with the TNRCC Interoffice Memorandum "Implementation of the Existing Risk Reduction Rule". This memorandum was reviewed to determine the applicable requirements that have not been included in the previous scope of work for this project. These requirements include: additional laboratory analyses; additional laboratory quality assurance/quality control (QA/QC) measures, documentation, and reporting; and, additional evaluation of field documentation, laboratory analyses and QA/QC documentation. A detailed discussion of these requirements is included in memorandum and the requirements are briefly discussed below.

In order to meet the data quality objectives outlined in the memorandum, moisture analyses of soil samples will be performed for each sample. A Level III data quality package will be requested with each set of analytical results from the laboratory. The data quality packages will

be reviewed and evaluated in accordance with the guidelines of the memorandum. The data review and evaluation will include an evaluation of the frequency of detection of a contaminant, review for blank contamination, evaluation of quantitation limits, evaluation for data censoring, evaluation of any data qualifiers, and an evaluation of analytical methods. In order to determine whether the analytical results support field observations, field notes, chain-of-custodies, sample preservation techniques, and other sampling data will be reviewed and compared to the analytical results. A description of the data review and evaluation procedures and results will be included in the report.

Item 6: TNRCC Coordination

According to Voluntary Cleanup Program guidelines of the TNRCC, a receptor survey is required for the area within a 0.5-mile radius of the facility. Based on our review of conditions at the property and surrounding area, a receptor survey within a 500-foot radius was determined to be more than adequate to meet TNRCC requirements for this property. The reduced radius for the receptor survey was discussed with and approved by Mr. Khwaja Murshed, the previous TNRCC coordinator for this project. According to correspondence from Mr. Bell, written documentation of this approval or a description of the reasoning for the reduced radius was requested. A brief letter will be prepared and submitted to Malcolm Pirnie, Inc. for review and comment. Upon receiving comments, the letter will be revised and provided to Malcolm Pirnie, Inc. for forwarding to the City of Houston and the TNRCC.

Due to the amount of coordination that has been performed with each of the three TNRCC coordinators and the differing approaches for completion of this project, the original TNRCC budget of $1,000 to evaluate the site assessment and closure of the property has been exceeded. At this time, it is projected that an additional $500 will be incurred by the TNRCC to evaluate the remaining site assessment and closure activities. These costs are not included in our cost estimate. We will forward all documentation concerning additional TNRCC costs to Malcolm Pirnie, Inc. for review and payment.

Item 7: Report

The additions and modifications outlined above will be incorporated into the closure report. Supporting documentation such as analytical results, field documentation, and maps with the off-site sources will also be included in the closure report.

Cost and Schedule

The estimated cost to complete the additions and modifications and the total cost to complete the project are provided in Attachment A. The original deadline for the completion of this project was February 1, 1999. Due to delays associated with the submittal and review of the Work Plan, we are requesting an extension of the deadline to eight weeks from the date that this scope of work for the additions and modifications are approved.

Limitations

As suggested by Mr. Joe Bell with the TNRCC, the scope of work outlined above was developed to obtain site closure under RRS No. 2. If the actual results of the proposed assessment activities do not coincide with the expected results (i.e., the uppermost water-bearing zone produces more than 150 gallons per day), additional activities, such as a partial or full CEAM, may be necessary to obtain closure for the site. These activities are not included in the scope of work or estimated costs for this project.

If there are any questions, please contact myself or Mr. Wendall Honeycutt, P.G., Senior Project Geologist at (281) 474-7455.

Sincerely,

Gary L. Kratochvil, P.G.
Senior Project Manager

GLK/WBH/msm/jls

\Jobs\Malcolm Pirnie-COH\98S-128 Additional Site \Phase II Corr\TNRCC Requested Add. Svcs Ltr. Report.doc

CORRIGAN CONSULTING, INC.

1909 Capri Lane
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(281) 474-7455 • Fax (281) 474-4501

July 16, 1999

Mr. Barry Daniels, P.E.
Malcolm Pirnie, Inc.
1700 West Loop South, Suite 950
Houston, Texas 77027-3006

Re: Elevated Lead Concentrations in Background Samples
Heights Service Center
City of Houston
3602 Center Street, Houston

Dear Mr. Daniels:

On behalf of the City of Houston, Corrigan Consulting, Inc. performed additional site assessment activities at the above-referenced property to address elevated concentrations of lead that were previously detected in soil and groundwater samples from the property. The activities included an evaluation of background concentrations of lead in soil at the property. During the background study, lead was detected at concentrations of 201 parts per million (ppm) and 154 ppm in soil samples that were collected from one background soil boring. This boring was located on the west boundary of the property.

We have performed a statistical evaluation of analytical results for the background samples and determined that the concentrations of lead in the two background samples from the west boundary of the property exceed the calculated upper tolerance limits (UTLs) for background lead. Based on guidance from the TNRCC, additional assessment of the west boundary is required to determine whether these concentrations are actually background concentrations or are associated with an undocumented release. The scope of work and estimated cost to assess the presence and extent of lead along the west boundary are summarized below.

Scope of Work

In order to confirm the analytical results at background sampling point BG-1, soil samples will be collected from the 0 to 0.5-foot interval and 1.0 to 1.5-foot interval at the BG-1 sampling location. Three shallow soil borings will be drilled to a maximum depth of four feet to assess whether lead contamination is present near the BG-1 boring. Soil samples will be collected from natural ground surface. The natural ground surface is expected to be encountered at a depth of one to four feet below ground surface. The samples will be submitted to XENCO Laboratories for analysis of lead using EPA Method 6010 or 7000 series.

Upon receipt of the analytical results, the analytical results will be evaluated. If the lead concentration in the soil is determined to be representative of background concentrations, the analytical results will be incorporated into the statistical evaluation of background lead

concentrations. Using the Tolerance Interval Method, a 95 percent confidence UTL will be calculated for lead at the property. If lead in the soil is determined to represent contamination, we will coordinate with Malcolm Pirnie, Inc. and the City of Houston and present our recommendations to assess the extent of contamination and obtain a certificate of completion from the Texas Natural Resource Conservation Commission.

The additions and modifications outlined above will be incorporated into the site investigation report. Supporting documentation such as analytical results, field documentation, and maps will also be included in the closure report.

Cost and Schedule

The estimated cost to complete the additions and modifications and the total cost to complete the project are provided in Attachment A. Due to delays associated with this additional assessment, we are requesting an extension of the deadline to six weeks from the date that this scope of work for the additions and modifications are approved.

Corrigan Consulting, Inc. appreciates this opportunity to work with Malcolm Pirnie, Inc. If there are any questions, please feel free to call me or Mr. Wendall Honeycutt, P.G., Senior Project Geologist, at 281-474-7455.

Sincerely,

Gail A. Corrigan
President

GLK/WBH/wbh

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CORRIGAN CONSULTING, INC.

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December 4, 2001

Mr. Tanwir Badar, P.E.
Building Services Department
City of Houston
P. O. Box 1562
Houston, Texas 77210-1562

Re: Voluntary Cleanup Program Assistance
Heights Service Center
3602 Center Street, Houston, Texas
CCI Proposal No. 01PR-1103

Dear Mr. Badar:

As requested, Corrigan Consulting, Inc. is submitting this proposal to continue our work on the Heights Service Center property, located at 3602 Center Street. As we discussed, Corrigan Consulting, Inc. has previously assisted the City of Houston with several phases of site investigation at this property as well as the associated submittals for the Texas Natural Resource Conservation Commission (TNRCC).

Based on our previous work on this site, the site was entered into the TNRCC's Voluntary Cleanup Program (VCP) and the initial site investigation report was submitted to the TNRCC at that time. Additional investigation was requested by the TNRCC to further evaluate potential sources of contamination that were identified. Most recently in 2000, additional field investigations were completed, including the collection and analysis of soil and groundwater samples. Funding was not authorized at that time to enable completion of the report for submittal to the TNRCC.

We understand that the City of Houston wishes to move forward with completion of the report and other such information as may be required by the TNRCC in order to obtain regulatory closure for this site. The scope of work, schedule and estimated cost are described below for completion of the report and other foreseeable tasks that will be required by the TNRCC.

Scope of Work

Item 1: Phase III ESA Report

Initially, we will review the project files from 1998 to 2000 and all new guidance that has been developed by the TNRCC since May 2000 relating to the Voluntary Cleanup Program. In addition, due to the time that has elapsed since the TNRCC requested the additional investigation, we will contact the TNRCC case coordinator to determine whether any additional

requirements can be anticipated. We will then prepare the Phase III environmental site assessment (ESA) report to describe and document the additional investigation activities that were conducted as required by the TNRCC. In addition to the investigation procedures and results, the report will also include documentation including copies of soil boring logs and well construction diagrams, water well review and utility line survey, copies of laboratory reports and waste disposal manifests, and calculations used to determine the site-specific background concentrations for metals constituents. Five copies of the report will be prepared for submittal to the City of Houston and the TNRCC.

The initial VCP Application Fee that was paid to the TNRCC has been expended due to the time spent on review of reports and other documents by the TNRCC. Therefore, an additional payment to the TNRCC will be required and is included in the budget for this project.

Item 2: Deed Recordation

The plan that was previously developed to achieve closure of this site was for impacted media to remain in place, in accordance with the requirements of the Risk Reduction Rules. Therefore, the TNRCC regulations require that information be recorded in the deed record for the property at the county courthouse, documenting the presence of contamination on the property. After review and approval of the report by the TNRCC, we will prepare the required deed recordation documents and submit them to the office of the Harris County Clerk.

Item 3: Closure Documentation

After the deed recordation process has been completed by the Harris County Clerk, we will obtain copies of the recorded documents. They will then be submitted to the TNRCC along with a request for a Certificate of Completion. We will also coordinate with the TNRCC VCP case coordinator to determine if there are any additional administrative requirements or a need for additional technical information in order to obtain closure of the site.

Schedule and Cost

Corrigan Consulting, Inc. is prepared to resume our work on this project upon receiving written authorization to proceed with the items described above. Preparation of the Phase III ESA report can be completed within three weeks. The time frame for completion of the remaining tasks is dependent upon receipt of a response from the TNRCC, but it is anticipated that these items can also be completed within several months.

Estimated costs for completion of these items are attached. These costs are based on the assumption that no additional site investigation or reporting will be required by the TNRCC and that no additional administrative requirements will be imposed by the TNRCC. If additional requirements are imposed, we will coordinate with you to provide a schedule and cost for the completion of those additional items.

Corrigan Consulting, Inc. has appreciated the opportunity to provide our services to the City of Houston on this project and we look forward to carrying it forward to completion and closure. If there are any questions, please feel free to call Mr. Wendall Honeycutt, Project Manager, or me at Corrigan Consulting, Inc. at (281) 474-7455.

Sincerely,

Roxie L. Voran, P.G.
Senior Associate

RLV/
Attachments

MASTER SERVICES AGREEMENT FOR PROFESSIONAL SERVICES
Between
MALCOLM PIRNIE, INC.
and
CORRIGAN CONSULTING, INC.

Exhibit 1

PROFESSIONAL SERVICES TASK ORDER

Task Order Number: 98MP-002 (98S-128)

Task Order Date: December 1, 1998

Subject to the Master Agreement between Malcolm Pirnie, Inc. (Malcolm Pirnie) and Corrigan Consulting, Inc. (Consultant), dated March 24, 1998, Malcolm Pirnie hereby authorizes Consultant to perform services as specified in the Task Order and in accordance with the above mentioned Agreement.

1. **Project Description:** A description of the Project for which work is requested is provided below.

   Client's Project Number: 0854-375
   Project Name: Heights Service Center; Site Closure
   Malcolm Pirnie's Representative: Barry T. Daniels, P.E.
   Consultant's Representative: Wendell Honeycutt, P.G.

2. **Scope of Work:** Consultant shall perform its services, as described in Attachment 2, incorporated into this Task Order. Consultant's proposal, dated October 2, 1998.

3. **Time Schedule:** It is estimated that these services will be performed during the period from one week after the date of authorization to within 8 weeks of the date of authorization. The draft ~~final~~ report must be delivered to Malcolm Pirnie no later than ~~December 22, 1998~~. February 19, 19

4. **Compensation:** Consultant's compensation under this Task Order, which shall not be exceed without prior written authorization of Malcolm Pirnie, is he total scope, including other subcontractors, is

5. **Special Conditions:** This Task Order is subject to special provisions as described below: The City of Houston must provide access to the interior of the buildings for sample collection. Cores will be repaired using a cement/bentonite grout.

6. Amendment: ( ) This Task Order amends a previously executed Task Order.
   Previous Task Order Number: 98 MP-001 Previous Task Order Date: May 5, 1998

ISSUED AND AUTHORIZED BY
MALCOLM PIRNIE, INC.

By: _____

Title: ASSOCIATE

ACCEPTED AND AGREED TO BY
CORRIGAN CONSULTING, INC.

By: _____

Title: President

Gail A. Corrigan, President

Environmental Chemist/Regulatory Specialist

Credentials

1984	M. S. Environmental Management University of Houston, Clear Lake, TX
	Thesis: "Groundwater Contamination from Hazardous Waste Sites in Harris County, Texas"
1977	B. S. Chemistry, Purdue University, W. Lafayette, IN
√	Previous TNRCC Representative
√	40-Hour OSHA Training for Hazardous Waste Sites, 1984
√	17 Years RCRA/CERCLA Experience

Professional Affiliations

American Consulting Engineers Council;
Hazardous Waste Action Coalition;
- Board of Directors 1994 - 1995
- Certification Subcommittee 1992 - 1994

Texas Hazardous Waste Management Society
- Officer of Incorporation 1985
- Gulf Coast Chapter President 1985 - 1986
- Board of Directors 1986 - 1991

ASTM E-50 Committee, Phase I ESA Standards
American Chemical Society
National Groundwater Association
Clear Lake Chamber of Commerce
Seabrook Association

Summary

With previous experience working as a regulator for the TNRCC, an environmental manager for an industrial facility, and a project manager for an engineering consulting firm, Gail Corrigan formed Corrigan Consulting, Inc. in May 1986. As a RCRA/CERCLA regulatory specialist, Ms. Corrigan has directed the company in completing over 500 projects for a wide variety of clients, providing peer review and quality control to ensure client satisfaction. She has directed hazardous waste permit and compliance projects, petroleum storage tank closures and remediation, environmental site assessments, environmental training, and Superfund site remedial investigations. Ms. Corrigan developed the course materials and instructed two Hazardous Waste Management Courses under contract with Texas A&M University for five years. She founded the Texas Hazardous Waste Management Society, served on the Board of Directors for the ACEC, Hazardous Waste Action Coalition, and is a regular speaker at conferences, professional meetings, universities, and civic organizations.

Work History

President, Corrigan Consulting, Inc., Seabrook, Texas	1986 - current
Independent Environmental Consultant, S&B Engineers, Inc., Houston, Texas	1984 - 1986
Environmental Manager, Texas Instruments, Inc., Stafford, Texas	1984
Field Representative, Texas Department of Water Resources (TNRCC) Deer Park, Texas	1982 - 1984
Research Chemist, Exxon Chemicals U.S.A., Baytown, Texas	1981 - 1982
Research Assistant, M. D. Anderson Hospital and Tumor Institute, Houston, Texas	1978 – 1981

Publications

Ms. Corrigan recently published six comprehensive regulatory compliance manuals for facilities in Texas which are registered in the U.S. Patent and Trademark Office under the mark of ***"Library of Environmental Compliance"***, including the following: "Hazardous Waste Compliance Plan"; "Underground Storage Tank Compliance Plan"; "Hazard Communication Compliance Plan"; and "Storm Water Pollution Prevention" ®.

Project Experience

Ms. Corrigan has directed hazardous waste projects, including complex waste classifications, RCRA facility closures, corrective action, agency negotiations, and risk reduction standard (RRS) closures, as well as Superfund Site remedial investigations. One project included a comprehensive site investigation and corrective action of 40 hazardous and solid waste sites located over 80 acres. She developed the site investigation plan to verify waste locations and assess the underlying hydrogeological conditions.

She has also directed RCRA Part B Permit Application Projects for many facilities. She was instrumental in the 1980s to plan the original permit strategies and identify methods of reducing the permit requirements. Recently, she reviewed several Part B Permit renewal applications for accuracy and completeness.

On a large litigation support project, she provided peer review and quality control of all work on a high profile RRS closure, involving a complex site characterization, toxicology, risk assessment, and remedial action. She assisted to prepare press releases. She presented the case during an alternate dispute resolution (ADR) hearing before the TNRCC, which lead to successful negotiations to reduce long-term liabilities. She has directed RRS closures under the Voluntary Cleanup Program for chemical companies, municipalities and state agencies.

She testified as a fact witness in a Superfund Site hearing on behalf of the TNRCC, and as an expert witness in a CERCLA cost recovery case. During a hazardous waste transportation accident, which resulted in a fatality, she coordinated between five agencies, an insurance adjuster, two law firms, an emergency response contractor, and the news media. She also provided litigation support during property transactions, including five cases with adjacent property owner damage claims regarding LPST site releases, and two cases involving releases from dry cleaner facilities.

Relevant Expertise

- √ Hazardous Waste Permitting, Investigations, and Corrective Action
- √ Risk Reduction Standard (RRS) and Voluntary Cleanup Program (VCP) Closures
- √ Environmental Site Assessments (ESAs) Ph I – III
- √ LPST Site Assessments, Remediation and RBCA Closures
- √ Expert Witness Testimony and Litigation Support

Ms. Corrigan has directed the firm's petroleum storage tank (PST) work for the City of Houston for the initial evaluations of 500 PSTs, which included developing bid specs, overseeing removals, and implementing remediation and closures using RBCA procedures. She has directed the site investigations on over 80 LPST sites, including multi-source releases and disputes regarding contamination in rights-of-ways.

Ms. Corrigan has directed over 100 Phase I-III ESAs including several roadway corridor acquisition projects. She developed a unique scope of work for infrastructure ESA projects, which was subsequently adopted as a standard by the City of Houston. Several clients have retained her to review ESA reports prepared by other firms and to evaluate the validity of conclusions and recommendations. As a result, she has avoided costly investigations; in one case saved a client over $60,000. She has also provided litigation support on five ESA projects, including property damage cases involving off-site releases.

Ms. Corrigan has also directed Phase II and Phase III ESAs to investigate and remediate sites including abandoned hazardous substances, PCB-contaminated oil, radioactive wastes, explosive wastes, wastewater, pesticide wastes, asbestos, lab chemicals, oil and gas exploration wastes, naturally occurring radioactive materials (NORM) and contaminated soil and groundwater. She directed a Phase I/II ESA on a 15-mile railroad corridor, and two 1.5-mile roadway projects. These clients not only complimented the reports, but also have used the report format as a standard for other firms to use on corridor and infrastructure projects.

Wendall B. Honeycutt, P.G., CAPM

Senior Project Geologist

Relevant Credentials

1995	M. S. Environmental Management University of Houston, Clear Lake, TX
1987	B.S. Geology University of Texas, Austin, Texas
√	Registered Corrective Action Project Manager (CAPM # 00599)
√	Certified Professional Geologist in the State of Tennessee (#TN3576)
√	40-Hour OSHA Training, 1990; 8-Hour Updates Annually
√	National Water Well Association Member
√	Houston Geological Society Member
√	11 Years of Experience

Continuing Education

Applied Hydrogeochemistry, Environmental Education Enterprises, 16 hrs, 1998

Designing in Situ Soil & Groundwater Remediation Systems, Univ. of Wisconsin, 24 hrs, 1997

Soil & Groundwater Modeling for Soil Clean Up, NGWA, 16 hrs, 1997

Understanding Migration, Assessment and Remediation, of Non-Aqueous Phase Liquids, NGWA, 24 hrs, 1996

Oil Pollution Act of 1990 Conference, Reidel Peterson and United States Coast Guard, 8 hrs, 1993

Techniques in Contingency Planning, University of Southwestern Louisiana, 4 hrs, 1993

Hazardous Waste Management Course, Texas A&M University, 24 hrs, 1992

Soil Gas Surveys & Soil Vapor Extraction Teleconference, Hazardous Waste Action Coalition, 8 hrs, 1992

Solving the Mysteries: Analytical Laboratory Services, Halliburton NUS, 24 hrs, 1992

Environmental Property Assessments, National Water Well Association, 16 hrs, 1991

Brown Bag Sessions (RCRA, CERCLA, and Well Hydraulics), Geraghty & Miller, 1990-1991

Summary

Mr. Honeycutt has completed a variety of environmental consulting projects as an environmental geologist. These projects include RCRA investigations and corrective action, Superfund site remedial investigations, hydrogeologic investigations, environmental site assessments, underground storage tank closures, leaking petroleum storage tank (LPST) site assessments, soil vapor surveys, aquifer tests, groundwater modeling of aquifer test data, remedial system installations, oil spill response plans, and standard exemptions for air emissions. His experience also includes environmental site assessments and litigation support for property transactions including the investigation and remediation of hazardous substances, underground storage tanks, abandoned wastes, and soil and groundwater contamination.

Work History

Senior Project Geologist, Corrigan Consulting, Inc., Seabrook, TX	1991-current
Geologist, Geraghty & Miller, Inc., Corpus Christi, TX	1990-1991
Logging Geologist, EXLOG, Houston, TX	1988-1990

Project Experience

Mr. Honeycutt has assisted with two RCRA Hazardous Waste Permit Applications. He also performed groundwater, surface basin, and hazardous waste sampling during a RCRA Facility Investigation (RFI). Sampling included collection of liquid and sludge samples from surface basins and hazardous waste storage tanks and groundwater sampling and collection of quality assurance/quality control samples.

At a large industrial facility, he provided technical assistance on a RFI at a Solid Waste Management Unit (SWMU). The RFI was performed to investigate a release that had migrated to a nearby surface water body. The investigation was performed in five phases due to the presence of several contaminant plumes that included acid, petroleum hydrocarbon, and chlorinated hydrocarbon contamination. He evaluated the investigation results to determine the extent of soil and groundwater contamination, sources and types of contamination, biodegradation processes, and alternatives for closure of the SWMU.

Mr. Honeycutt managed the installation of phase-separated hydrocarbon (PSH) recovery systems at three sites. At one site, five monitoring wells were impacted with PSH and a system of skimming pumps, aboveground tank, and piping was installed. At the other sites, only one well was impacted with PSH. The PSH was successfully remediated to a sheen at both of these sites.

On behalf of the City of Houston, he performed a Phase II ESA of a 1.5-mile corridor. The corridor was located in an area where oil and gas exploration and production was historically conducted. The ESA included an investigation of former pits, a bulk petroleum storage terminal, an active oil well, and two pipeyard facilities.

On behalf of the City of Houston, he performed a Phase I ESA for a 1.5 mile ROW corridor being considered for acquisition. He identified twenty current and former UST sites adjacent to the ROW and obtained TNRCC file information on the ten sites listed as Leaking Petroleum Storage Tank (LPST) sites. He used this information to develop a scope of work for a Phase II ESA at the ROW. In association with this project, he performed a Phase I ESA for a Harris County Flood Control District drainage ditch that crosses the 1.5-mile ROW.

Mr. Honeycutt prepared a TNRCC wastewater and storm water permit amendment for an industrial client. The permit amendment was prepared to reflect changes in operating conditions and management of wastewater and storm water at the industrial facility. The permit amendment included relocation of outfalls and revised methods for management of storm water. Also provided recommendations to revise EPA NPDES permit.

He performed Phase I environmental site assessments (including asbestos sampling) and compliance audits of eleven sites being considered for acquisition by a fuel distribution company. The sites included two vacant lots and nine operating service stations and convenience stores. Mr. Honeycutt identified PST noncompliances and potential releases, and performed subsurface investigations when necessary. This information was used to negotiate the property transactions.

Relevant Expertise

- √ RCRA Site Investigation & Corrective Action
- √ Soil & Groundwater Modeling, RBCA Corrective Action Plans, and Remediation System Installation
- √ LPST Site Assessments & RBCA Closures
- √ PST Reimbursement & Preapproval Negotiations
- √ Bid Specifications & Oversight for PST Removals, Upgrades, and Replacements
- √ ESA Phase I-III

APPENDIX B

Selected Portions of Phase I and II ESA Report

Phase I & II Environmental Site Assessment

Prepared for
City of Houston

OCTOBER 1997

CH2MHILL

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Tel 713.462.0161
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CH2MHILL

October 16, 1997

135601.02.ZZ

John Herrmann, PE
Corrigan Consulting, Inc.
1909 Capri Lane
Seabrook, TX 77586

Dear Mr. Herrmann:

Subject: Phase I and II Environmental Site Assessment
City of Houston - Heights Service Center
Submittal of Final Assessment Report

Transmitted herewith are four copies of the final Phase I and II Environmental Site Assessment report for your use.

We have enjoyed working with you on this project. I will be on vacation October 17 through 31, 1997. Tracy Ingram is working on the waste disposal issues on my behalf, and she will be submitting a proposal early the week of October 20. If you have any questions regarding the report, please contact Jeff Adkins during my absence at (713) 462-0161.

Sincerely,

CH2M HILL

Susan C. Spore, P.E.
Project Manager

enclosure

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1.0 Executive Summary

CH2M HILL conducted a Phase I environmental site assessment (ESA) at the Heights Service Center at 3602 Center Street in Houston, Texas on September 9, 1997. The purpose of this assessment was to provide limited information on the apparent site environmental condition to the owner, the City of Houston. The American Society for Testing and Materials (ASTM) standard for Phase I ESAs was used as the guide for preparation of this report, but the report is not intended to serve as due diligence for potential purchasers. CH2M HILL reviewed available site history, regulatory databases, and conducted a site survey as outlined in the Scope of Work. The facility, located in the Houston Heights area just west of downtown, was used by the City of Houston Wastewater Division as a paint and body shop for approximately 10 years.

Pumper trucks and sludge trucks were painted and serviced at the facility. Small quantities of oils, hydraulic fluids, paints, and solvents were stored at several locations throughout the facility. The trucks were parked overnight in one of three bays, and maintenance crews stored lawnmowers, cranes, bulldozers, and roll-off boxes at the site. The site has not been used by the Wastewater Division in several years. At the time of the site visit, the Solid Waste Division is storing portable recycling bins in the truck bays and recycling dumpsters on the north side of the site.

Based on the Sanborn maps, the site was developed between 1907 and 1925. The northern half of the site was a machine shop and a feed mill. The southern half of the site was a dairy plant for approximately 50 years. According to the chain-of-title search, the City of Houston acquired the site in 1981.

A review of the regulatory database identified a leaking PST site immediately east of the subject property. According to the TNRCC records, this leak impacted soil only. Four additional leaking PST sites were identified within an eighth-mile radius, but it appears unlikely that any of these releases would have affected the site. One small quantity RCRA generator was found approximately 0.1 miles southwest of the Heights Service Center.

A nominal amount of staining was observed on the building floors and concrete pad immediately north of the truck bays and loading dock. However, due to the age and location of the facility and to the potential for past spills, surface and subsurface soil samples as well as groundwater samples were collected at the facility. Two surface samples were collected prior to the Phase I ESA by the City of Houston in August 1997, and those results indicated low levels of metals and total Petroleum Hydrocarbons. Five borings were drilled to a depth of approximately 18 feet using direct push technology on October 17, 1997, as given below. Soil samples were collected at the near-surface and at the termination depth of each boring.

- B-1: Immediately south of former front office.
- B-2: Immediately east of former front office.

- B-3: Asphalt area between concrete drives, and just north of the office buildings where the asphalt surface has been patched.

- B-4: Northeast corner of property and just south of railroad spur.

- B-5: Gravel area north of the main concrete.

Because groundwater was not encountered using the direct push technology, three temporary piezometers were drilled using conventional technologies. Groundwater was not initially encountered in MW-1 (corresponding to B-2), but after an hour or so, groundwater began to seep into the hole. MW-2 was drilled next to boring B-4, and MW-3 was drilled next to boring B-3. Groundwater samples were collected on September 25, 1997.

Soil sample results were compared with the TNRCC's Risk Reduction Standards (RRS) which are health-based standards established for soil exposure and groundwater protection. Soil sample results indicated low levels of barium, lead, and chromium, with one exception. A chromium concentration of 37.3 mg/kg was found at a depth of 16 to 18 feet in boring B-2. This value is greater than the concentration in the near-surface sample (<5.0 mg/kg), and it exceeds the Risk Reduction Standard No. 2 (RRS2) concentration of 10.0 mg/kg for industrial groundwater protection. TPH concentrations ranged from <10.0 mg/kg to 1140 in the near-surface sample of boring B-2. As this boring was drilled in the street under asphalt pavement, the sample could have been affected by either the asphalt pavement or possibly oil leakage from automobiles.

Groundwater levels were measured both immediately after drilling and prior to sampling. While the top of casing elevations have not been surveyed, it appears that the relative groundwater flow direction is roughly to the east. Barium was detected in all of the groundwater samples ranging from 0.41 mg/L to 1.94 mg/L, and these results are below the health-based groundwater standard or MCL of 2.0 mg/L. Lead concentrations ranged from <0.01 mg/L to 0.031 mg/L. While 0.031 mg/L is greater than the MCL, the total lead concentration in the soil was below detection limits, and the groundwater sample contained some silt size particles which may have affected the analytical results. No VOCs, SVOCs, or TPH were detected in the samples.

Asbestos and lead-based paint were found in several samples collected at the site. It is recommended that the lead-based paint and asbestos either be encapsulated or abated in accordance with EPA, TNRCC, and OSHA regulations.

Various City-owned equipment, waste materials, and debris from previous City activities were observed during the site inspection. Prior to proceeding with property transfer activities, these materials should be properly classified and transported for off-site disposal in accordance with Title 30 TAC Chapter 335.

In addition, the City of Houston could also consider participating in the TNRCC's Voluntary Cleanup Program (VCP). Upon successful completion of the VCP, the City and subsequent property owners would be released from liability by the TNRCC.

2.0 Objectives

2.1 Objectives

A Phase I and Phase II Environmental Site Assessment was conducted by CH2M HILL in September 1997. The purpose of this assessment was to document the apparent environmental conditions at the former Heights Service Center located at 3602 Center Street in Houston, Texas. This assessment was based on a limited investigation of available records and site survey, in order to provide information to the owner, the City of Houston.

This assessment report was prepared for use by the City of Houston, the owner. The American Society for Testing and Materials (ASTM) standard for Phase I ESAs was used as the guide for preparation of this report, but the report is not intended to serve as due diligence for potential purchasers. The ASTM standard is intended to be used on a voluntary basis by parties associated with commercial real estate transactions, including buyers, sellers, tenants, appraisers, lenders, insurers, legal counsel, and environmental professionals. The standard is intended to constitute "good commercial or customary practices" necessary to conduct "all appropriate inquiry into the previous ownership and use of the property" under CERCLA. No environmental assessment can wholly eliminate uncertainty regarding the environmental condition of a property; therefore, the standard is intended to reduce, but not eliminate, such uncertainty and recognizes the reasonable limits of time and cost implicit in commercial real estate transactions.

2.2 Limitations and Exceptions of Assessments

The findings presented in this report are based on information provided by the City of Houston as well as the site visit conducted on September 9, 1997 and the site investigation conducted on September 17, 24, and 25, 1997. The findings are based on publicly available information, interviews with agency or other knowledgeable personnel, and visual observations made by CH2M HILL. Additional regulatory sites may be present but not documented by regulatory agency files or included in the selected regulatory agency site listings reviewed for this study. Therefore, CH2M HILL does not guarantee its completeness or accuracy. The technical staff who performed the site visit and completed the site assessment report are not attorneys; therefore, the report is not a legal representation or interpretation of environmental laws, rules, or regulations, or policies of local, state, or federal governmental agencies. The scope of work for the Phase II investigation was limited to concerns that were previously identified during the Phase I assessment and did not include a comprehensive assessment of the surface or subsurface conditions. The selected sample locations and analytical parameters were based on previously identified concerns. Therefore, there is no guaranty that hazardous substances and petroleum products do not exist on the property. Although the conclusions and recommendations presented in this report were developed in accordance with generally accepted engineering and geological practices, CH2M HILL does not warrant or guarantee

the suitability of the site for development or the absence of environmental risks, either expressed or implied.

Honesty Environmental was subcontracted to perform an asbestos and lead-based paint survey. It was beyond the scope of CH2M HILL's services for this assessment report to review or examine the following:

1. The presence of radon,
2. Lead in the drinking water,
3. Identification or delineation of jurisdictional wetlands,
4. Issues associated with worker health and safety,
5. Issues pertaining to compliance with environmental regulations, and
6. Liabilities associated with the off-site management of solid or hazardous wastes.

Cost estimates for cleanup and identification of parties potentially responsible for the cleanup of hazardous substance releases were also beyond the defined scope of services.

2.3 Limiting Conditions and Methodology Used

The site visit consisted of a walk through of the facilities at the plant and a pedestrian survey of the right-of-way to the north, south and east of the property. Access to the private property along the western property edge was not available, therefore only limited information was obtained during the site survey along adjacent properties. For reasons of confidentiality, adjacent landowners or tenants were not approached during the site assessment.

In addition, soil sample locations were affected by the presence of underground utilities and overhead power lines. The sample quality and the resulting analytical data obtained during the Phase II investigation represent the conditions at the time of the assessment. Therefore, the groundwater sampling data represents the conditions of the saturated unit located 35 to 40 feet below ground surface.

The methods used to complete this report are consistent with the guidance of ASTM Standard E 1527-94, but the report is prepared for the owner, and is not intended to serve as due diligence for potential purchasers.

3.0 Site Survey

Susan Spore of CH2M HILL conducted a visual survey of the Heights Service Center at 3602 Center Street. The purpose of the site visit, conducted on September 9, 1997, was to identify apparent environmental conditions by visual observation at the facility. Mr. John Bess, the former manager of the Service Center, and Mr. Barry Daniels, also with the City of Houston, were available during the site visit. Figure 1 is a site map, and Figure 2 is a detailed site map. Photographs taken during the assessment are located in Appendix A and are referenced in the paragraphs below.

The one acre facility contains a one-story brick building with approximately 10,000 square feet of building space, and a metal warehouse building with approximately 6,200 square feet of space. The brick building is at least 60 years old, while the metal building was constructed between 1950 and 1969 (Photo 1).

The City of Houston's Wastewater Division used the site as a paint and body shop for approximately 10 years. Pumper trucks and sludge trucks were painted on-site, and routine maintenance such as oil and other fluid changes also occurred at the site. Lawn maintenance equipment such as mowers and small tractors were stored at the property, and general equipment such as cranes, bull dozers, and roll-off boxes were also stored on the concrete pad immediately north of the buildings. Approximately five one-foot diameter weathered stains are visible on this concrete. An asphalt area, which appears as if it had been patched, is between and extends north of the brick building and the metal warehouse. Black stains were observed on both horizontal and vertical surfaces along the edge of the former loading dock (Photo 2).

Brick Building

The interior of the brick building was in very poor condition. Paint and plaster were peeling from walls, and in a few places, the roof is missing. Trash and rubbish were found in the main hallway and in some of the offices (Photo 2). Interior finish of the walls ranged from painted brick and plaster to faux wood paneling. In several of the offices fronting Center Street, the wall has fallen away, and the insulation consisted of cork material. Because the site was formerly used as a dairy plant, the existing offices could have been used for cold storage in the past. This was later verified during the Sanborn fire insurance map review. Floors in the majority of the brick building were concrete. Some of the concrete has a reddish tint to it (Photo 3) from either paint or mastic. Two to three layers of vinyl tile were found in the front offices.

As previously mentioned, the southern portion of the brick building had been converted into offices. Although Mr. Bess indicated that the premises had not been occupied in approximately 10 years, correspondence as recent as 1993 was found stapled to the wall in two or three locations. Little remains in the former offices except for trash and rubbish. Personnel lockers and the remnants of a break room were located north of the front offices. Another room appears to have been used for training. Several long wooden tables were observed, and Mr. Bess indicated that training occurred at the facility.

Numerous floor drains were observed in the building, particularly in the northern half of the building. Mr. Bess stated that all of them were connected to the City's storm sewer system. It was not always apparent from visual inspection as to whether or not all of the floor drains were functional.

A large room lies north of the break room, and overhead pipes were observed (Photo 4). Mr. Bess indicated that the pipes were left over from the dairy operation and had not been used by the City. The floors in this room were in poor condition (Photo 5). Three rectangular areas were observed in the room where the concrete was either chipped away or not finished when it was poured. A review of the Sanborn maps (see Section 4.3) indicated that this area was formerly a boiler and machine room.

The painting operation, paint storage and drum storage occurred in the northern-most section of the building. A small room was used for drum storage of oils and miscellaneous lubricants. One drum was observed in the room at the time of the site visit. A few dark stains were observed on the concrete floor in this room by flashlight. Due to lighting restrictions, this inspection was cursory.

A paint storage room was located immediately across the hall from the drum storage room. The room was painted a light green color, and a built-in wall storage unit was located on the north side of the room. Several dark stains were visible on the floor, and one drum remained in the room (Photo 6).

The largest room in the building was used to paint the trucks and to perform some routine maintenance (Photo 7). Mr. Bess pointed out the shallow, wooden trough found in the northeast corner of the room was used to collect fluids from the trucks (Photo 8). He stated that an off-site recycling company came to pick up the drums of waste oil and other hydraulic fluids on a routine basis. Stains were observed on the concrete in this area. A wooden cabinet was located against the western wall of the room. Mr. Bess said that they formerly used this cabinet to store truck decals, respirators, and small cans of paint.

A small metal building has been attached to the northwest corner of the brick building. According to Mr. Bess, it was also used for the storage of paint and miscellaneous supplies. Wooden shelves are located against the south wall, and half a dozen cans of paint still remain on the shelves. Minor staining, each a few inches in diameter, was observed on the concrete floor.

Metal Building

The metal warehouse consisted of corrugated sheet metal walls and roof, and its primary purpose was a truck bay. The City's Solid Waste Division was using the building for storage of portable recycling bins (Photo 9) at the time of the site visit. Neither the floors nor walls are finished. Four-inch concrete curbs divide the space into three lanes. Grate inlets are located in each bay or lane, and the inlets tie into the municipal storm sewer system. Mr. Bess stated that up to 16 to 18 trucks could be housed in the building. A small office and an oil drum storage area were located in the southeast corner of the building. Dark or rusty stains were observed on the concrete in the former drum storage area (Photo 10).

A large room connects the truck bays to the brick building. Air compressors for the painting operation used to be located against the south wall (Photo 11). Mr. Bess also indicated that pumps and miscellaneous appurtenances were stored on the north side of the room.

Northern Site Areas

A concrete pad or parking area lies immediately north of the two buildings. Trucks, cranes, bull dozers, roll-off boxes, and other maintenance equipment were stored there. The middle area is asphalt, not concrete, and in poor condition. Weeds were growing among the expansion joints in the concrete at the time of the site visit.

A gravel area lies between the concrete and the northern property line. Vegetation is growing up through the gravel, especially near the fence and in the northwest corner of the site. The vegetation did not appear to be stressed at the time of the site visit. Much of the area could not be surveyed for visible stains because of the dense vegetation. Currently, The City's Solid Waste Division is storing portable recycling dumpsters along the north fence (Photo 12). Mr. Bess did not indicate how the gravel area was specifically used, but it can be presumed that it was also used for storage.

Surrounding Areas

The site lies in a commercial area of the Houston Heights District. A mini-warehouse storage facility is located immediately west of the site. Admiral Linen and Uniform Service is located across Harvard street to the east. Leo's Mexican Restaurant is across Center street to the south. A railroad spur lies immediately north of the site, and a machine shop that fronts Harvard is located north of the railroad track.

Asbestos and Lead-Based Paint Survey

Honesty Environmental Services, Inc. (HES) conducted an asbestos and lead-based paint survey at the Heights Service Center at the same time the environmental site survey was conducted. Asbestos samples were collected in 16 locations throughout the building, and asbestos concentrations greater than 1 percent were found in the following locations:

- 450 SF of floor tiles (3 layers) in the front offices
- 50 LF of pipe insulation in the northern half of the building

Twelve samples were collected from the paint coatings in the buildings. The paint is in fair to poor condition, and lead concentrations exceeded 0.5 percent in the following paints:

- Green paint on plaster walls, wood door, and door frame behind the wood paneling in two of the front offices
- Yellow paint on concrete floor and metal I-beams in the warehouse area

The HES report has been included as Appendix B.

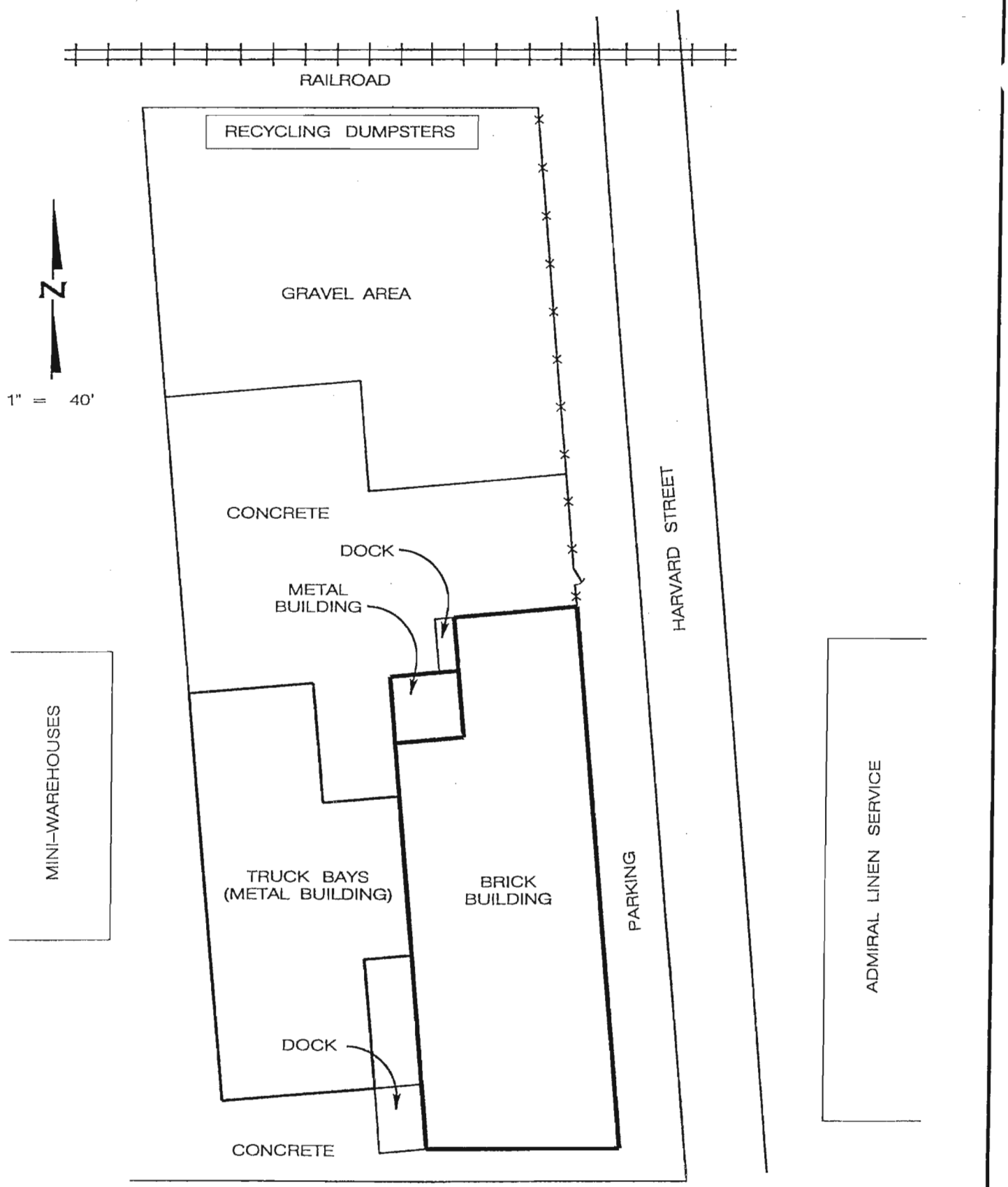


FIGURE 1
SITE MAP

HEIGHTS SERVICE CENTER
HOUSTON TX.

4.0 Site History

4.1 Personnel Interviews

Mr. John Bess, an employee with the City of Houston Wastewater Division, was interviewed regarding site history. Mr. Bess managed the shop in the late 1980s before it was closed. He remembered that the site was a dairy when he was growing up. The City acquired the site in the early 1980s and used it as a paint and body and general maintenance shop for Wastewater Division vehicles and equipment. He was not aware of any sand blasting that occurred on the site with the exception of water-sanding, and this mixture was washed into the floor drains that went into the municipal storm sewer. He stated that they used to perform oil changes and other minor maintenance items at the site and that the waste oils and other fluids were drummed and recycled on a regular basis. He indicated that Wastewater was no longer using the site but that Solid Waste was using the truck bay to store plastic recycling bins.

4.2 Chain of Title

A fifty year chain of title search was performed at the site, and this is included in Appendix C. South Texas Producers Association bought the property in 1950, and Milk Producers Inc. acquired the site in 1967. The City of Houston acquired the site in September 1981.

4.3 Sanborn Maps

A search was performed for Sanborn fire insurance maps. These maps provide good historical information regarding site and surrounding area structures and land uses. Sanborn maps from the years 1907, 1925, 1950, and 1969 were available for the facility. Copies of these maps have been provided in Appendix D.

The 1907 map shows the site, located at the northwest corner of Center and Harvard streets, to be undeveloped. Houston Show Case & Manufacturing is across the street to the south. Lumber storage occurred across the street to the east, but no business name was listed on the map.

The 1925 map shows the southern half of the property to be undeveloped. A machine shop and a feed mill lie on the northern half of the site. Houston Showcase and Manufacturing is across the street to the south and to the east. Lumber is still stored on the east side of Harvard. The streets are now paved.

The 1950 map shows the South Texas Producers Association Dairy Products plant on the southern half of the site. The brick building is used both for offices and the milk plant. The boiler room at that time is approximately in the same location as the open space south of the paint room. The metal building does not yet exist. Crawford Grain Company is located on the northern half of the site. Houston Show Case & Manufacturing has moved from the south side of the subject property to the east side.

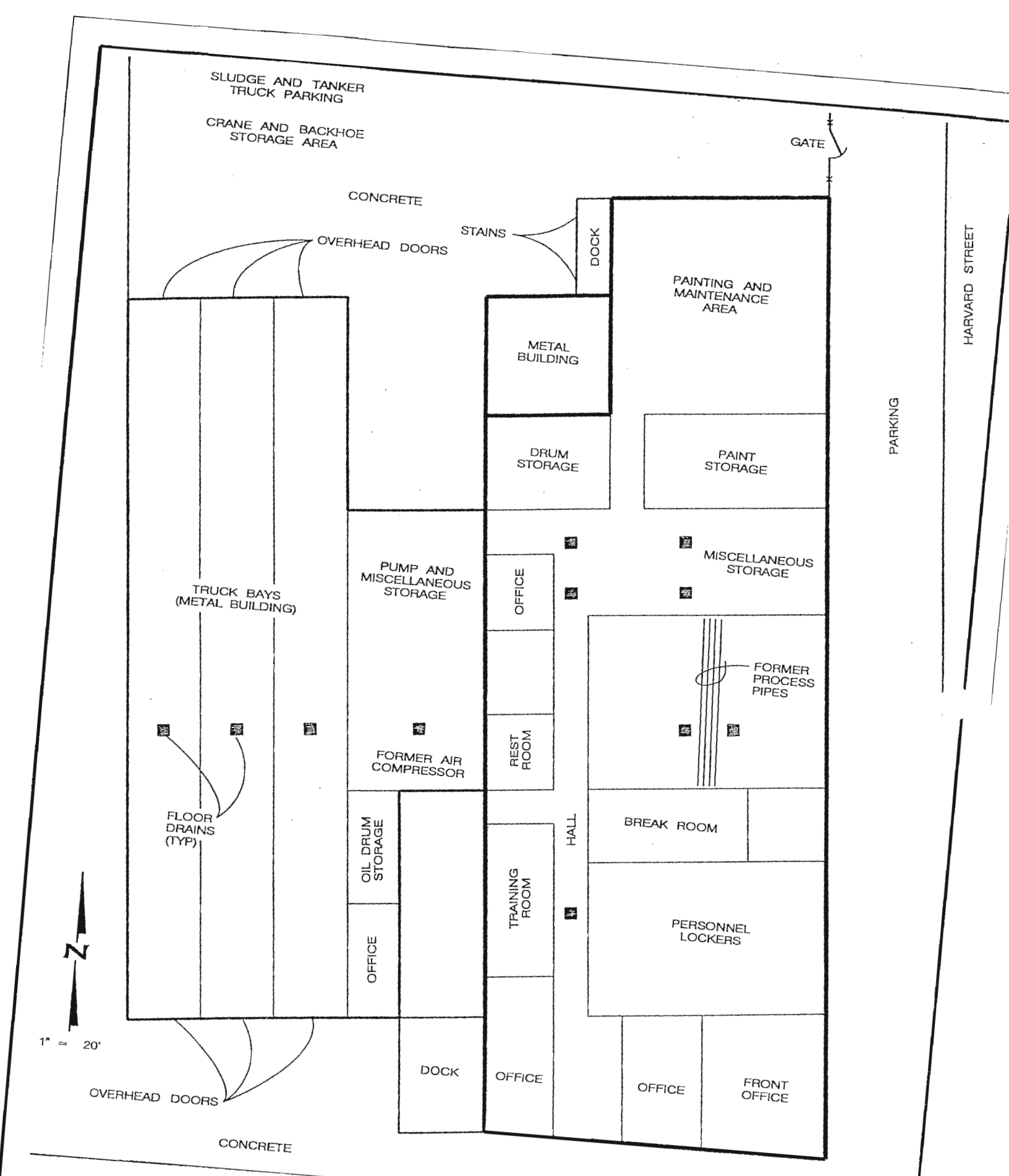


FIGURE 2
DETAILED SITE MAP

HEIGHTS SERVICE CENTER
HOUSTON TX.

The 1969 map shows the building footprint essentially as it is today. The brick building has been expanded to the north, and the metal building has been added to the west side of the brick building. Four storage tanks, which are no longer present, were located on the south side of the property near Center Street. The Gulf Coast Federated Feed Association occupies the northern third of the site. Ineeda Linen Service is across Harvard street to the east, and the South Texas Producers Association is using the building across Center street to the south as office space.

4.4 Historical City Directories

City of Houston Historical Directories were reviewed at the downtown Public Library at 5 to 10 year intervals. The information is summarized in Table 1 below. The subject property is located at the northwest corner of Center Street and Harvard.

TABLE 1
City of Houston Historical Directories
Heights Service Center- Houston, Texas

Year	Northwest Corner of Harvard and Center Streets	Northeast Corner of Harvard and Center Streets
1917	Mr. Moses Bell	NA = Not Available
1925	Golden Rule Lodge Odd Fellows	NA
1931-32	Superior Milk Company	NA
1936	Becker Cheese Company	NA
1945	South Texas Producers Association; Houston Milk Producers Credit Union #1584; Houston Dairymen's League	vacant
1953	South Texas Producers Association (plant)	Jos. Dames; Mrs. Bennie DeForks
1964	South Texas Producers Association (plant)	Jos. Dames; Mrs. Bennie DeForks
1973	Associated Producers (plant)	Ineeda Linen Service
1976	Associated Producers (plant)	Ineeda Linen Service
1980	Associated Milk Producers dairy equipment	Ineeda Linen Service
1982	vacant	vacant
1986	City of Houston Wastewater Division	Team Textile Service Division (linen supply)

5.0 Records Review

A records review was conducted within the radii selected under the guidance of ASTM E 1527-94. The review consisted of databases that included the following:

- **RCRA:** These facilities have notified the EPA that they generate, treat, store, transport, and/or dispose of hazardous wastes in accordance with the Resource Conservation and Recovery Act. In addition, reported violations are kept on file.

- **CERCLIS:** This is a list of facilities (generally RCRA) that are suspected to have or do have documented uncontrolled releases of hazardous substances into the environment. These sites are classified as active, pending, or no further action.

- **NPL:** An assessment is conducted on CERCLA sites, and if contamination is found, a hazardous ranking is assigned to the site. Depending on the ranking, the site becomes a federal Superfund site or is referred to the state Superfund program. Federal Superfund sites are ranked on the National Priority List (NPL).

- **PST:** All states require owners of both above ground and underground storage tanks to register them with the appropriate agency (Texas Natural Resource Conservation Commission). This information can include the number of tanks, construction materials, and date of installation.

- **Leaking PST:** States maintain records of reported leaking storage tanks and their associated site assessments and remedial action.

- **Solid Waste Landfills:** The TNRCC permits both non-hazardous industrial and municipal solid waste landfills. These sites include both industrial and municipal solid waste facilities, landfills, transfer stations, etc.

- **Emergency Response Notification System:** The ERNS serves to store information on releases of oil and hazardous substances when they are initially reported to the federal government by any party.

The database search was conducted by VISTA Information Solutions, Inc., and their report and maps are located in Appendix E. No NPL, RCRA TSD facilities, or State Superfund Sites were identified within a one mile radius of the site. No CERCLIS and no permitted solid waste facilities were identified within a half mile radius of the site. One RCRA generator and one reported spill site were located within an eighth of a mile. JV Tool Die, located at 3708 Raymond approximately 0.1 miles southwest of the site, is classified as a small quantity generator. Although the City of Houston maintained small quantities of paint, hydraulic oils, etc. on the premises, they were not identified as either a small quantity or conditionally exempt small quantity generator in the regulatory review. Hollywood Marine, also located approximately 0.1 miles southwest of the site, had a small benzene spill (10 gallons) in 1991. It is unlikely that this would have impacted the property of interest.

Eleven registered PST sites were located within an eighth mile radius of the site. Five of these sites have been reported as leaking. The closest LPST site is across the street to the east. The registration says Unitog Rental Services although the site is now occupied by Admiral Linen. The address given for Admiral Linen (3316 Washington) appears to be an independent used car dealership. The tanks were removed around 1989, and according to the TNRCC's database, only the soil was affected. The closure status was not available. The next closest LPST site is located at the intersection of Washington and Heights Boulevards, just southwest of the site. The site contained a former service station, and the leak was discovered in January 1995. The cleanup has been completed and the LPST case has been closed by the TNRCC.

6.0 Environmental Setting

CH2M HILL reviewed the available geology, soils characteristics, groundwater, and surface drainage patterns at the subject property. Site specific data was available because of the soil borings drilled on-site. No obvious wetland areas were encountered during the site inspection, but a formal wetland survey was beyond the scope of the project.

6.1 Surface Water Characteristics

The site itself is flat with no obvious low points. The concrete pad north of the buildings is graded slightly toward the south or south-southeast to convey stormwater runoff toward the railroad right-of-way and the municipal stormwater collection system. Stormwater inlets were located at the intersection of Harvard and Center Streets.

The nearest tributary is White Oak Bayou which lies approximately 0.3 miles north of the site. Buffalo Bayou lies approximately half a mile to the south. Regional topography slopes toward the bayous, and the site lies near the flow divide between the two watersheds.

6.2 Geological and Hydrogeological Characteristics

Houston is located on the Quaternary Coastal Plain of Texas, and the site is located on the nearly level, rather featureless Beaumont formation. The seaward gradient of the Beaumont plain is approximately 2 feet per mile. The Beaumont depositional plain is one of five such surfaces recognized in the Quaternary Coastal Plain of Texas. The Beaumont is the youngest of the four plains that represent the depositional surfaces that existed during the Pleistocene interglacial stages. The fifth plain represents the Holocene era during the current high sea level stage.

The Pleistocene interglacial stages were periods when glaciers were melting, or of a minimum size, and the release of glacial waters resulted in high surface runoff and the deposition of large quantities of sediment along the Gulf of Mexico. These five coastal plains are separated by time gaps representing glacial stages when the sea level was much lower, and primary deposition took place on what is now the Continental Shelf. As the sea level fell, the exposed surface was subjected to weathering and mature soil profiles developed.

The Harris County Soil Survey was reviewed to identify the soil types in the vicinity of the site. The soils are classified as Urban, meaning that the soils are so disturbed by development, they can no longer be classified. Soils beneath the site consist of clays and sandy clays to a depth of approximately 40 feet. Boring logs are provided in Appendix F, and the site investigation is discussed in section 7.0.

The public water supply for consumption by residents in the Houston area is a combination of groundwater and surface water. The principal water-bearing beds in the area are the Chicot aquifer beneath the Beaumont clays. The uppermost occurrence of groundwater across the Texas Gulf Coastal Plain generally occurs in thin sand and silt layers within the

Beaumont formation. These layers are found at depths between 10 and 25 feet below ground surface. At the Heights Service Center, these layers were encountered between 35 and 40 feet below the ground surface. The water-bearing zone is confined by the overlying clay. However, some leakage does occur as the meteoric water moves downward through secondary permeability into the transmissive unit. Regional groundwater flow is toward the east-southeast, generally toward the Gulf Coast. However, streams, topography, or other surface features may locally influence groundwater flow direction.

7.0 Site Investigation

A Phase II site investigation was conducted at the Heights Service Center on September 17, 1997 and September 23, 1997. The purpose of the investigation was to determine if past activities at the site had impacted the subsurface.

7.1 Subsurface Soil Sampling

Five soil borings (B-1 through B-5) were drilled at and around the site. Borings B-1 and B-2 were drilled in the City of Houston right-of-way southeast of the property. Boring B-3 was drilled just north of the buildings. Boring B-4 was drilled near the northern fence line, and B-5 was drilled north of the concrete drive. Soil boring locations are shown on Figure 3.

Two soil samples were collected from each boring to determine if surface spills had impacted the subsurface. One sample was collected from the near-surface, and the second sample was supposed to be collected at the first water bearing zone. Because groundwater was not encountered, the second sample was collected at the termination depth instead.

Soil borings were drilled using direct push technology; a Geoprobe unit was mounted on the drill rig vehicle. Undisturbed samples were collected by hydraulically advancing a 1-inch diameter, thin-walled tygon sampling tube from 2 feet below the subsurface until refusal was encountered. New tygon sampling tubes were used for each soil sample interval to reduce the potential for sample cross-contamination. The sample from 0 to 2 feet was collected by a Shelby tube. Continuous soil sampling occurred at four foot intervals until refusal occurred, and this ranged from 16 to 20 feet below ground. As a minimal amount of cuttings were generated, they were put back into the hole at the completion of sampling activities. If necessary, a small amount of bentonite was placed on top of the cuttings in the bore holes drilled in soil. The bore holes drilled in pavement were topped off with grout.

Recovered soil samples were visually logged and field classified by a CH2M HILL engineer. Notation of soil type, color, and soil odors, if present, were recorded. Soil boring logs are included as Appendix F. The subsurface soil samples were field screened with an organic vapor monitor (OVM). Organic vapor response measurements on the cuttings were 0 ppm, and no odors were noticeable.

Soil samples selected for analysis were placed in 4 oz, laboratory-supplied, glass jars with Teflon-lined lids. After collection, the soil samples were immediately placed on ice in a cooler, and the cooler was transported to Xenco Laboratories for chemical analysis. Soil samples were analyzed for the following constituents:

- Total Petroleum Hydrocarbons (EPA 418.1)
- 8 RCRA Metals (EPA 6010)

The soil sample with the highest TPH concentration was also analyzed for volatile organic compounds (VOCs, EPA 8260) and semivolatile organic compounds (SVOCs, EPA 8270).

Soil samples from B-2 were analyzed for BTEX and polyaromatic hydrocarbons because the boring was located next to a former leaking PST site.

Soil sample results are summarized in Table 2 and discussed below. Laboratory analytical reports have been included as Appendix G. Sample B-6 is a duplicate of sample B-3A.

No arsenic, cadmium, silver, selenium, or mercury were detected in the soil samples. Barium, which is naturally occurring, was detected in all of the soil samples at concentrations ranging from 13.6 mg/kg to 171 mg/kg. Lead was detected in five of the eleven samples at concentrations ranging from 6.6 to 47.4 mg/kg. Chromium was detected in four of the eleven samples at concentrations ranging from 6.5 to 37.3 mg/kg.

No BTEX or PAHs were found in the samples drilled adjacent to the leaking PST site. However, this boring did have the highest TPH concentration (1140 mg/kg) at a depth of 0 to 2 feet. Because this boring was drilled in the street, the TPH could represent the asphalt pavement or leaks or spills from vehicles. The sample with the next highest TPH concentration was B-4A (389 mg/kg), and this sample was located in the vicinity of the City's previous sampling effort. Sample B-4A was then analyzed for volatile and semivolatile organic compounds. 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, and m,p-xylenes were detected.

The Texas Natural Resource Conservation Commission (TNRCC) has established regulations for the remediation and closure of historical releases in Title 30, Texas Administrative Code (TAC) Chapter 335, Subchapter S, entitled "Risk Reduction Standards" (RRS). Under the RRS 2 there are established health-based standards for soils including exposure concentrations and groundwater protection concentrations, which are listed in Table 2. The concentrations of barium, lead, chromium, and organics detected in the soil samples during this assessment were all well below the health-based standards for soil. However, concentrations of lead and chromium detected in the soil samples exceeded the standards for groundwater protection. The TNRCC allows the use of the Synthetic Precipitation Leaching Procedure (SPLP) analyses and the Texas 7-day test to prove groundwater protection. In essence, if the amount of chromium, lead, or other constituent that leaches from the soil is less than the Maximum Contaminant Level (i.e., the health-based groundwater standard), then the groundwater protection criteria is satisfied. However, this must be coordinated through and approved by the TNRCC.

As an alternative, an application for including this site in the TNRCC's Voluntary Cleanup Program (VCP) may be submitted. The technical standards in the RRS would still apply, but after successful completion of the VCP, the current and all subsequent property owners would be released from liability by the TNRCC.

7.2 Groundwater Sampling

One wet sand lens was encountered at a depth of 10 feet in boring B-1, but there was not enough groundwater to collect a sample. No groundwater was collected in borings B-2 through B-5. Therefore, three temporary piezometers were installed at the site on September 23 and 24, 1997. MW-1 was drilled next to B-2, and MW-2 was placed next to B-4. MW-3 was located immediately north of boring B-3. Piezometer locations are shown on Figure 3.

Each piezometer was drilled to a depth of 40 feet. Ten feet of slotted screen PVC pipe was placed in the bottom of the hole, topped by 30 feet of 2-inch diameter, PVC casing to the ground surface. Two bags of sand were poured in the annulus between the piezometer and the soil.

The piezometers were developed using a pump mounted on the drilling rig. Approximately 20 gallons of water were removed from MW-1. Approximately 10 gallons of water each were removed from MW-2 and MW-3. However, some fines were still present during sampling, especially in MW-1 and MW-3. The piezometers were removed on October 7, 1997, and each of the holes was filled with grout.

The soil cuttings from each piezometer were placed in drums that were labeled with the location and date. Due to the small volume of development water, the groundwater was combined in one drum. The three drums of soil and one drum of groundwater were placed on the north side of the brick building for temporary storage prior to disposal.

Groundwater samples were collected on September 25, 1997 and placed in the appropriate plastic or glass bottle supplied by the laboratory. After collection, the water samples were immediately placed on ice in a cooler, and the cooler was transported to Xenco Laboratories for chemical analysis. MW-4 is a duplicate sample of MW-3. Groundwater samples were analyzed for the following constituents:

- Total Petroleum Hydrocarbons (EPA 418.1)
- Volatile Organic Compounds (EPA 8260)
- Semivolatile Organic Compounds (EPA 8270)
- 8 RCRA Metals (EPA 6010)

Groundwater results are presented in Table 3 and discussed below. The groundwater results are compared to Maximum Contaminant Levels (MCLs) which are health-based water standards included in the TNRCC's Risk Reduction Rules. MW-4 is a duplicate of MW-3, and the difference between the two concentrations is generally a factor of 2. Barium, which is naturally occuring, was detected in all four of the samples at concentrations ranging from 0.138 to 1.94 mg/L. These are below the MCL of 2.00 mg/L. Lead was also detected in three of the four groundwater samples (MW-1 and MW-3). MW-1 (0.031 mg/L) exceeded the MCL of 0.015 mg/L. However, the soil concentration was below detection limits. The MW-03 lead level exceeded the MCL but the duplicate sample (MW-04) did not. No VOCs, SVOCs, or TPH were detected in the four samples.

7.3 Site Stratigraphy

With the exception of a wet sand lens at a depth of approximately 10 feet in boring B-1, groundwater was encountered between 35 and 40 feet below the surface. The boring logs (see Appendix F) indicate that the upper 2 to 4 feet consists of a sand and clay fill material. A dark brown silty clay is generally encountered between 4 and 8 to 10 feet below ground. Grey sand clays and fat clays with ferrous nodules were encountered to a depth of 18 to 20 feet. Soil stratigraphy information was not collected below this depth.

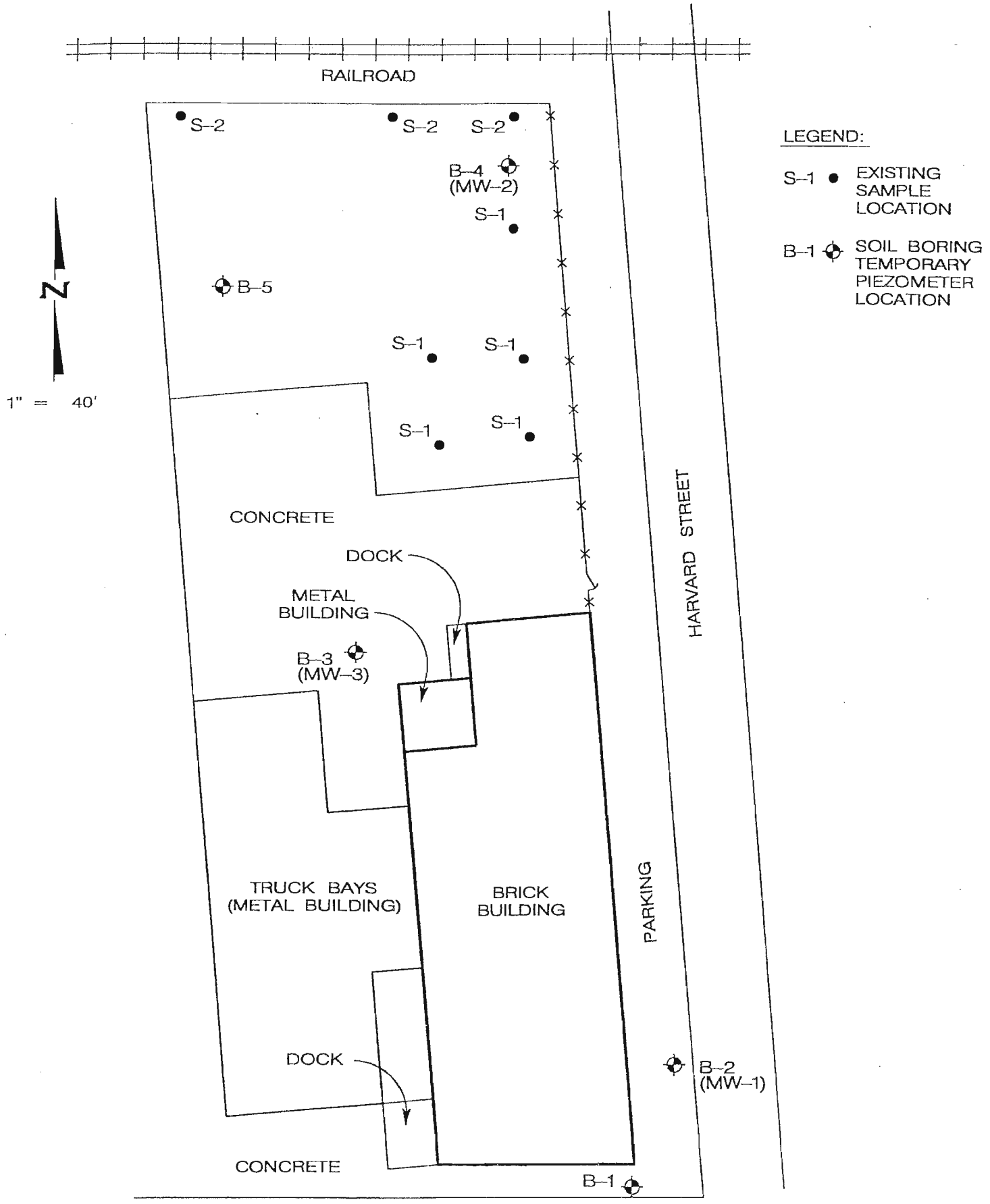


FIGURE 3
SAMPLE LOCATION MAP

HEIGHTS SERVICE CENTER
HOUSTON TX.

TABLE 2
Soil Sample Results
Heights Service Center, Houston, TX

Field ID:	B-1A	B-1B	B-2A	B-2B	B-3A	B-3B	B-4A	B-4B	B-5A	B-5B	B-6
Depth:	0-2	14-16	2-4	16-18	2-4	16-18	0-2	14-16	2-4	18-20	2-4
RCRA Metals											
Barium	16.4 mg/kg	31.2 mg/kg	63.4 mg/kg	25.7 mg/kg	71.0 mg/kg	171 mg/kg	64.8 mg/kg	13.6 mg/kg	88.1 mg/kg	64.1 mg/kg	66.6 mg/kg
Chromium	<5.0*	<5.0*	<5.0*	37.3	7.0	<5.0*	<5.0*	<5.0*	<5.0*	6.7	6.5
Lead	<5.0*	<5.0*	24.5	<5.0*	6.6	38.8	47.4	<5.0*	<5.0*	11.2	<5.0*
Organics											
1,2,4 Trimethylbenzene	NA	NA	NA	NA	NA	NA	0.016	NA	NA	NA	NA
1,3,5 Trimethylbenzene	NA	NA	NA	NA	NA	NA	0.005	NA	NA	NA	NA
m,p-xylenes	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA
Total Petroleum Hydrocarbons	26.9	<10.0*	1,140	<10.0*	<10.0*	<10.0*	389	26.9	65.4	<10.0*	<10.0*

NA- Not Analyzed
*Represents Detection Limit
Industrial Groundwater Protection Standard: Barium- 200 mg/kg; Chromium- 10 mg/kg; Lead- 1.5 mg/kg.
Industrial Soil-Air-Ingestion Standard: Barium- 137,000 mg/kg; Chromium- 5,110 mg/kg; Lead- 1,000 mg/kg.

TABLE 3
Groundwater Sampling Results
Heights Service Center, Houston, TX

Constituent	MW-1	MW-2	MW-3	MW-4
Barium	0.41 mg/L	0.138 mg/L	1.94 mg/L	0.96 mg/L
Lead	0.031	<0.01*	0.031	0.012

All units in mg/L
Maximum Contaminant Level for Barium is 2.00 mg/L. MCL for Lead is 0.015 mg/L.
* Represents Detection Limit

8.0 Conclusions and Recommendations

CH2M HILL conducted a Phase I environmental site assessment (ESA) at the Heights Service Center at 3602 Center Street in Houston, Texas. CH2M HILL reviewed available site history, regulatory databases, and conducted a site survey as outlined in the Scope of Work. The facility, located in the Houston Heights area just west of downtown, was used by the City of Houston Wastewater Division as a paint and body shop for approximately 10 years. Prior to that time, the site was used as a dairy plant for over 50 years.

Our observations and conclusions are summarized as follows:

- Pumper trucks and sludge trucks were painted and serviced at the facility. Small quantities of oils, hydraulic fluids, paints, and solvents were stored at several locations throughout the facility. The trucks were parked overnight in one of three bays, and maintenance crews stored lawnmowers, cranes, bulldozers, and roll-off boxes at the site. The site has not been used by the Wastewater Division in several years. Currently, the Solid Waste Division is storing portable recycling bins in the truck bays and recycling dumpsters on the north side of the site.

- Based on the Sanborn maps, the site was developed between 1907 and 1925. The northern half of the site was a machine shop and a feed mill. The southern half of the site was a dairy plant. A review of the regulatory database identified a leaking PST site immediately east of the subject property. According to TNRCC records, the leak impacted soil only. Four additional leaking PST sites were identified within an eighth-mile radius, but it appears unlikely that any of these releases would have affected the site. One small quantity RCRA generator was found approximately 0.1 miles southwest of the Heights Service Center.

- A nominal amount of staining was observed on the building floors and concrete pad immediately north of the truck bays and loading dock.

- Due to the age and location of the facility and to the potential for past spills, subsurface soil samples as well as groundwater samples were collected at the facility. Two surface samples were collected by the City of Houston prior to the Phase I ESA in August 1997, and those results indicated low levels of metals and Total Petroleum Hydrocarbons. Five borings were drilled using direct push technology, as given below:

  - B-1: Immediately south of former front office.

  - B-2: Immediately east of former front office.

  - B-3: Asphalt area between two concrete drives and just north of office buildings where the asphalt surface has been patched.

- B-4: Northeast corner of property, just south of railroad spur.

- B-5: Gravel area north of the main concrete.

Because groundwater was not encountered using the direct push technology, three temporary piezometers were drilled using conventional technologies. Groundwater was not initially encountered in MW-1 (corresponding to B-2), but after an hour or so, groundwater began to seep into the hole. MW-2 was drilled next to boring B-4, and MW-3 was drilled next to boring B-3. Groundwater samples were collected on September 25, 1997, and the piezometers were removed on October 7, 1997.

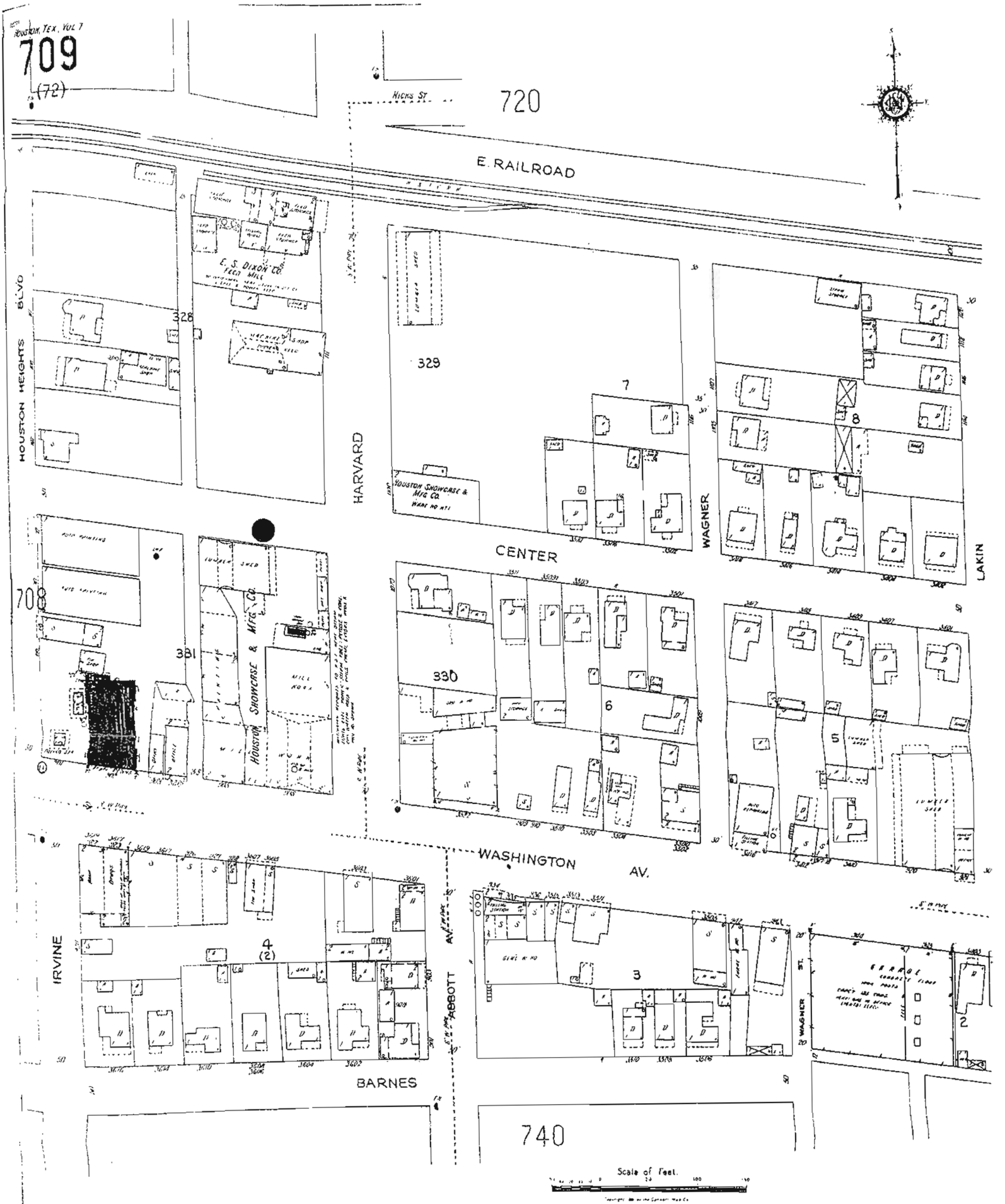
Soil sample results were compared with the TNRCC's Risk Reduction Standard 2 criteria for industrial groundwater protection. The results indicated levels of barium, lead, and chromium below the RRS 2 concentrations with one exception. A chromium concentration of 37.3 mg/kg was found at a depth of 16 to 18 feet in boring B-2. This value is greater than the concentration in the near-surface sample (<5.0 mg/kg), and it exceeds the RRS 2 industrial groundwater protection concentration of 10.0 mg/kg. TPH concentrations ranged from <10.0 mg/kg to 1140 in the near-surface sample of boring B-2. As this boring was drilled in the street under asphalt pavement, the TPH could be a relic of either the asphalt pavement or oil leaking from automobiles.

Groundwater levels were measured both immediately after drilling and prior to sampling. While the top of casing elevations have not been surveyed, it appears that the groundwater flows are approximately to the east. Barium, which is naturally occuring, was detected in all four of the groundwater samples ranging from 0.41 mg/L to 1.94 mg/L, and these results are below the health-based standard or MCL of 2.0 mg/L. Lead concentrations ranged from <0.01 mg/L to 0.031 mg/L. While 0.031 mg/L is greater than the MCL, the total lead concentration in the soil was below detection limits, and the groundwater sample contained some silt, which may have affected the analytical results. No VOCs, SVOCs, or TPH were detected in the samples.

- Asbestos and lead-based paint were found in several samples collected at the site. It is recommended that the lead-based paint and asbestos either be encapsulated or demolished in accordance with OSHA regulations.

- Waste materials and debris from former City operations were observed at the site. These materials were stored in drums and by other means. It is recommended that these materials be properly classified and transported for off-site disposal in accordance with TNRCC regulations prior to proceeding with property transfer activities.
- Consider entering the site in the TNRCC's Voluntary Cleanup Program. Upon successful completion of the program, the TNRCC releases the current and subsequent owners from liability. In addition, alternate analyses such as the SPLP and Texas 7 day test can be available to demonstrate compliance with groundwater protection standards, or other clean-up standards (i.e., Risk Reduction Standard 3) could be negotiated.

Appendix B: Sanborn Maps



SANBORN

Environmental Risk Information & Imaging Services

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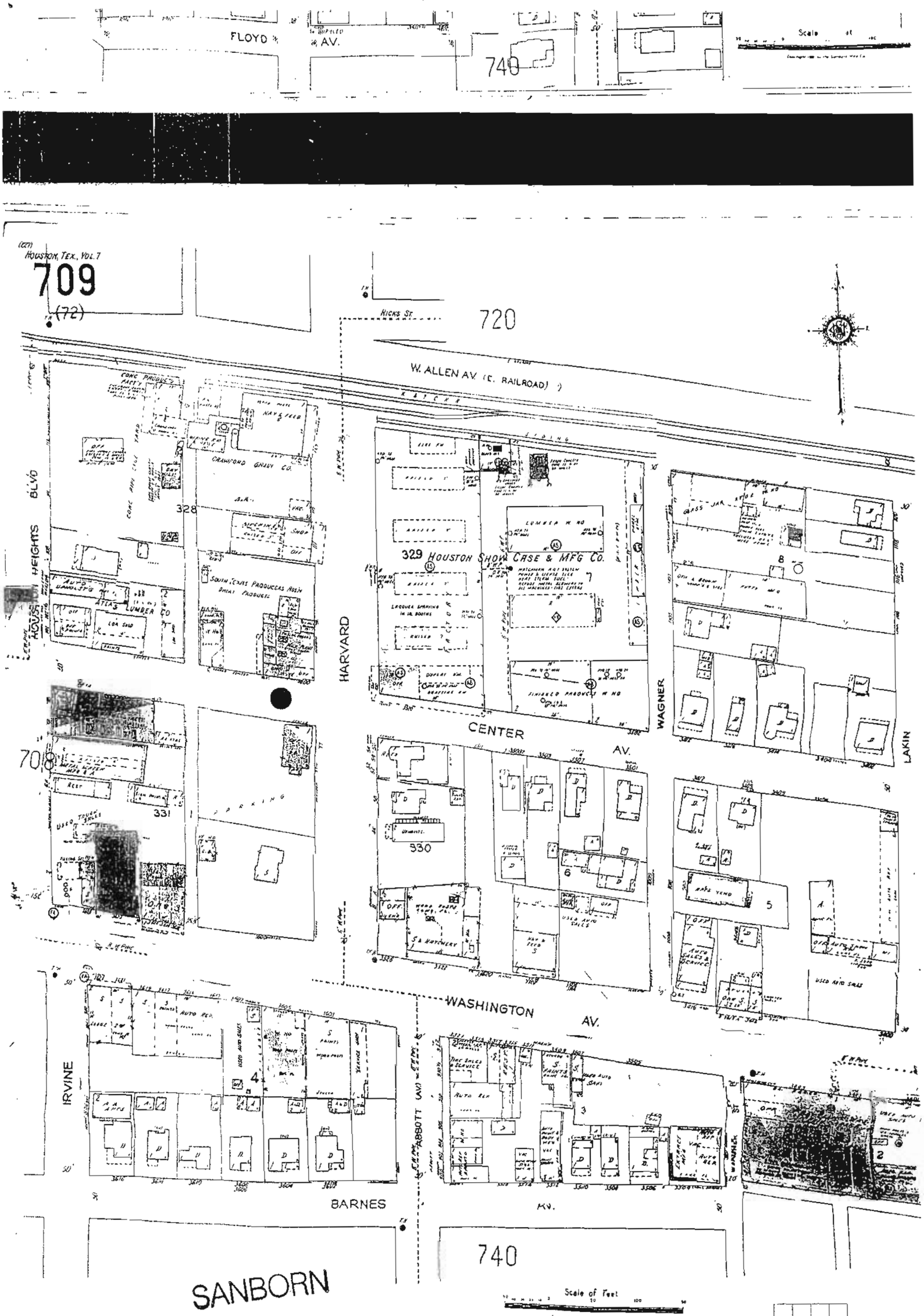

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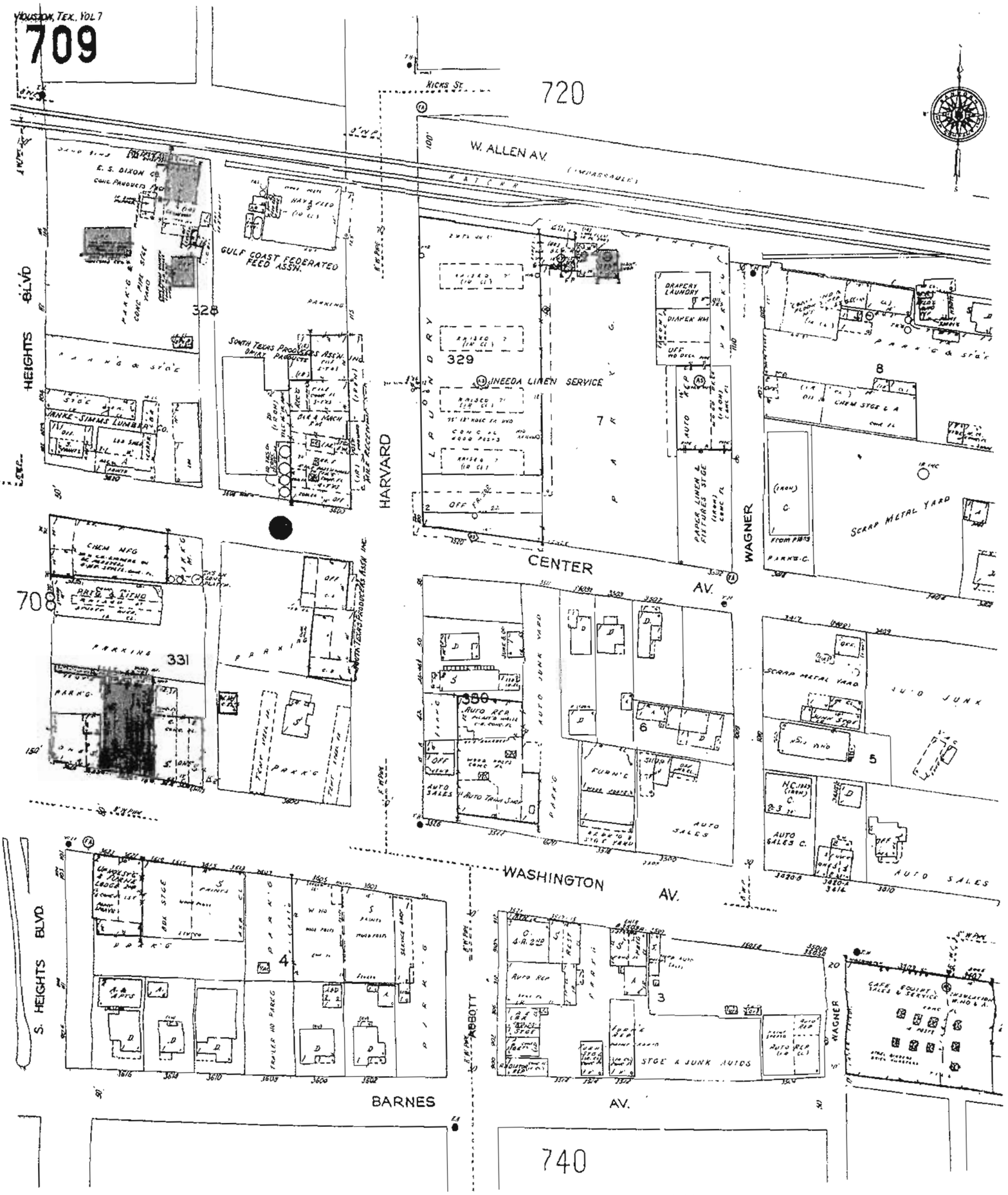
1952



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Appendix F: Boring Logs

PROJECT NUMBER	BORING NUMBER	
135601.02.ZZ	B-1	SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT City of Houston - Quick Response LOCATION Heights Service Center

ELEVATION 65± DRILLING CONTRACTOR HVJ Associates

DRILLING METHOD AND EQUIPMENT Geoprobe

WATER LEVEL AND DATE NA 9/17/97 START 0840 FINISH 0930 LOGGER S. Spore

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USGS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0'	0-4'		0.5	NA	**SANDY FILL MATERIAL (SC)**, tan, medium grained, no odor	
5'	4-8'		0.6	NA	**SANDY FILL MATERIAL (SC)**, dry, medium grained, tan, well sorted, no odor	
10'	8-12'		3.2	NA	**SANDY CLAY (CL,SC)**, rusty gray, damp to wet, tan, sand lense at 10 ft, no odor	
15'	12-16'		3.2	NA	Tan sand lense (wet) at 12 ft, stiff, tannish gray **CLAY (CL)** with iron and olive mottling, damp, no odor	No appreciable amount of groundwater Terminated boring at 16 ft
20'						

PROJECT NUMBER	BORING NUMBER	
135601.02.ZZ	B-3 (MW-3)	SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT City of Houston - Quick Response LOCATION Heights Service Center

ELEVATION 65± DRILLING CONTRACTOR HVJ Associates

DRILLING METHOD AND EQUIPMENT Geoprobe

WATER LEVEL AND DATE NA (29.6) 9/17/97 (9/24/97) START 1050 FINISH 1130 LOGGER S. Spore

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION (SOIL NAME, USGS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	SYMBOLIC LOG	WELL CONSTRUCTION	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION)
0'	0-2'		0.3	NA	**FILL MATERIAL**, dark brown to black, **SAND-CLAY-GRAVEL (GC)**, dry, no odor			
	2-4'		1.0	NA	**SILTY CLAY (CL)**, dark brown, damp, no odor			
5'	4-8'		4.0	NA	**SANDY CLAY (CL)**, dark brown to gray, with occasional olive and iron mottling, firm, damp, no odor			
10'	8-12'		4.0	NA	**CLAY (CH)**, dark brown to gray, with occasional olive and iron mottling, firm, plastic, damp, no odor			
	12-16'		4.0	NA	12-14 ft: **CLAY (CH)**, medium gray with iron mottling, plastic, damp 14-16 ft: **SANDY CLAY (CL)**, light gray with iron mottling, hard, damp			
15'	16-18'		2.0	NA	16-18 ft: **SANDY CLAY (CL)**, light gray with iron mottling, damp, no odor			Refusal encountered at 18 ft on 9/17/97
20'	20-40'		NA	NA	20-40 ft: **SANDY CLAY (CL)**, dark brown to brown, no obvious seams of groundwater but soil is much sandier between 35 and 40 ft			Temporary piezometer drilled on 9/24/97. Screen set from 30-40 ft below ground.
25'								
30'								
35'								
40'								

PROJECT NUMBER	BORING NUMBER	
135601.02.ZZ	B-5	SHEET 1 OF 1

CH2MHILL

SOIL BORING LOG

PROJECT City of Houston - Quick Response LOCATION Heights Service Center

ELEVATION 65± DRILLING CONTRACTOR HVJ Associates

DRILLING METHOD AND EQUIPMENT Geoprobe

WATER LEVEL AND DATE NA 9/17/97 START 1140 FINISH 1220 LOGGER S. Spore

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USGS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0'						
	0-2'		0.3	NA	**SILT MATERIAL (SM)**, light tan, powdery, occasional aggregate and dark brown clay, dry, no odor	
	2-4'		1.0	NA	**SILTY CLAY (CL)**, dark brown, damp, occasional gravel	
5'	4-8'		4.0	NA	**CLAY (CH)**, stiff, dark gray with olive mottling, some iron mottling, damp, no odor	
10'	8-12'		0	NA	**CLAY**, gray	No recovery
15'	12-16'		4.0	NA	**CLAY (CL)**, hard, light gray with iron mottling, slightly damp, no odor	
	16-20'		4.0	NA	**CLAY (CH)**, stiff, gray with iron mottling, sticky, very hard	
20'						Refusal encountered at 20 ft

APPENDIX C

TNRCC Correspondence

CITY OF HOUSTON

Post Office Box 1562 Houston, Texas 77251-1562

Lee P. Brown, Mayor

CITY COUNCIL MEMBERS: Bruce Tatro Michael J. Yarbrough Martha J. Wong Jew Don Boney, Jr. Rob Todd Ray F. Driscoll Jean Kelley Felix Fraga John E. Castillo Annise D. Parker Joe Roach Orlando Sanchez Chris Bell Carroll G. Robinson CITY CONTROLLER: Sylvia R. Garcia

Chief of Staff
Office of the Mayor

JIMMIE SCHINDEWOLF, P.E.
Director of Public Works & Engineering

February 2, 1998

Texas Natural Resource Conservation Commission
MC-214
P. O. Box 13088
Austin, Texas 78711-3088
Attention: Cashier

Re: City of Houston
Heights Service Center
3602 Center Street
Houston, Texas

Certified Mail
Returned Receipt requested

Subject: Voluntary Cleanup Program Application

Dear Sir or Madam:

Enclosed is the Voluntary Cleanup Program Application for the above-referenced site. As required, the following information is attached to the application:

- Check in the amount of $1,000.00 made payable to the Texas Natural Resource Conservation Commission
- Sampling Plan for the property dated September 1997
- Phase I and II Environmental Site Assessment (ESA) report for the property dated October 1997
- Phase I and II ESA - Addendum No. 1 for the property dated November 30, 1997

The information outlined in the example Table of Contents for a Site Investigation report; which is included in "Guidance for Initiating and Reporting Response Actions Conducted Under TNRCC's Voluntary Cleanup Program" is included in the attached report. In order to facilitate your review of the site information, the attached Table 1 includes a listing of the various items of information and their locations within the report.

Wastes which were identified during the Phase I ESA have been transported to a disposal facility. Waste disposal documentation is included in the Phase I and II ESA - Addendum No. 1 report. The future use of the property is unknown since the future property owner has not been identified. Due to the location of the property within a commercial and industrial area of the city, commercial and/or industrial use of the property is the most probable future use.

Printed on Recycled Paper

If there area any questions regarding the enclosed application, please contact Mr. John Herrmann, P.E., Senior Project Manager of Corrigan Consulting, Inc. at (281) 474-7455 or Mr. Barry Daniels, P.E., of the City of Houston at (713) 754-0787.

Sincerely,

Leah S. Flanagan
Project Manager

LSF:BTD:btd

Attachments

cc: Jimmie Schindewolf, P.E.
Wendell L. Barnes, P.E.
John D. Grubbs, P.E.
Nancy Collins, Esq.
Barbara Loring
Anne Day, Esq.
John Herrmann, P.E. - Corrigan

TABLE 1

City of Houston
Heights Service Center
3602 Center Street
Houston, Texas

Voluntary Cleanup Program
Summary of Site Investigation Information

Item	Location in Reports
Introduction	
Site Location and History	Phase I ESA, Sections 1 and 3 Phase I ESA, Attachment C
Legal Description	Phase I ESA, Attachment C
Site Map	Phase II ESA, Appendix B, Plate 2
Current and Proposed Land Use	Cover Letter
Site Documentation	Phase I ESA, Attachment D
Objectives of Investigation Activities	Phase II ESA, Sections 2 and 4
Scope of Investigation Activities	Phase II ESA, Section 4
Site Investigation Results	
Site Stratigraphy and Hydrogeology	Phase II ESA, Section 4 and Appendix B.
Assessment of Analytical Results	Phase II ESA, Section 4
Contamination Assessment	Phase II ESA, Section 5
Investigation Summary and Conclusions	Phase II ESA, Sections 5 and 6
Risks to Human Health and the Environment	Phase II ESA, Section 6
Tables and Figures	Phase II ESA, Section 4 Phase II ESA, Appendix B, Plate 2
Appendices	
Sampling Methods, Decontamination Methods, & Quality Assurance Procedures	Phase II ESA, Appendix B, Section 3
Soil Boring Logs	Phase II ESA, Appendices C & D of the report included in Appendix B.
Laboratory Analytical Data and Chain-of-Custody Forms	Phase II ESA, Appendix C Phase II ESA, Appendix E of the report included in Appendix B,
Supporting Information about Site History	Phase I ESA, Attachment C
Site Photographs	Phase I ESA, Attachment A Phase II ESA, Appendix F of the report included in Appendix B

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

VOLUNTARY CLEANUP AGREEMENT

INTRODUCTION

This Agreement is entered into voluntarily by City of Houston (Applicant) and the Executive Director of the Texas Natural Resource Conservation Commission (TNRCC). This Agreement is not and shall not be construed as an admission of any liability under the Texas Solid Waste Disposal Act or any other law or as a waiver of any defense to such liability. No approval hereunder or receipt of funds hereby shall be taken as a warranty as to sufficiency or efficacy of the response action. The purpose of this Agreement is to detail the obligations and functions of each party, related to the voluntary cleanup process at the Heights Service Center (site), Voluntary Cleanup Program (VCP) number _____.

The activities conducted by the Applicant under this Agreement are subject to approval by TNRCC. The activities conducted by the Applicant shall be consistent with this Agreement, all applicable laws and regulations and any appropriate guidance documents. Applicant shall employ sound scientific, engineering and construction practices.

STATEMENT OF ELIGIBILITY

The Executive Director has determined that the application submitted by the Applicant is complete and that the Applicant is eligible to participate in the VCP established under Subchapter S of Chapter 361 of the Health and Safety Code (HSC). If the agency determines that the Applicant withheld or misrepresented information that would be relevant to the Applicant's eligibility, the Executive Director may exercise his right to withdraw from this Agreement.

PARTIES BOUND

This Agreement shall apply to and be binding upon the Applicant, its officers, directors, principals, employees, receivers, trustees, agents, successors, subsidiaries, and assigns and upon the TNRCC, its employees, agents and successors. The signatories to this Agreement certify that they are fully authorized to execute and legally bind the parties they represent. No change in ownership, corporate, or partnership status of the Applicant shall in any way alter its status or responsibilities under this Agreement unless Applicant or TNRCC withdraws from this Agreement.

The Applicant shall provide a copy of this Agreement to any subsequent owners or successors before ownership rights are transferred. The Applicant shall provide a copy of this Agreement to all contractors, subcontractors, laboratories, and consultants which are retained to conduct any work performed under this Agreement, within fourteen (14) days after the effective date of this Agreement or within 14 days of the date of retaining their services, whichever is later.

DEFINITIONS

"Site" means the area described in the VCP application, attached and incorporated herein as Exhibit "A".

ADDRESSES FOR ALL CORRESPONDENCE

Documents, including reports, approvals, notifications, disapprovals, and other correspondence to be submitted under this Agreement, may be sent by certified mail, return receipt requested, hand delivery, overnight mail or by courier service to the following addresses or to such addresses as the Applicant or TNRCC may designate in writing.

Documents to be submitted to TNRCC should be sent to:

Mailing Address	Physical Address
Project Manager Voluntary Cleanup Section MC 221 P.O. Box 13087 Austin, TX 78711-3087	Project Manager Voluntary Cleanup Section MC 221 12100 Park 35 Circle Austin, TX 78753

Documents to be submitted to the Applicant should be sent to:
(provides this information)

Ms. Leah Flanagan
City of Houston, Dept. of Public Works & Engr.
P.O. Box 1562
Houston, TX 77251-1562

(phone number)

713/754-9703

COMPLIANCE WITH APPLICABLE LAWS

All work undertaken by the Applicant pursuant to this Agreement shall be performed in compliance with all applicable federal, state and local laws, ordinances and regulations, including, but not limited to, all Occupational Safety and Health Administration, Department of Transportation and Resource Conservation and Recovery Act regulations. In the event of a conflict in the application of federal, state, or local laws, ordinances and regulations, the Applicant shall comply with the more/most stringent such laws, ordinances, or regulations, unless provided otherwise in writing by TNRCC. Federal requirements shall be followed if they are the more/most stringent. However, as provided by HSC, Section 361.611 a state or local permit shall

not be required, although the Applicant must coordinate with ongoing federal and state hazardous waste programs and must comply with the substantive requirements of an otherwise required state permit. Where it is determined that a permit is required under federal law, the Applicant shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. The Applicant shall be responsible for obtaining all federal permits which are necessary for the performance of any work hereunder.

APPLICABLE RULES AND REGULATIONS

The VCP rules, 30 Texas Administrative Code (TAC) 333, and the following rules or regulations are specifically designated as being directly applicable for the site and must be followed. Citation of these rules does not imply that they are the only applicable rules.

___ 30 TAC 334 (Petroleum Storage Tank Rules)
_X_ 30 TAC 335 (Industrial Solid Waste & Municipal Hazardous Waste Rules, i.e., Risk Reduction Rules)
___ Other_____

SUBMITTALS AND SCHEDULES

In compliance with the aforementioned rules or regulations, the required submittals shall include a monthly status report, which details activities completed for the current month and those planned for the upcoming month, along with the following: N/A

The schedule for submittals shall be as follows: The Phase I & II Environmental Site Assessment report, dated October 1997, the Sampling Plan dated September 1997 and Addendum No. 1 to the Phase I & II ESA report are the only reports prepared for this property to date.

Proposed future land use to be achieved:

___ residential (i.e., unrestricted)
X non-residential (i.e., commercial/industrial)
X other (e.g., agricultural or recreational) Unknown, future owner has not been identified. Due to the property location, future use as a commercial/industrial facility is most probable.

DESIGNATED PROJECT MANAGER

On or before the effective date of this Agreement, the TNRCC and the Applicant shall each designate a project manager. Each project manager shall be responsible for overseeing the implementation of this Agreement. The TNRCC project manager will be the TNRCC designated representative at the site. To the maximum extent possible, communications between the

Applicant and TNRCC and all documents (including reports, approvals, and other correspondence) concerning the activities performed pursuant to the terms and conditions of this Agreement shall be directed through the project managers. During implementation of this Agreement, the project managers shall, whenever possible, operate by consensus and shall attempt in good faith to resolve disputes informally through discussion of the issues. Each party has the right to change its respective project manager by notifying the other party in writing at least five (5) days prior to the change.

ACCESS

To the extent that the site or other areas where work is to be performed hereunder is presently owned or controlled by parties other than those bound by this Agreement, the Applicant shall obtain, or shall use its best efforts to obtain access agreements from the present owners. Best efforts shall include at a minimum, a certified letter from Applicant to the present owner of such property requesting access agreements to permit Applicant, TNRCC and their authorized representatives access to such property. Any such access agreements shall be incorporated by reference into this Agreement. Such agreements shall provide access for TNRCC and authorized representatives of TNRCC, as specified below. In the event that such access agreements are not obtained, the Applicant shall so notify TNRCC, which may then, at its discretion, assist the Applicant in gaining access.

The Applicant shall provide authorized representatives of TNRCC access to the site and other areas where work is to be performed at all reasonable times. Such access shall be related solely to the work being performed on the site and shall include, but not be limited to: inspecting records, operating logs and contracts related to the site; reviewing the progress of the Applicant in carrying out the terms of this agreement; conducting such tests, inspections, and sampling as TNRCC may deem necessary; using a camera, sound recording, or other documentary type equipment for field activities; and, verifying the data submitted to TNRCC by the Applicant hereunder. The Applicant shall permit TNRCC's authorized representatives to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, which pertain to this Agreement and over which the Applicant exercises control. All persons with access to the site pursuant to this Agreement shall comply with submitted health and safety plans. The TNRCC does not approve health and safety plans.

DISPUTE RESOLUTION

This section (Dispute Resolution) shall apply to any dispute arising under any section of this Agreement, unless specifically excepted. It should be noted, that as provided for in HSC, Section 361.607, the executive director or the Applicant in its sole discretion may terminate the Agreement by giving 15 days advance written notice to the other.

The parties shall use their best effort to, in good faith, resolve all disputes or differences of opinion informally. If, however, disputes arise concerning this Agreement which the parties are unable to resolve informally, the Applicant may present written notice of such dispute to TNRCC and set forth specific points of dispute and the position of the Applicant. This written notice shall be submitted no later than five (5) calendar days after the Applicant discovers the project managers are unable to resolve the dispute. The Applicant's project manager shall notify the TNRCC's project manager immediately by phone or other appropriate methods of communication prior to written notice, when he/she believes the parties are unable to resolve a dispute.

Within ten (10) days of receipt of such a written notice, the TNRCC shall provide a written response to the Applicant setting forth its position and the basis therefore. During the five (5) calendar days following the receipt of the response, the parties shall attempt to negotiate in good faith a resolution of their differences. If during this negotiation period, the TNRCC concurs with the position of the Applicant, the Applicant shall be notified in writing and this Agreement shall be modified to include any necessary extensions of time or variances of work.

Following the expiration of the previously described time periods, if no resolution of the disputed issue(s) has been reached the Executive Director or their designee, shall make a determination regarding the dispute, based upon and consistent with the terms of this Agreement, and shall provide written documentation of such determination to the Applicant.

At this juncture, if dispute resolution fails, and either or both parties exercise their right to withdraw from the Agreement by giving 15 days advance written notice to the other, only those costs incurred or obligated by the TNRCC before notice of termination of the Agreement are recoverable under the Agreement.

RESERVATION OF RIGHTS

TNRCC and Applicant reserve all rights and defenses they may have pursuant to any available legal authority unless expressly waived herein.

Nothing herein is intended to release, discharge, or in any way affect any claims, causes of action or demands in law or equity which the parties may have against any person, firm, partnership or corporation, not a party to this Agreement for any liability it may have arising out of, or relating in any way to the generation, storage, treatment, handling, transportation, release or disposal of any materials, hazardous substances, hazardous waste, contaminants or pollutants at, to or from the site. The parties to this Agreement expressly reserve all rights, claims, demands, and causes of action they have against any and all other persons and entities who are not parties to this Agreement, and as to each other for matters not covered hereby.

The Applicant reserves the right to seek contribution, indemnity, or any other available remedy against any person other than TNRCC found to be responsible or liable for contribution, indemnity or otherwise for any amounts which have been or will be expended by the Applicant in connection with the site.

During the term of this Agreement, TNRCC will not bring an enforcement action against Applicant for any violations of statutes or regulations for the specific violations or releases that are being remediated by this Agreement, unless the Applicant withdraws from this Agreement prior to completion of the cleanup. However, a responsible party remains liable for contamination it caused, should cleanup standards change or additional contamination be discovered. Non-responsible party Applicants have a release from liability upon issuance of the Certificate of Completion subject to statutory conditions in Section 361.610(b) HSC.

ADMINISTRATIVE COSTS

Applicant A, unless indicated otherwise in Exhibit "A", agrees to reimburse TNRCC for all of its costs associated with implementation of this Agreement. These costs may include direct and indirect costs of overhead, salaries, equipment, and utilities, and legal, management, and support costs associated with the review of the Applicant's work plans and reports, and oversight of field activities.

TNRCC will track all costs to the TNRCC for review and oversight activities related to the site and provide quarterly invoices to the person responsible, per this Agreement for said costs. If TNRCC costs are less than the application fee of one thousand ($1,000) dollars, the remaining balance in the site account will not be refunded. The Applicant shall pay these invoiced costs to the TNRCC within 30 days after the date the Applicant receives notice that these costs are due and owing. If payment is not made within thirty days, the TNRCC shall request that the attorney general bring action to recover all costs allowed by law.

Checks shall be made payable to the Texas Natural Resource Conservation Commission and be mailed along with a transmittal letter stating the site name, VCP number, and addressed to the Texas Natural Resource Conservation Commission; MC-214; Attention: Cashier; P.O. Box 13088, Austin, Texas, 78711-3088.

In the event that this Agreement is terminated for any reason, Applicant A, unless indicated otherwise in Exhibit "A", agrees to reimburse TNRCC for all costs incurred or obligated by the TNRCC before notice of termination of the Agreement.

NOTICE OF BANKRUPTCY

As soon as Applicant has knowledge of its intention to file bankruptcy or no later than 7 days prior to the actual filing of a voluntary bankruptcy petition, Applicant shall notify TNRCC of its intention to file a bankruptcy petition. In the case of an involuntary bankruptcy petition, Applicant shall give notice to the TNRCC as soon as it acquires knowledge of such petition.

INDEMNIFICATION

The Applicant agrees to indemnify and save and hold the State of Texas, its agencies, successors, departments, agents, and employees, harmless from any and all claims, damages, or causes of action arising from, or on account of, the negligent acts or omissions of the Applicant, its officers, directors, principals, employees, receivers, trustees, agents, successors, subsidiaries, and assigns in carrying out the activities pursuant to this Agreement.

EFFECTIVE DATE AND SUBSEQUENT MODIFICATION

The effective date of this Agreement shall be the date on which this Agreement is signed by the Executive Director of TNRCC or his authorized representative.

This Agreement may be amended by mutual agreement of TNRCC and the Applicant. Amendments shall be in writing and shall be effective when signed by the Executive Director of TNRCC or his authorized representative.

TERMINATION AND SATISFACTION

The provisions of the Agreement shall be satisfied when TNRCC gives the Applicant written notice in the form of a Final Certificate of Completion that the Applicant has demonstrated to TNRCC's satisfaction that all terms of this Agreement have been completed, including the selection and implementation of a remedial action, when appropriate.

Nothing in the Agreement shall restrict the State of Texas from seeking other appropriate relief to protect human health or the environment from pollution or contamination at or from this site not remediated in accordance with this Agreement.

SIGNATURES

Applicant A

By: Leah S. Flanagan
(signature of authorized representative)

Name: Leah S. Flanagan
(print or type)

Date: February 2, 1998

Applicant B

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

Applicant C

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

Applicant D

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

TNRCC Representative

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____ Title:_____

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

VOLUNTARY CLEANUP AGREEMENT

ADDITIONAL APPLICANTS FORM

Applicant E

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

Applicant F

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

Applicant G

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

Applicant H

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____

OFFICE USE ONLY
Site name:
PCA number:
Agency Object Code:
VCP Project number:

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION VOLUNTARY CLEANUP PROGRAM

Program Application

Complete this form to request assistance and review from the Texas Natural Resource Conservation Commission (TNRCC) staff in the Voluntary Cleanup Program (VCP) pursuant to §361.604 of the Texas Solid Waste Disposal Act.

Complete all applicable sections. Incomplete or inaccurate applications may be rejected as per §361.605 of the VCP statute. Please refer to the application instruction sheet or call (512) 239-5891 with any questions concerning the completion of this form.

General Information

Property/Site name Heights Service Center
Address 3602 Center Street
City Houston State TX Zip Code 77007
Latitude 29.770 Longitude 95.396
Property size (acres) One

Applicant(s)

Applicant A (The person seeking review and approval of a plan or report, and/or issuance of a Certificate of Completion by the TNRCC. Applicant A is responsible for payment of TNRCC costs of review and oversight unless indicated otherwise on page 2 of this form.)
Applicant City of Houston, Department of Public Works & Engineering
Contact Person Leah S. Flanagan Title Project Manager
Organization Facilities Engineering Div. Phone (713) 754-9703 Fax (713) 651-2574
Address P.O. Box 1562
City Houston State TX Zip Code 77251-1562
Interest in Property Property owner

Applicant B
Applicant N/A
Contact Person Title
Organization Phone ( ) Fax ( )
Address
City State Zip Code
Interest in Property

Applicant C
Applicant N/A
Contact Person _____ Title _____
Organization _____ Phone ( ) _____ Fax ( ) _____
Address _____
City _____ State _____ Zip Code _____
Interest in Property _____

Applicant D
Applicant N/A
Contact Person _____ Title _____
Organization _____ Phone ( ) _____ Fax ( ) _____
Address _____
City _____ State _____ Zip Code _____
Interest in Property _____

Current Property Owner (if different from applicant)

Owner(s) N/A
Contact Person _____ Title _____
Organization _____ Phone ( ) _____ Fax ( ) _____
Address _____
City _____ State _____ Zip Code _____

Other Contacts (Consultant/Attorney)

Name(s) John P. Hermann Title Senior Project Manager
Organization Corrigan Consulting, Inc. Phone (281)474-7455 Fax (281)474-4501
Address P.O. Box 99
City Seabrook State TX Zip Code 77586

Name(s) N/A Title _____
Organization _____ Phone ( ) _____ Fax ( ) _____
Address _____
City _____ State _____ Zip Code _____

Billing Information

If billing should be directed to a person other than Applicant A, please enter the required information below and include their signature consenting to payment of TNRCC oversight costs.

Name(s) John P. Hermann Title Senior Project Manager
Organization Corrigan Consulting, Inc. Phone (281) 474-7455 Fax (281) 474-4501
Address P.O. Box 99
City Seabrook State TX Zip Code 77586

Signature of Consent: _____

Current Property Use (Use percentage if property is divided into different use categories.)

Residential ____ Agricultural ____ Other Vacant ____
Commercial/Industrial ____ Recreational ____

Involvement With Other Regulatory Programs

Please describe any and all prior contact with any state or federal environmental regulatory programs or agencies which relate to the property in question, especially any orders, permits, notices of violations, or inspections. Indicate if there has been no prior contact. Attach additional sheets as necessary. No regulatory contacts are known to have occured.

Please provide any and all state and federal identification numbers related to the property in question, including any solid waste, leaking petroleum storage tank (PST), CERCLIS, RCRIS, etc., registration numbers which have been assigned. Facility is not registered as a PST, LPST, CERCLIS, or RCRIS facility.

Applicant's Intended Response Action Objectives (Cleanup Levels)

___ Not known at this time. Applicant wishes to receive guidance form VCP staff prior to the signing of a VCP agreement.

___ Cleanup to Background (i.e. Risk Reduction Standard 1).

_x_ Cleanup to Generic Risk-Based Levels (following Risk Reduction Standard 2 or PST Plan A requirements).

___ Cleanup to Site Specific Risk-Based Levels not relying on engineering or institutional controls (following Risk Reduction Standard 3 or PST Plan B requirements).

___ Cleanup to Site Specific Risk-Based Levels which rely on engineering or institutional controls (following Risk Reduction Standard 3 or PST Plan B requirements).

___ Other (explain)_____

_____

_____

Environmental Assessment

An environmental assessment must be attached with this application and include the required information as follows:

1. a legal description of the site, including a site map;
2. the physical characteristics of the site;
3. the operational history of the site, to the extent the history is known by the applicant;
4. information that the applicant is aware of concerning the nature and extent of any relevant contamination and/or release at the site and immediately contiguous to the site, or wherever the contamination came to be located; and
5. relevant information the applicant is aware of concerning the potential for human and environmental exposure to contamination at the site.

Intent to Participate

The undersigned requests oversight by the TNRCC of investigation and cleanup activities of possible contamination at the property described above and intends to negotiate in good faith a written agreement with the TNRCC to provide voluntary oversight. This Intent to Participate does not constitute such an agreement, and neither TNRCC or the undersigned will be bound to proceed with voluntary oversight unless such an agreement is executed. Applicants should be aware, that in order for the TNRCC to issue a Certificate of Completion for an entire site, the applicant must provide adequate information to document that the entire site meets the applicable standards. As an alternative, the applicant may pursue a Certificate of Completion for only a portion of the site, as a partial response action area. The agreement will describe the project activities of each party and will require Applicant A (unless indicated otherwise on page 2 of this form) to reimburse the TNRCC for all of its oversight costs. By completing and signing this Intent to Participate, the undersigned does affirm the applicant's financial capability to perform the voluntary cleanup. The Executive Director may request additional information to support this affirmation.

With this Intent to Participate, the undersigned does not admit or assume liability for investigation or cleanup of the site. In addition, the undersigned may terminate the Intent to Participate at any time. If the TNRCC rejects the application, it will notify the applicant and explain the reasons for rejection, and will refund half of the application deposit, unless the applicant indicates a desire to resubmit a corrected application.

Deposit of Oversight Costs

The applicant must submit with this application, a deposit in the amount of one thousand dollars ($1,000), made payable to the Texas Natural Resource Conservation Commission. Deposits may be made in the form of company or personal checks. Cash deposits will not be accepted.

Please execute this Intent to Participate in the space below and return it to:

Attention: Cashier
Texas Natural Resource Conservation Commission
MC- 214
P.O. Box 13088
Austin, Texas 78711-3088

For overnight or express mail please use the following street address:

Attention: Cashier
Texas Natural Resource Conservation Commission
MC-214
12100 Park 35 Circle
Austin, Texas 78753

Correctness of Information

The undersigned affirm that the information contained in this application is true and accurate to the best of their knowledge.

Applicant's Signatures

Applicant A

By: Leah A Flanagan (signature of authorized representative)
Name: Leah Flanagan (print or type)
Date: February 2, 1998
Title: Project Manager
Company: City of Houston
Phone: (713) 754-9703

Applicant B

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____ Title:_____

Company:_____ Phone: (___) ___ - _____

Applicant C

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____ Title:_____

Company:_____ Phone: (___) ___ - _____

Applicant D

By:_____ Name:_____
(signature of authorized representative) (print or type)

Date:_____ Title:_____

Company:_____ Phone: (___) ___ - _____

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION VOLUNTARY CLEANUP PROGRAM

Program Application - Additional Applicants Form

Applicant E

By:_____ Name:_____
(signature of authorized representative) (print or type)
Date:_____ Title:_____

Company:_____ Phone: ( ) -_____

Applicant F

By:_____ Name:_____
(signature of authorized representative) (print or type)
Date:_____ Title:_____

Company:_____ Phone: ( ) -_____

Applicant G

By:_____ Name:_____
(signature of authorized representative) (print or type)
Date:_____ Title:_____

Company:_____ Phone: ( ) -_____

Applicant H

By:_____ Name:_____
(signature of authorized representative) (print or type)
Date:_____ Title:_____

Company:_____ Phone: ( ) -_____

RIGAN CONSULTING, INC.

10082

tural Resource Cons. Comm

Check Number 10082

Date: 1/14/98 Check Amt: $1,000.00

ıer Invoice	Type	Date	Reference	Balance	Discount	Pay Amount
199 011498	Invoice	01/14/9	COH-Heights VCP	$1,000.00	$0.00	$1,000.00

10082
10082

CORRIGAN CONSULTING, INC.
P.O. BOX 99
SEABROOK, TX 77586-0099
PH. 281-474-7455

WELLS FARGO BANK
SEABROOK, TX 77586
35-1787-1130

tly One thousand and xx / 100 Dollars

DATE	AMOUNT
1/14/98	$1,000.00

IE
R TX Natural Resource Cons. Comm
Fiscal Services Section MC-214
P. O. Box 13088
Austin TX 78711-3088

MP

⑈010082⑈ ⑆113017870⑆0745 931071⑈

's on back.
Security features include

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Dan Pearson, *Executive Director*

APR 0 8 1998

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

April 1, 1998

Ms. Leah S. Flanagan
Project Manager
Facilities Engineering Division
City of Houston, Department of Public Works
P.O. Box 1562
Houston, TX 77251-1562

Re: Heights Service Center, 3602 Center Street, Houston, Harris County; VCP No. 700

Dear Ms. Flanagan:

The Texas Natural Resource Conservation Commission (TNRCC) has reviewed the October 1997 Phase I and Phase II Environmental Site Assessment Report prepared by CH2M Hill for the above referenced site. Based on our review of this report the TNRCC has concluded that the site investigation requirements of the Voluntary Cleanup Program (VCP) rules have not been met. As per 30 Texas Administrative Code §333.7 (VCP Rules), reports should include an investigation of the full nature and extent of contamination in all media. Following our review of the CH2M Hill report, the TNRCC identified areas that require additional investigation. To fulfill the investigation requirements of the VCP, the City of Houston should address the following areas:

1. Brick Building - Drum Storage Room and Paint Room. Collect soil samples beneath the flooring to determine if operations in these areas have impacted the soil. The sampled areas should be within or in the vicinity of the visible staining on the floor. The selected testing parameters should be indicative of the material stored in the areas sampled.

2. Brick Building - Wood Fluid Collection Trough. Collect soil samples around the trough beneath the floor to determine if vehicle related fluids drained in to the trough had impacted the neighboring soils. The selected testing parameters should be indicative of the material stored in the trough.

3. Metal Building - Drum Storage Room. Collect soil samples beneath the flooring to determine if operations in these areas have impacted the soil. The sampled areas should be within or in the vicinity of the visible staining on the floor. The selected testing parameters should be indicative of the material stored in the areas sampled.

4. Boring B-4A. Collect additional soil samples from this area to determine the horizontal and vertical extent of the Total Petroleum Hydrocarbon (TPH) contamination in the soil. Soil data from this boring indicated that TPH concentrations exceeded the VCP-TPH default non-residential groundwater protection cleanup level of 310 mg/kg. Please note that the City of Houston does have the option of developing site specific cleanup levels for TPH. If the city elects to develop site specific TPH cleanup levels, please contact the TNRCC to discuss the methodology that the city will use to develop the cleanup levels.

The TNRCC has provided this information to assist the City of Houston in obtaining a VCP Certificate of Completion. If you have any questions concerning the issues presented in this letter, please do not hesitate to contact me at (512) 239-5634. The city should submit the results of the requested investigation activities to TNRCC within 90 days from receipt of this letter.

Sincerely,

Rodney Concienne
Project Manager
Voluntary Cleanup Section
Pollution Cleanup Division

RC/ts

CORRIGAN CONSULTING, INC.

Record of Communication

Contact: Rodney Concienne	**Date:** June 24, 1998
Title:	**By:** Wendall Honeycutt
Co./Agency: TNRCC, VCP	**Client:** Malcolm Pirnie/City of Houston
Phone No.: 512/239-1000	**Project:** Heights Svc. Center VCP
City/State: Austin, Texas	**Job No:** 98S-128

Type of Communication:

☒ Telephone Call ☐ Meeting ☐ Other (specify) _____

☐ On-Site Interview ☐ Teleconference

Subject: Site assessment and closure approval

Summary of Communication:

Discussed the TPH concentration of 389 ppm in the parking lot area of the facility and stated that I was planning to use VOC and SVOC data to characterize the type of TPH. He stated that we could use this method, but that it would probably not provide all of the information needed and recommended that we collect and analyze another sample from the same location. He recommended that the sample be analyzed for TPH by 418.1 to have comparable concentrations and then run the sample for TPH using the Massachussets Method. Once we have the data for the MA TPH, we can use the weighted TPH value calculations in the MA Guidance Document to calculate a TPH cleanup goal. Regarding the detection limits for VOCs and SVOCs which exceed the RRS 2, he stated that we will probably receive a comment from them, especially if TPH is detected but no VOCs or SVOCs are detected in a sample. We will need to address why TPH is in the sample. Regarding elevated metals concentrations, he recommended a background study to determine background levels of the appropriate metals such as lead. I told him that we already have several non-detects for lead from other samples. He stated that lead requires more effort to demonstrate that it is not a problem and to obtain closure approval.

CORRIGAN CONSULTING, INC.

FAX MEMO

Date: July 7, 1998

No. of Pages: 9

To:	Khwaja Murshed	**From:**	Wendall Honeycutt
	TNRCC, VCP Section	**Phone:**	(281) 474-7455
Phone:	512/239-6753	**Fax:**	(281) 474-4501
Fax:	512/239-1212	**Job No.:**	98S-128

Transmitting:

Attached is the information we discussed regarding the VCP application for the City of Houston Heights Service Center (VCP No. 700). A brief history of assessment activities and a scope of work for additional assessment activities is discussed in the attachment. Originally, we had planned to request closure under the Risk Reduction Standard No. 2. Based on the SPLP lead results for one sample, we are now planning to request closure under Risk Reduction Standard No. 3 by completing the actions listed in the attachment. We are requesting the TNRCC's concurrence with this approach and suggestions to obtain closure for the site. In addition, there were several questions that we would like to pose. These questions are listed below:

1. Is a 0.25 mile radius search for receptors necessary, especially when working with metals contaminated soils beneath a building? Can the search distance be reduced to 500 feet?

2. During the previous assessment, a TPH (by 418.1 Method) concentration of 389 ppm was detected in surface soil sample. The laboratory used VOC (Method 8260) and SVOC (Method 8270) data to determine the proportions and types of organic compounds in the sample. Do I need to collect a confirmation sample from the same location and analyze the sample using the Massachusetts method?

Re: Site Investigation and Closure
Heights Service Center
3602 Center Street, Houston
VCP Application No. 700

Background

In September 1997, a Phase I/II Environmental Site Assessment (ESA) was performed at the Heights Service Center facility. The scope of work for this ESA included a historical records review, a site reconnaissance, and sampling of various media. These media included, lead-based paint, suspected asbestos containing materials, soils and groundwater. Based on information obtained during the Phase I/II ESA, the facility was used by the City of Houston from 1981 to present as an equipment storage and/or maintenance facility. Prior to 1981, the facility was occupied by a machine shop, a feed mill, and a dairy plant.

During the Phase I/II ESA, elevated concentrations of total petroleum hydrocarbons (TPH) were detected in one soil sample and elevated concentrations of chromium were detected in another soil sample. Elevated concentrations of lead were detected in three soil samples and in two groundwater samples. A Phase I/II ESA report was prepared and submitted with a Voluntary Cleanup Program (VCP) application to the VCP Section of the Texas Natural Resource Conservation Commission (TNRCC).

Based on the results of the Phase I/II ESA, the TNRCC requested additional assessment involving five locations. These locations included a drum storage room, a paint storage room, and a maintenance room inside the brick building; a drum and paint storage room inside the metal building; and the area surrounding soil boring B-4 where elevated TPH concentrations were detected. These locations were assessed and the results of the assessment are discussed below.

Additional Assessment

Shallow soil samples were collected at the five locations requested by the TNRCC including four locations beneath the concrete foundations of the brick and metal buildings. A second concrete or brick foundation was encountered at a depth of approximately three feet below the upper foundation. Soil samples were collected from the fill material beneath the upper foundation. No samples were collected from beneath the second foundation. Soil samples were also collected around the soil boring B-4 area.

Elevated concentrations of TPH, total lead and total cadmium were detected in the soil samples from beneath the building. No volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) were detected in these samples. The samples with the highest concentrations of total lead and total cadmium were also analyzed using the Synthetic

Precipitation Leaching Procedure (SPLP). The concentration of SPLP cadmium was less than the Risk Reduction Standard (RRS) No. 2 Groundwater Standard for Industrial Use as established by the TNRCC in Title 30 Texas Administrative Code Chapter 335 Subchapter S. The concentration of SPLP lead was greater than the RRS No. 2 Groundwater Standard for Industrial Use.

Soil samples were collected from three locations around soil boring B-4 and the samples were analyzed for TPH. The concentrations of TPH ranged from less than the practical quantitation limits to 14.5 ppm. Using analytical data obtained during the Phase I/II ESA, XENCO Laboratories performed an assessment of the sample with elevated TPH concentrations from soil boring B-4. General types (aliphatics, aromatics, alkanes, and cycloalkanes) and approximate proportions of organic compounds in this sample were identified. According to a November 3, 1995 TNRCC memorandum, this information can be used to develop site-specific TPH cleanup goals as outlined in the Massachusetts Surrogate Approach. Based on the analytical results, a GWP Standard for Industrial Use for TPH was calculated to be 900 parts per million (ppm). Since the highest TPH concentration in the B-4 area was 389 ppm, no additional assessment or remediation of this area is necessary. The sample locations are included in Figure 1 and the analytical results for both phases of assessment are summarized in Tables 1 through 4.

The results of the assessment were verbally discussed with Mr. Rodney Concienne, Project Manager of the VCP Section of the TNRCC. According to Mr. Concienne, and based on the results of the assessment, additional assessment or remediation of the following areas will be necessary in order to obtain closure under RRS Standard No. 3.

- Elevated concentrations of lead beneath the buildings and in the subsurface soils
- Elevated concentrations of lead in groundwater
- Elevated concentrations of chromium in one subsurface soil sample

The following scope of work is proposed to obtain TNRCC approval for closure of the facility under RRS No. 3. Closure under RRS No. 3 is recommended since the concentrations of SPLP lead exceed the RRS No. 2 standards for groundwater. The scope of work includes services to prepare a Preliminary Conceptual Environmental Assessment Model (CEAM) which will include a receptor survey and an evaluation of environmental conditions. A preliminary CEAM is recommended by the TNRCC to evaluate exposure pathways and to determine whether a full CEAM is necessary.

Scope of Work

The following items are proposed in order to confirm the results of the previous assessments and to determine whether the elevated concentrations of lead and chromium in soil will leach at concentrations which exceed TNRCC RRS Standard No. 2 Groundwater Standards.

Item 1: Records Review and Project Coordination

Prior to the start of field investigation activities, a water well records inventory will be completed for the area within a 0.5 mile radius of the facility. Water well records will be reviewed and available records for the wells will be obtained from the TNRCC. These records will be evaluated for potential exposure points.

We will coordinate with the City of Houston to obtain access to the facility, including the brick building. We will revise the Sampling/Analysis and Health and Safety Plans, as appropriate to complete the additional scope of work.

Item 2: Field Investigation

In order to define the vertical extent of lead contamination in soils beneath the building, the lower building foundation will be cored at two locations by Holes, Inc. a direct subcontractor to Malcolm Pirnie, Inc. A GeoProbe drilling rig or hand auger will be used to drill a soil boring at each location and collect soil samples. The soil borings will be drilled to a maximum depth of ten feet below ground surface (bgs). The samples will be analyzed for total lead and total cadmium in accordance with EPA Publication SW-846 "Test Methods for Evaluating Solid Waste."

Three soil borings will be drilled to a maximum depth of ten feet bgs at locations around the perimeter of the brick building to define the horizontal extent of lead and cadmium contaminated soils. Soil samples will be analyzed for total lead and total cadmium. The samples with the highest concentration of total lead and total cadmium will be analyzed for SPLP lead and SPLP cadmium.

One soil boring will be drilled to a depth of 18 feet near the former location of soil boring B-2. A confirmation soil sample will be collected from the 16 to 18 foot depth interval bgs. The sample will be analyzed for total chromium and SPLP chromium.

During previous assessment activities, total lead was detected in two groundwater samples at concentrations which exceeded the RRS No. 2 standard of 0.015 ppm. According to the Phase I/II ESA report, these samples also contained suspended solids which may have affected the analytical results for total lead. Therefore, a temporary monitoring well and low flow purging of the well are recommended to determine whether total lead concentrations in groundwater are due to suspended solids and/or due to contamination from past activities at the site.

One soil boring will be drilled to a depth of 40 feet bgs and a confirmation soil sample will be collected from the 16 to 18 foot depth interval bgs and analyzed for total lead and SPLP lead. The temporary monitoring well will be installed in the soil and boring and will be subsequently developed.

Following development, the well will be purged using the low flow purging method. The pump will be positioned at the approximate mid-point of the screened interval and water will be pumped at a rate of 0.5 liters per minute or less. Temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity will be monitored during the purging of the well. Once these parameters have stabilized, a groundwater sample will be

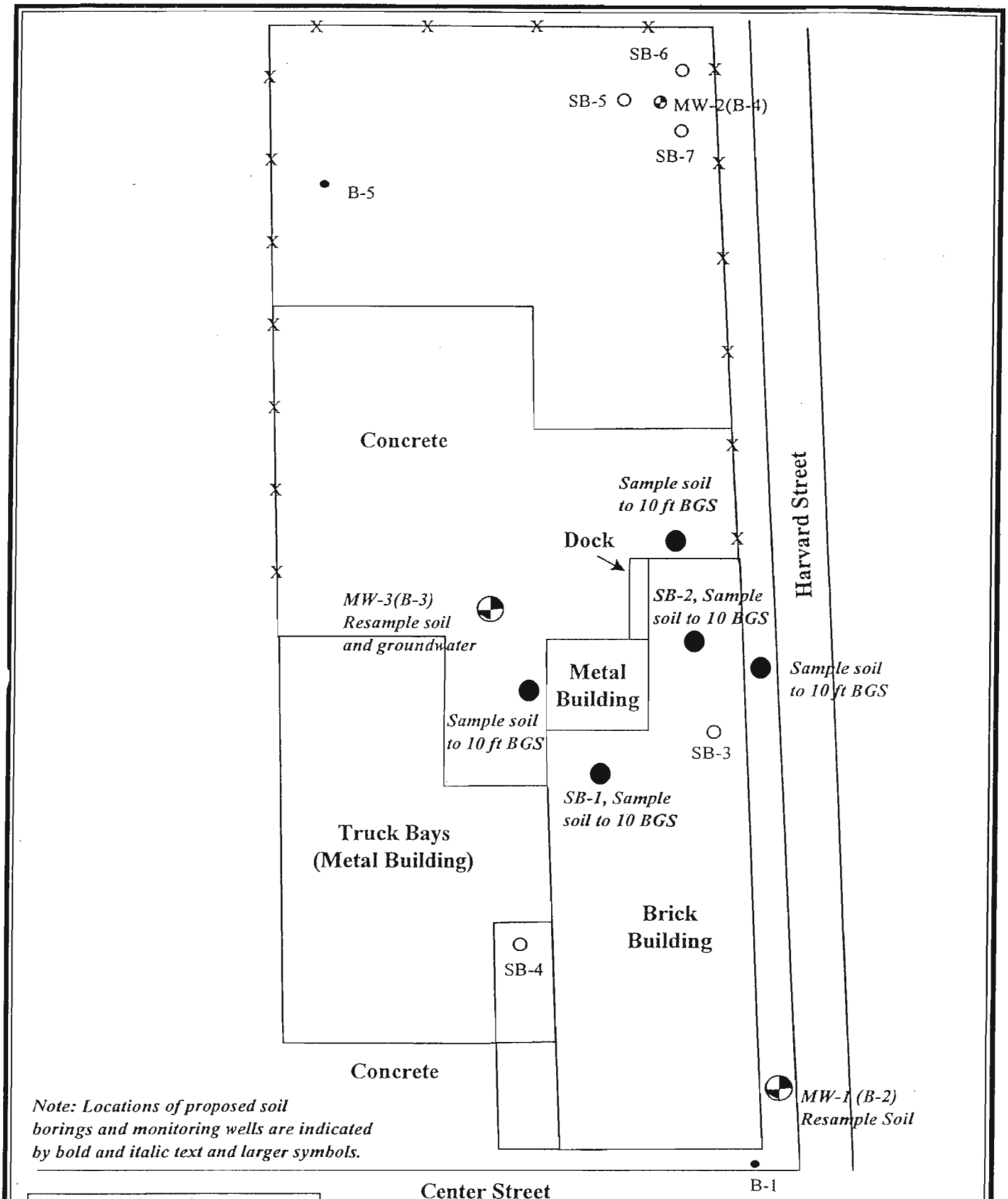
collected from the well and submitted to a laboratory for analysis of total lead and total dissolved solids.

During field investigation activities, a field receptor survey will be performed to identify potential receptors within 0.25 miles of the facility and to identify migration pathways within 500 feet of the facility. Potential receptors include water wells, schools, hospitals, residences, day care centers, nursing homes, parks, recreational areas, wildlife sanctuaries, businesses, and potential wetlands. Migration pathways will be identified by obtaining and reviewing utility maps from the City of Houston. In addition, the area within 500 feet of the facility will be visually inspected for other migration pathways, such as drainage ditches, and these pathways will be noted.

Item 3: Report

Final laboratory reports will be reviewed and laboratory quality assurance/quality control procedures will be evaluated. A report will be prepared which summarizes the assessment activities performed in May 1998 and the proposed assessment activities outlined in this proposal. The report will include photographs, field documentation, laboratory reports, a description of assessment procedures and a discussion of the analytical results. Three copies of the draft report will be provided to Malcolm Pirnie, Inc. for review and comment. Three copies of the final report will be prepared and submitted to Malcolm Pirnie, Inc. following the receipt of comments.

Since closure under RRS Standard No. 2 is not feasible due to elevated concentrations SPLP lead in soils, a preliminary CEAM will be prepared and included in the assessment report. The CEAM will be limited to an evaluation of conditions and use of the facility, an evaluation of the regional geology and hydrogeology, and a review of the receptor survey and potential receptors.



Proposed Sample Location Map	City of Houston Heights Service Center Houston, Texas
Date: 05/21/98	
Figure 1	*CORRIGAN CONSULTING, INC.*

TABLE 1

Organic Analytical Results for Soil Samples (in ppm)
City of Houston - Heights Service Center
3602 Center Sreet, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)							
			Total Petroleum Hydro-carbons (418.1)	m, p-Xylenes (8260)	BTEX (8020)	1,2,4-Trimethyl-benzene (8260)	1,3,5 - Trimethyl-benzene (8260)	Remaining VOCs (8260)	Polycyclic Aromatic Hydrocarbons (8270)	SVOCs (8270)
Phase I & II Environmental Site Assessment Results										
B-1A	9/17/97	0 - 2'	26.9	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-1B	9/17/97	14 - 16'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-2A	9/17/97	2 - 4'	1,140	N.A.	N.D. (0.050 ea.)	N.A.	N.A.	N.A.	N.D. (0.7 ea.)	N.A.
B-2B	9/17/97	16 - 18'	N.D. (10.0)	N.A.	N.D. (0.050 ea.)	N.A.	N.A.	N.A.	N.D. (0.07 ea.)	N.A.
B-3A	9/17/97	2 - 4'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-3B	9/17/97	16 - 18'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-4A	9/17/97	0 - 2'	389	0.010	N.A.	0.016	0.005	N.D. (0.005 ea.)	N.A.	N.D. (0.33 ea.)
B-4B	9/17/97	14 - 16'	26.9	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-5A	9/17/97	2 - 4'	65.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-5B	9/17/97	18 - 20'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
B-6 9 (Dup B3A)	9/17/97	2 - 4'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Phase II B Environmental Site Assessment Results										
SB-1A	5/21/98	1 - 2'	210	N.D. (0.005)	N.A.	N.D. (0.005)	N.D. (0.005)	N.D. (0.005 ea.)	N.A.	N.D. (3.3 ea.)
SB-2A	5/21/98	1 - 2'	72.3	N.D. (0.005)	N.A.	N.D. (0.005)	N.D. (0.005)	N.D. (0.005 ea.)	N.A.	N.D. (0.33 ea.)
SB-3A	5/21/98	1 - 2'	21.7	N.D. (0.005)	N.A.	N.D. (0.005)	N.D. (0.005)	N.D. (0.005 ea.)	N.A.	N.D. (0.33 ea.)
SB-4A	5/21/98	1 - 2'	14.5	N.D. (0.005)	N.A.	N.D. (0.005)	N.D. (0.005)	N.D. (0.005 ea.)	N.A.	N.D. (0.33 ea.)
SB-5A	5/21/98	3 - 4'	14.5	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
SB-6A	5/21/98	3 - 4'	N.D. (10.4)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
SB-7A	5/21/98	3 - 4'	N.D. (10.0)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

N.D. = Not Detected (Practical Quantitation Limit in ppm)

N.A. = Not Analyzed

TABLE 2

Inorganic Analytical Results for Soil Samples (in ppm)
City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	Depth (feet) bgs	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)									
			Total Arsenic (6010)	Total Barium (6010)	Total Cadmium (6010)	SPLP Cadmium (1312/6010)	Total Chromium (6010)	Total Lead (6010/7421)	SPLP Lead (1312/239.2)	Total Mercury (7471)	Total Silver (6010)	Total Selenium (6010)
Phase I & II Environmental Site Assessment												
B-1A	9/17/97	0 - 2'	N.D. (10.0)	16.4	N.D. (2.00)	N.A.	N.D. (5.0)	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-1B	9/17/97	14 - 16'	N.D. (10.0)	31.2	N.D. (2.00)	N.A.	N.D. (5.0)	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-2A	9/17/97	2 - 4'	N.D. (10.0)	63.4	N.D. (2.00)	N.A.	N.D. (5.0)	24.5*	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-2B	9/17/97	16 - 18'	N.D. (10.0)	25.7	N.D. (2.00)	N.A.	37.3*	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-3A	9/17/97	2 - 4'	N.D. (10.0)	71	N.D. (2.00)	N.A.	7.0	6.6*	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-3B	9/17/97	16 - 18'	N.D. (10.0)	171	N.D. (2.00)	N.A.	N.D. (5.0)	38.8*	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-4A	9/17/97	0 - 2'	N.D. (10.0)	64.8	N.D. (2.00)	N.A.	N.D. (5.0)	47.4*	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-4B	9/17/97	14 - 16'	N.D. (10.0)	13.6	N.D. (2.00)	N.A.	N.D. (5.0)	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-5A	9/17/97	2 - 4'	N.D. (10.0)	88.1	N.D. (2.00)	N.A.	N.D. (5.0)	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-5B	9/17/97	18 - 20'	N.D. (10.0)	64.1	N.D. (2.00)	N.A.	8.7	11.2*	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
B-6 (Dup. B3A)	9/17/97	2 - 4'	N.D. (10.0)	66.6	N.D. (2.00)	N.A.	6.5	N.D. (5.0)	N.A.	N.D. (0.10)	N.D. (4.00)	N.D. (10.0)
Phase II B Environmental Site Assessment Results												
SB-1A	5/21/98	1 - 2'	N.D. (5.0)	29.5	2.58*	N.D. (0.005)	4.8	117*	0.32	N.A.	N.A.	N.A.
SB-2A	5/21/98	1 - 2'	N.D. (5.0)	79.3	2.28*	N.A.	5.4	99.1*	N.A.	N.A.	N.A.	N.A.
SB-3A	5/21/98	1 - 2'	N.D. (5.0)	31.8	0.60*	N.A.	2.7	31.6*	N.A.	N.A.	N.A.	N.A.
SB-4A	5/21/98	1 - 2'	N.D. (5.0)	12.8	N.D. (0.50)	N.A.	N.D. (2.5)	0.91	N.A.	N.A.	N.A.	N.A.
SB-5A	5/21/98	3 - 4'	N.D. (5.0)	N.A.	N.A.	N.A.	N.A.	9.3*	N.A.	N.A.	N.A.	N.A.
SB-5B	5/21/98	5 - 6'	N.A.	N.A.	N.A.	N.A.	N.A.	5.62*	N.A.	N.A.	N.A.	N.A.
SB-6A	5/21/98	3 - 4'	N.A.	N.A.	N.A.	N.A.	N.A.	3.2*	N.A.	N.A.	N.A.	N.A.
SB-7A	5/21/98	3 - 4'	N.A.	N.A.	N.A.	N.A.	N.A.	4.62*	N.A.	N.A.	N.A.	N.A.
RRS 2 Groundwater Protection Standard for Industrial Use			5.0	200	0.5	0.005	10	1.5	0.015	0.2	51.1	5.0

N.D. = Not Detected (Practical Quantitation Limit in ppm) N.A. = Not Analyzed

*Note: These concentrations are above the following TNRCC Risk Reduction No. 2 standards.

TABLE 3
Organic Analytical Results for Groundwater Samples (in ppm)
City of Houston - Heights Service Center
3602 Center Sreet, Houston, Texas

Field Identification Number	Date	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)		
		Total Petroleum Hydrocarbons (418.1)	Volatile Organic Compounds (8260)	Semi-volatile Organic Compounds (8270)
Phase I & II Environmental Site Assessment Results				
GW-1	9/25/97	N.D. (0.9)	N.D. (0.010 ea.)	N.D. (0.010 ea.)
GW-2	9/25/97	N.D. (0.9)	N.D. (0.005 ea.)	N.D. (0.010 ea.)
GW-3	9/25/97	N.D. (0.9)	N.D. (0.005 ea.)	N.D. (0.10 ea.)
GW-4 (Dup. GW-3)	9/25/97	N.D. (0.9)	N.D. (0.005 ea.)	N.D. (0.10 ea.)
Trip Blank	Not Appl.	N.A.	N.D. (0.005 ea.)	N.A.

N.D. = Not Detected (Practical Quantitation Limit in ppm) N.A. = Not Analyzed

TABLE 4

Inorganic Analytical Results for Groundwater Samples (in ppm)
City of Houston - Heights Service Center
3602 Center Street, Houston, Texas

Field Identification Number	Date	CONSTITUENTS OF INTEREST (EPA SW-846 Method No.)							
		Total Arsenic (6010)	Total Barium (6010)	Total Cadmium (6010)	Total Chromium (6010)	Total Lead (6010/7421)	Total Mercury (7471)	Total Silver (6010)	Total Selenium (6010)
Phase I & II Environmental Site Assessment									
GW-1	9/25/97	N.D. (0.050)	0.41	N.D. (0.005)	N.D. (0.050)	0.031*	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-2	9/25/97	N.D. (0.050)	0.138	N.D. (0.005)	N.D. (0.050)	N.D. (0.010)	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-3	9/25/97	N.D. (0.050)	1.94	N.D. (0.005)	N.D. (0.050)	0.031*	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)
GW-4	9/25/97	N.D. (0.050)	0.96	N.D. (0.005)	N.D. (0.050)	0.012	N.D. (0.0010)	N.D. (0.020)	N.D. (0.050)

N.D. = Not Detected (Practical Quantitation Limit in ppm) N.A. = Not Analyzed

*Note: These concentrations are above the following TNRCC Risk Reduction No. 2 standards.

Groundwater Protection Standard for Industrial Use	0.05	2.0	0.005	0.010	0.015	0.002	0.183	0.05

CORRIGAN CONSULTING, INC.

Record of Communication

Contact: Khwaja Murshed	**Date:** 7-14-98
Title: VCP Team	**By:** GLK
Co./Agency: TNRCC	**Client:** MP
Phone No.: 512-239-6753	**Project:** Heights Service Center
City/State: Austin, TX	**Job No.:** 98S-128

Type of Communication:

☒ Telephone Call ☐ Meeting ☐ Other (specify)

☐ On-Site Interview ☐ Teleconference

Subject: Response to Fax questions

Summary of Communication:

KM - With regard to the receptor survey, reducing the radius of your search is acceptable at this time since the primary driver appears to be metals contamination. However, if subsequent investigation shows that contamination has extended off-site, you'll need to go back and extend your radius of survey out to the original 0.25 mile dimension.

With regard to the TPH issue, since you'll be going back to the site for more investigation anyway, I recommend that you re-sample the elevated TPH location and run the Massachusetts method for that sample.

With regard to risk standard for closure, it is OK to close under RRS 3. You'll need to revise your schedule to reflect that change.

GK - Does the fax sent to you suffice as our request to close under RRS 3 or do you need a formal letter requesting that closure strategy?

KM - No, the fax is fine and this discussion serves as approval to proceed under the provisions of RRS 3.

CITY OF HOUSTON

Public Works and Engineering Department
Post Office Box 1562 • Houston, Texas 77251-1562

Lee P. Brown, Mayor

CITY COUNCIL MEMBERS: Bruce Tatro Michael J. Yarbrough Martha J. Wong Jew Don Boney, Jr. Rob Todd Ray F. Driscoll Jean Kelley Felix Fraga John E. Castillo Annise D. Parker Joe Roach Orlando Sanchez Chris Bell Carroll G. Robinson CITY CONTROLLER: Sylvia R. Garcia

December 10, 1998

Texas Natural Resource Conservation Commission
Voluntary Cleanup Section, Pollution Cleanup Division
P.O. Box 13087
Austin, Texas 78711-3087

Attention: Mr. Khwaja Murshed
Project Manager

Subject: **Heights Service Center, 3602 Center Street, Houston**
VCP No. 700

Dear Mr. Murshed:

Presented for your review and concurrence is an alternate scope of work proposed by Corrigan Consulting, Inc. which outlines procedures to obtain closure for the above-referenced facility under Risk Reduction Standard No. 3. Upon your concurrence we will implement the alternate scope of work and anticipate submittal of reports documenting the closure by February 1, 1999.

If you have questions regarding the proposed change in the scope of work, please contact Wendall Honeycutt (281-474-7455) directly. Otherwise contact me at 713-837-0075. Thank you for your assistance in this matter.

Sincerely,

Leah S. Flanagan
Department of Public Works & Engineering

cc: Jerry King, P.E.
Hilda Garza Scott, P.E.
Gary N. Oradat, P.E.
Edwin Mergele, A.I.A.
Barry Daniels, P.E., - Malcolm Pirnie
Wendall Honeycutt, P.G., Corrigan Consulting

CORRIGAN CONSULTING, INC.

Record of Communication

Contact: Jay Carsten/Joe Bell	**Date:** January 21, 1999
Title:	**By:** Wendall Honeycutt
Co./Agency: TNRCC, VCP	**Client:** Malcolm Pirnie/City of Houston
Phone No.: 512/239-6753	**Project:** Heights Svc. Center VCP
City/State: Houston, Texas	**Job No:** 98S-128

Type of Communication:

☒ Telephone Call ☐ Meeting ☐ Other (specify) _____

☐ On-Site Interview ☐ Teleconference

Subject: Status of project and proposed actions

Summary of Communication:

According to J. Carsten, the project was assigned to Joe Bell who was recently transferred to the VCP Section of the TNRCC. J. Bell has not reviewed our scope of work yet and does not plan to review it until the first part of February since he has already made some prior commitments on other projects. He expects to complete the review within a week.

CORRIGAN CONSULTING, INC.

Record of Communication

Contact: Joe Bell	**Date:** February 4, 1999
Title:	**By:** Wendall Honeycutt
Co./Agency: TNRCC, VCP	**Client:** Malcolm Pirnie/City of Houston
Phone No.: 512/239-6753	**Project:** Heights Svc. Center VCP
City/State: Houston, Texas	**Job No:** 98S-128

Type of Communication:

☒ Telephone Call ☐ Meeting ☐ Other (specify) _____

☐ On-Site Interview ☐ Teleconference

Subject: Review of Work Plan

Summary of Communication:

He has reviewed the Work Plan and does not believe that the contamination is extensive or elevated. He believes that we may be able to obtain closure under RRS #2 if we perform a background study for metals, especially lead. If the concentrations of lead in groundwater after low flow purging are below the MCLs, he suggested that we use a modeling program such as SESOIL to evaluate the rate and concentration at which lead and other metals will leach to groundwater. He was not aware that we had reported the results of the investigation beneath the building and he will start reviewing that report. I asked to schedule a teleconference call with him prior to his issuance of a letter regarding our proposed actions. He agreed and asked that I call him back with a time and date for the teleconference call.

CORRIGAN CONSULTING, INC.

Record of Communication

Contact: Barry Daniels/Joe Bell	**Date:** February 11, 1999
Title:	**By:** Wendall Honeycutt
Co./Agency: Malcolm Pirnie/TNRCC	**Client:** Malcolm Pirnie/City of Houston
Phone No.: 713/9607408/512/2396753	**Project:** Heights Svc. Center VCP
City/State: Houston/Austin	**Job No:** 98S-128

Type of Communication:

☒ Telephone Call ☐ Meeting ☐ Other (specify)

☐ On-Site Interview ☐ Teleconference

Subject: Work Plan

Summary of Communication:

Reviewed scope of work in Work Plan. Joe Bell provided comments on the Work Plan as follows:

1. Recommended background study to address lead concentrations in soils and suggested that background samples be collected from 0 to 6" below ground surface at locations away from streets where concentrations of lead maybe higher due to leaded gasoline exhausts.
2. He agreed with recommendation regarding recollection of sample for SPLP and total chromium analyses.
3. Resample B-4A and reanalyze sample which contained TPH of 389 ppm. Analyze sample for TPH and SPLP TPH. He agreed with scope of work for vertical delineation of TPH.
4. He stated that our scope of work for low yield aquifer may not be sufficient without other data to confirm that aquifer is truly low yield. He requested that we perform a quasi-pump test during the purging of the well to demonstrate that the well will not produce more than 150 gpd. Suggested pumping the well at a rate of 0.1 gpm for approximately 30 minutes and measuring drawdown in the well.

Record of Communication

5. Requested that we confirm the locations of off-site sources, especially the LPST site that is located near the site. These sources will be located on the receptor map as part of the receptor survey.

6. He believes that we have adequately assessed the area beneath a set of iron tanks which are shown on a Sanborn map. He asked that we plot the tanks on the map and assess this area if we have not already completed this task.

7. He stated that CEAM may not be required if the background study indicates that the lead concentrations are background or the TDS of the groundwater is high enough such that it is not used for drinking water purposes.

8. He approved extension for submittal of report and asked that we provide him with monthly updates on the project. He should complete written response to our letter by 2/19/99.

Barry and I discussed his recommendations after teleconference call and Barry agreed to recommendations that Joe Bell had suggested.

Received Time Mar. 19. 11:01AM

Post-it™ Fax Note 7671	Date 3/19	# of pages ▶ 3
To Barry Bands	From Leah	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

Barry R. McBee, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

February 22, 1999

Ms. Leah S. Flanagan
Project Manager
Facilities Engineering Division
City of Houston, Department of Public Works
P.O. Box 1562
Houston, TX 77251-1562

Re: Heights Service Center, 3602 Center Street, Houston, Harris County; VCP No. 700

Dear Ms. Flanagan:

The Voluntary Cleanup Section of the Texas Natural Resource Conservation Commission has completed its review of the alternate scope of work proposed in your response letter dated December 10, 1999. In reference to the alternate scope of work, I have provided the enclosed comments sheet.

A Site Investigation Report, addressing these concerns should be submitted within 45 days of the date of this letter. If additional time is required to prepare a response or if you have questions or comments related to this matter, please feel free to contact me at (512) 239-6753.

Sincerely,

Joe Bell
Project Manager
Voluntary Cleanup Section
Remediation Division

JNB/ts

Enclosure

I:\VOLCLEAN\BELL\700\700AMEND.LTR

ENCLOSURE 1
COMMENTS
Alternate Work Plan and Response Letter
Heights Service Center, VCP No. 700

General Comment #1: The adjusted scope of work proposes that sensitive receptors and migration pathways within 500 feet of the property perimeter will be identified during the performance of a field receptor survey. The VCP Guidance Document states that this receptor survey should be performed within a quarter-mile of the site boundaries. Therefore, please extend this receptor survey to the limits delineated in the VCP Guidance Document. Additionally, during performance of the field receptor survey, please note the location of any current or former Petroleum Storage Tank (PST) facilities or dry cleaning facilities located in the near vicinity of the property.

General Comment #2: Proceed with the water well search and vertical delineation of Total Petroleum Hydrocarbon (TPH) as stated in the alternate work plan. Please be prepared to advance the boring past 12 feet Below Ground Surface (BGS) in the event that hydrocarbon contamination is indicated by field screening at that depth. Consider performing a Synthetic Precipitation Leachate Procedure (SPLP) analysis on the sample with the highest indicated TPH concentration. A site specific Groundwater Protection (GWP) value for TPH has been proposed for this site. Prior to utilizing these calculations for closure criteria, please test the TPH contaminated soils for their leachate concentrations.

General Comment #3: Proceed with the installation of the temporary monitoring well as described in the alternate work plan and further clarified in the February 11, 1999 telephone conversation with Mr. Wendall Honeycutt of Corrigan Consulting and Mr. Barry Daniels of Malcolm Pirnie. As discussed, the well is to be constructed as a two inch diameter PVC monitoring well and is to be properly developed prior to micro purging and subsequent sampling. Low flow sampling procedures are to be utilized to characterize lead (Pb) concentrations in the groundwater. Well-yield calculations will be developed utilizing geotechnical data gathered from two soil samples collected in the saturated medium. Although such was not specifically mentioned in the proposed scope of work, please be aware that hydraulic conductivity estimates based on the results of standard geotechnical testing will not be accepted as being representative of the aquifer's lateral hydraulic conductivity. If, after proper development, you perform a direct yield test on the monitoring well, and the results of such a test indicate that the well cannot sustain a yield of 150 gallons per day (0.1 gallons per minute), then you may avoid what could be an extensive review of your calculations and input parameters.

General Comment #4: If, after resampling the wells, Pb concentrations remain elevated, you will be required to perform additional assessment to define the lateral and vertical extent of the contaminant plume. If you plan to use an adjusted cleanup level, based on low-yield criteria, then please be aware that the appropriate closure standard is Risk Reduction Standard 3, not the Risk Reduction Standard 2 scenario that I stated in the February 11, 1999 phone conversation with Mr. Daniels and Mr. Honeycutt.

General Comment #5: Before proceeding with alternate methods to address surface soil Pb leachate values in excess of MCL, you may consider establishing a 95% Upper Tolerance Limit (UTL) for background Pb in surface soils. If your total Pb concentrations are below the 95% UTL, you will not need to address this situation further. The highest indicated Pb value on the site is 117 mg/Kg, a value that might be contained within the 95% UTL for older, heavily trafficked, areas of Houston, Texas. Additionally, if your water bearing zone is determined to be low-yield, the allowable Pb leachate value may be adjusted to 1.5 mg/L.

General Comment #6: Response actions and presentation of results should be performed in accordance with the TNRCC Interoffice Memorandum, "Implementation of the Existing Risk Reduction Rule" (also referred to as the Consistency Document), located on the TNRCC Internet web site at **http://www.tnrcc. state.tx.us/waste**.

Specific Comments:

1. Phase I & II Environmental Site Assessment, 1969 Sanborn Map: Four large Aboveground Storage Tanks (ASTs) are shown on a concrete platform in the western portion of the site. The contents of these tanks cannot be determined from the description given. Please determine what material these tanks contained and assess the soils around the platform (or former platform area) if it is indicated that they were used to store substances that may have adversely affected the environmental quality of the site. Please be aware that if the material contained within these tanks cannot be determined, we will require that you treat them as having contained unknown materials of concern. If sampling has been previously performed in this area, you may use that information to assist in characterization of the soils in the vicinity of the ASTs shown on the 1969 Sanborn map.

CORRIGAN CONSULTING, INC.

1909 Capri Lane
P.O. Box 99, Seabrook, Texas 77586-0099
(281) 474-7455 • Fax (281) 474-4501

March 31, 1999

Ms. Marsha Hill
Industrial and Hazardous Waste Division
Texas Natural Resource Conservation Commission
5425 Polk Street
Houston, Texas 77023

Re: **City of Houston**
Heights Service Center
3602 Center Street, Houston
Voluntary Cleanup Program No. 700

Subject: **Notification of Site Investigation Activities**

Dear Ms. Hill:

On behalf of the City of Houston, Corrigan Consulting, Inc. performed a Phase I and Phase II Environmental Site Assessment (ESA) at the above-referenced property. Two areas of historical contamination were identified, and the property was entered into the Voluntary Cleanup Program (VCP) of the Texas Natural Resource Conservation Commission. Based on a review of the ESA report, Mr. Rodney Concienne, former VCP coordinator for the property, requested additional assessment of several areas of concern located inside of buildings on the property. The results of this additional assessment and recommendations to proceed toward closure were reported to Mr. Joe Bell, the current VCP coordinator for the property. The currently planned site investigation and closure activities were reviewed and approved with some modifications by Mr. Bell.

In accordance with Title 30 Texas Administrative Code Section 335.8(c), we are submitting this letter as notification to perform additional site investigation and closure activities at the above-referenced property on behalf of the City of Houston. The site investigation and closure activities will include: an evaluation of background concentrations of lead in shallow subsurface soils; an assessment of the leachability of total petroleum hydrocarbons (TPH) and a vertical delineation of TPH that was detected in a surface soil sample; sampling of groundwater for lead using low-flow purging and sampling methods; and an evaluation of the yield of the shallow saturated zone at the property.

Field activities are scheduled to start on April 9, 1999, and will be completed within approximately one week. We will call to advise if there are any changes to this planned schedule. Corrigan Consulting, Inc. appreciates your assistance in this matter. If there are any questions, please feel free to call me or Mr. Wendall Honeycutt, P.G., Senior Project Geologist, at 281-474-7455.

Sincerely,

Roxie L. Voran

Roxie L. Voran, P.G.
Senior Project Manager

RLV/WBH/msm

cc: Barry Daniels, Malcolm Pirnie, Inc.
Leah Flanagan, City of Houston

I:\CCI Documents\Jobs\Malcolm Pirnie-COH\98S-128 Additional Site Investigation\Phase II Correspondence\TNRCC Notification Letter 03-31-99.doc

CORRIGAN CONSULTING, INC.

1909 Capri Lane
P.O. Box 99, Seabrook, Texas 77586-0099
(281) 474-7455 • Fax (281) 474-4501

March 31, 1999

Mr. Joe Bell
Voluntary Cleanup Section
Remediation Division, M.C. 221
Texas Natural Resource Conservation Commission
P.O. Box 13087
Austin, TX 78711-3087

Re: Revisions to the Standard Receptor Survey Radius
City of Houston
Heights Service Center
3602 Center Street, Houston
VCP No. 700

Dear Mr. Bell:

On behalf of the City of Houston and Malcolm Pirnie, Inc., Corrigan Consulting, Inc. conducted a teleconference with you and Mr. Barry Daniels, P.E. of Malcolm Pirnie, Inc. In this teleconference, we proposed to perform a receptor survey for a distance within 500 feet of the above-referenced site. This distance was proposed as an alternative to the standard distance of 0.25 miles. This proposal was previously discussed and approved by Mr. Khwaja Murshed, the previous Texas Natural Resource Conservation Commission Project Manager, on July 14, 1998. The record of communication with Mr. Murshed is attached. As you requested, we are submitting this letter to summarize our reasoning for this request.

Based on the results of previous site investigations, two areas of potential concern were identified. The first area is located on the northern portion of the property and contains elevated concentrations of total petroleum hydrocarbons (TPH). During a follow-up site investigation, three surface soil samples were collected at this area for horizontal delineation of soil contamination. Based on the analytical results of these samples, the area with elevated concentrations of TPH is limited to a small area of the property where the original sample was collected.

The second area contains elevated concentrations of lead that were detected in soil and shallow groundwater samples. The concentrations of lead in groundwater samples are believed to be due to the collection of turbid samples that contained colloidal material. Low-flow purging and groundwater sampling will be performed to assess whether lead is actually present in groundwater. The first saturated zone in the Houston area is typically encountered at depths of 10 to 20 feet below ground surface and usually produces small volumes of water. Therefore, groundwater from the shallow saturated zone is typically not used as a source of potable water in the Houston area. Based on the limited area of TPH contaminated soils and the properties of

the shallow saturated zone, we are proposing to reduce the walking receptor survey distance from 0.25 miles to 500 feet.

In addition to a reduction in the receptor survey radius, we are requesting an extension of the deadline until May 21, 1999. If there are any questions, please contact Mr. Wendall Honeycutt, P.G., Senior Project Geologist at (281)474-7455 or Mr. Barry Daniels, P.E., of Malcolm Pirnie, Inc. at (713)960-7408.

Sincerely,

Roxie L. Voran

Roxie L. Voran, P.G.
Senior Project Manager

RLV/WBH/msm

cc: Barry Daniels, Malcolm Pirnie, Inc.
Leah Flanagan, City of Houston

I:\CCI Documents\Jobs\Malcolm Pirnie-COH\98S-128 Additional Site Investigation\Phase II Correspondence\TNRCC Ltr 0.25 mile Radius Search.doc

RECEIVED
APR 07 1999
BY: MM

Environmental Data Resources, Inc.
an edr company

The EDR-Water Well Review

Heights Service Center
3602 Center Street
Houston, TX 77007

April 6, 1999

Inquiry Number: 354048-1

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06490

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802

Environmental Data Resources, Inc.
Water Well Review Report

EDR reviewed available records made public by the state of Texas at the Texas Water Development Board (TWDB) and the Texas Natural Resource Conservation Commission (TNRCC) and obtained information identifying the approximate location of public and private water wells within the requested Area of Review (AOR). EDR researched the located and plotted water wells identified on county highway maps or USGS 7.5 minute topographic maps at the TWDB. EDR transferred the approximate water well locations onto a map for the client's review.

EDR cannot guarantee the accuracy of the information provided by state agencies. This review is intended to provide the user with a "working approximation" of reported well locations. The following are guidelines used to review available driller logs for water wells associated with client site information within the AOR.

- Identify Located Wells within the AOR according to the TWDB files.
- Identify Plotted Wells within the AOR according to the TWDB files.
- Identify Partially Numbered Wells within the AOR according to the TNRCC files containing records submitted by the well driller.
- Identify Unnumbered Wells within the AOR according to the TNRCC files containing records submitted by the well driller.

Description of Terms

Area of Review-(AOR):
Standard area of review is a 1/2 mile circumference around client specified target property.

Located Water Well:
Well locations that have been field checked by a TWDB or USGS staff member, spotted on a USGS 7.5' Topographical or county highway map, assigned a unique identification number, and filed at the TWDB.

Plotted Water Well:
Approximate well locations spotted on county highway maps by the TWDB staff members according to information submitted on the driller's log. The accuracy of the location for these wells is dependent on the driller. The state assigned unique identification numbers to these wells, but in high-density areas, a single identification number may represent multiple well locations. The TWDB eliminated this plotting activity in June 1986.

Partially Numbered Water Well:
Water well locations established to within a 2.5 minute topographic quadrangle and identified by the TNRCC according to maps submitted with the driller's log. Each water well was assigned a State ID number by the TNRCC. **Note:** This method for recording water well locations was procedure from 1986 to 1991.

Unnumbered Water Well:
Well locations identified on the driller's logs and corresponding driller's maps maintained by the TNRCC records. **Note:** The TNRCC implemented this procedure in 1991.

Please call EDR Nationwide Customer Service at
1-800-352-0050 (8am-8pm ET)
with questions or comments about your report.
Thank you for your business!

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Environmental Data Resources, Inc.
Water Well Review

Site Name: Heights Service Center **Inquiry #:354048-1**

Address: 3602 Center Street

City: Houston **State: TX** **Zip: 77007**

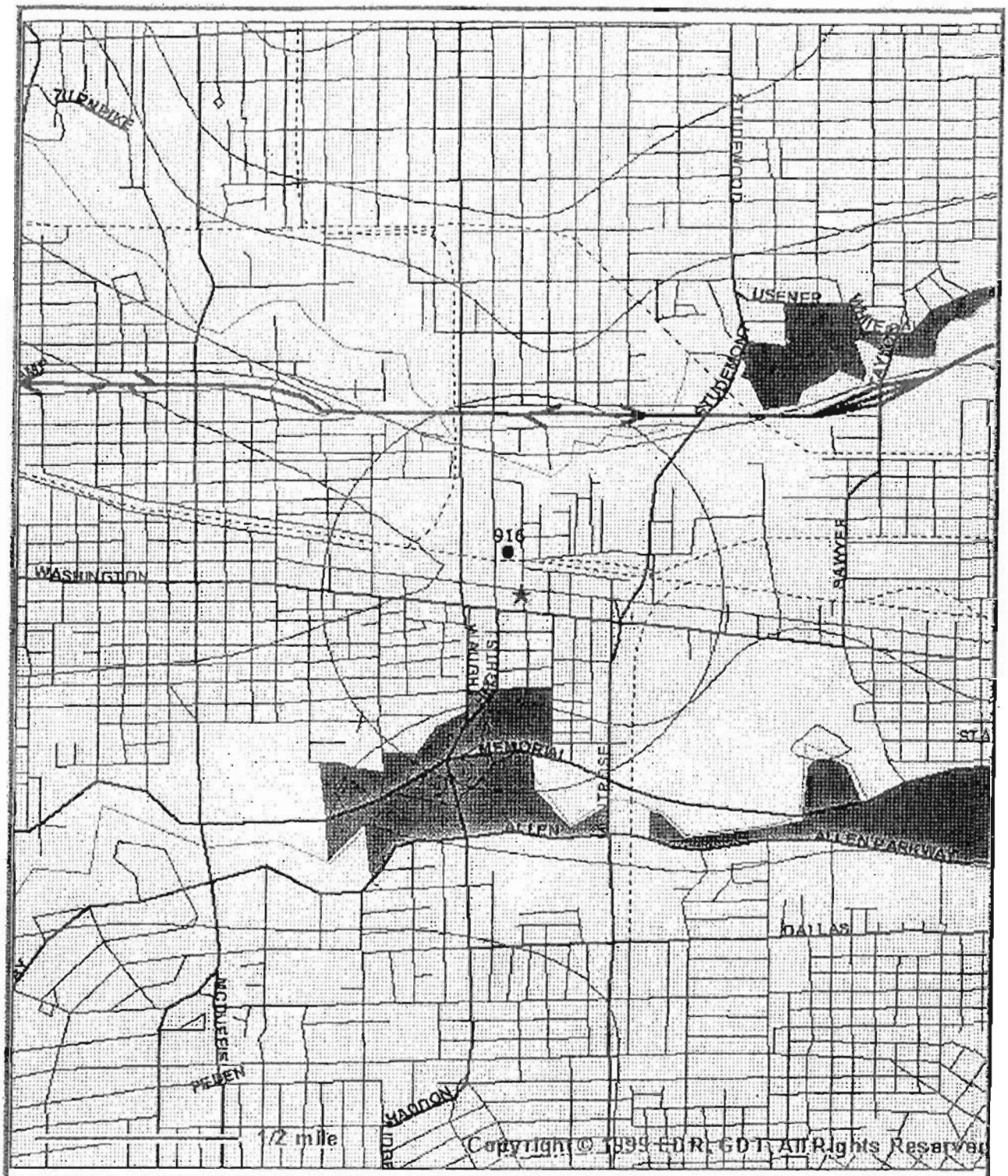
WELL CLASSIFICATION	NUMBER IDENTIFIED WITHIN AOR
LOCATED	1
PLOTTED	0
PARTIALLY NUMBERED	0
UNNUMBERED	0
TOTAL NUMBER IDENTIFIED	1

Located Water Wells:
65-13-916

Plotted Water Wells:
None Found

Partially Numbered Water Wells:
None Found

Unnumbered Water Wells:
None Found



APPROXIMATE LOCATIONS ONLY

WATER WELL LOCATION MAP
WELLS WITHIN A 1/2 MILE RADIUS
HEIGHTS SERVICE CENTER
3602 CENTER STREET
HOUSTON, TX 77007
HARRIS COUNTY
USGS 7.5 MINUTE QUADRANGLE
Houston Heights TX

ENVIRONMENTAL DATA RESOURCES
1000 WEST AVE, SUITE A
AUSTIN, TEXAS 78701
800-352-0050
FAX: 800-231-6802

WRD Exp. (GW)
April 1966

Well No LJ-65-13-916

WELL SCHEDULE

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

MASTER CARD

Record by P.B. Livingston 1931 (Gene McAdoo) Source of data File Date 1-19-68 Map Houston Heights 1955 1:24000

State Texas [48] County (or town) Harris [LJ]

Latitude: [29 46 17 N] Longitude: [095 23 47] Sequential number: [1]

Lat-long accuracy: [1] T. ____ S, R ____ W, Sec ____, ____, ____, ____

Local well number: LJ-65-13-916 Other number: 604 in B & M 889-C

Local use: ____ Owner or name: Harlock Ice Co.

Owner or name: HARLOCK ICE CO Address: Houston, Texas.

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist [N]

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Ind, (P) P S, (R) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (Z) Other [U]

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (O) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed [U] Z 1968

DATA AVAILABLE: Well data [9] Freq. W/L meas.: Quarterly 1931-1968 [Q] Field aquifer char. [ ]

Hyd. lab. data: [ ]

Qual. water data; type: [ ]

Freq. sampling: None [ ] Pumpage inventory: yes / no, period: [ ]

Aperture cards: [ ]

Log data: [ ]

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 340 ft [340] Meas. (rep) Driller accuracy [6]

Depth cased: (first perf.) ? ft [ ] Casing type: S ; Diam. 8 in [5]

Finish: (C) porous concrete, (F) gravel w. (perf.), (C) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., screen, sd. pt., (S) shored, (T) open hole, (B) other [ ]

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (B) other [H]

Date Drilled: 1925 [25] Pump intake setting: ____ ft [ ]

Driller: J.A. Walling (name), ____ (address)

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple (cent.), (M) multiple (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (O) other [N] Deep / Shallow [ ]

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; nat / LP H.P. ____ [ ] Trans. or meter no. ____

Descrip. MP ____ +1.7 ft above/below LSD, Alt. MP ____

Alt. LSD: 60 [60] Accuracy: (source) Topo 5' [3]

Water Level 71.34 ft above/below MP; Ft above/below LSD [70] Accuracy: meas [A]

Date meas: 1-23-31 [1 3 1] Yield: ____ gpm [ ] Method determined [ ]

Drawdown: ____ ft [ ] Accuracy: ____ [ ] Pumping period ____ hrs [ ]

QUALITY OF WATER DATA: Iron ____ ppm [ ] Sulfate ____ ppm [ ] Chloride ____ ppm [ ] Hard. ____ ppm [ ]

Sp. Conduct ____ K x 10^6 [ ] Temp. ____ °F [ ] Date sampled [ ]

Taste, color, etc. ____

Well No. LJ-65-13-916

Well No. LJ-65-[illegible]-916

Latitude-longitude 29 d 46 m 17 s 095 d 23 m 47.1 s

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD (1–19) Physiographic Province: Coastal Plain (20–21) Section: West

G C P (22) Drainage Basin: (23–25) Subbasin: (26)

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (O) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat (27)

MAJOR AQUIFER: system, series (28–29) Q aquifer, formation, group (30–31) C

Lithology: (32–33) Origin: (34) Aquifer Thickness: ft

(35–37) Length of well open to: ft (38–40) Depth to top of: ft (41–43)

MINOR AQUIFER: system, series (44–45) aquifer, formation, group (46–47)

Lithology: (48–49) Origin: (50) Aquifer Thickness: ft

(51–53) Length of well open to: ft (54–56) Depth to top of: ft (57–59)

Intervals Screened:

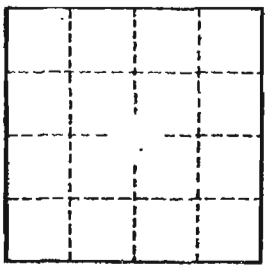
Depth to consolidated rock: ft (60–63) Source of data: (64)

Depth to basement: ft (65–68) Source of data: (69)

Surficial material: (70–71) Infiltration characteristics: (72)

Coefficient Trans: gpd/ft (73–75) Coefficient Storage: (76–78)

Coefficient Perm: gpd/ft^2; Spec cap: gpm/ft; Number of geologic cards: (79)



Well No. LJ-65-13-916

GPO 857-700

FOLLOWING ARE WATER WELL LOGS FOUND WITHIN THE PLOTTED OR UNNUMBERED WELL FILES. THE LOGS ARE FOR YOUR REVIEW AND ARE NOT INCLUDED IN THE REPORT OR LOCATION MAP. THESE LOGS HAVE INCOMPLETE LOCATION INFORMATION TO ACCURATELY LOCATE THEM WITHIN YOUR AREA OF REVIEW.

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

1) OWNER BRN GARVER (Name) ADDRESS 5402 Lawndale Hstn TX 77023 (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: Studemont
County HARRIS ____ miles in ____ (NE, SW, etc.) direction from ____ (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ **LEGAL DESCRIPTION:**

Section No. ____ Block No. ____ Township ____ Abstract No. ____ Survey Name ____

Distance and direction from two intersecting section or survey lines ____

☑ **SEE ATTACHED MAP**

3) TYPE OF WORK (Check):
☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☐ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☑ De-Watering

5) DRILLING METHOD (Check): ☐ Driven
☑ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ____

6) WELL LOG:

Date Drilling: Started 6/24 19 92 Completed 6/29 19 92

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
12 3/4	Surface	60

7) BOREHOLE COMPLETION:
☐ Open Hole ☑ Straight Wall ☐ Underreamed
☐ Gravel Packed ☐ Other ____
If Gravel Packed give interval . . . from ____ ft. to ____ ft.

From (ft.)	To (ft.)	Description and color of formation material
0	22	Top Soil + Clay
22	25	Sand
25	36	Clay
36	55	Sand
55	70	Clay

3 WELLS TOTAL

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
8	N	PVC	0	35	
8	N	PVC	35	55	.025

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 0 ft. to 15 ft. No. of Sacks Used 8
____ ft. to ____ ft. No. of Sacks Used ____
Method used Trimme
Cemented by Bussell & Son Inc.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:
Static level 20 ft. below land surface Date 6/29/92
Artesian flow ____ gpm. Date ____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☑ Submersible ☐ Cylinder
☐ Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS:
Type Test: ☐ Pump ☐ Bailer ☑ Jetted ☐ Estimated
Yield: 100 gpm with ____ ft. drawdown after ____ hrs.

RECEIVED JUL 28 1992 TEXAS WATER WELL DRILLERS BOARD

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☑ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☑ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME Bussell & Son Inc (Type or print) WELL DRILLER'S LICENSE NO. 2035

ADDRESS P O Box 874 (Street or RFD) Tomball (City) TX (State) 77377-0874 (Zip)

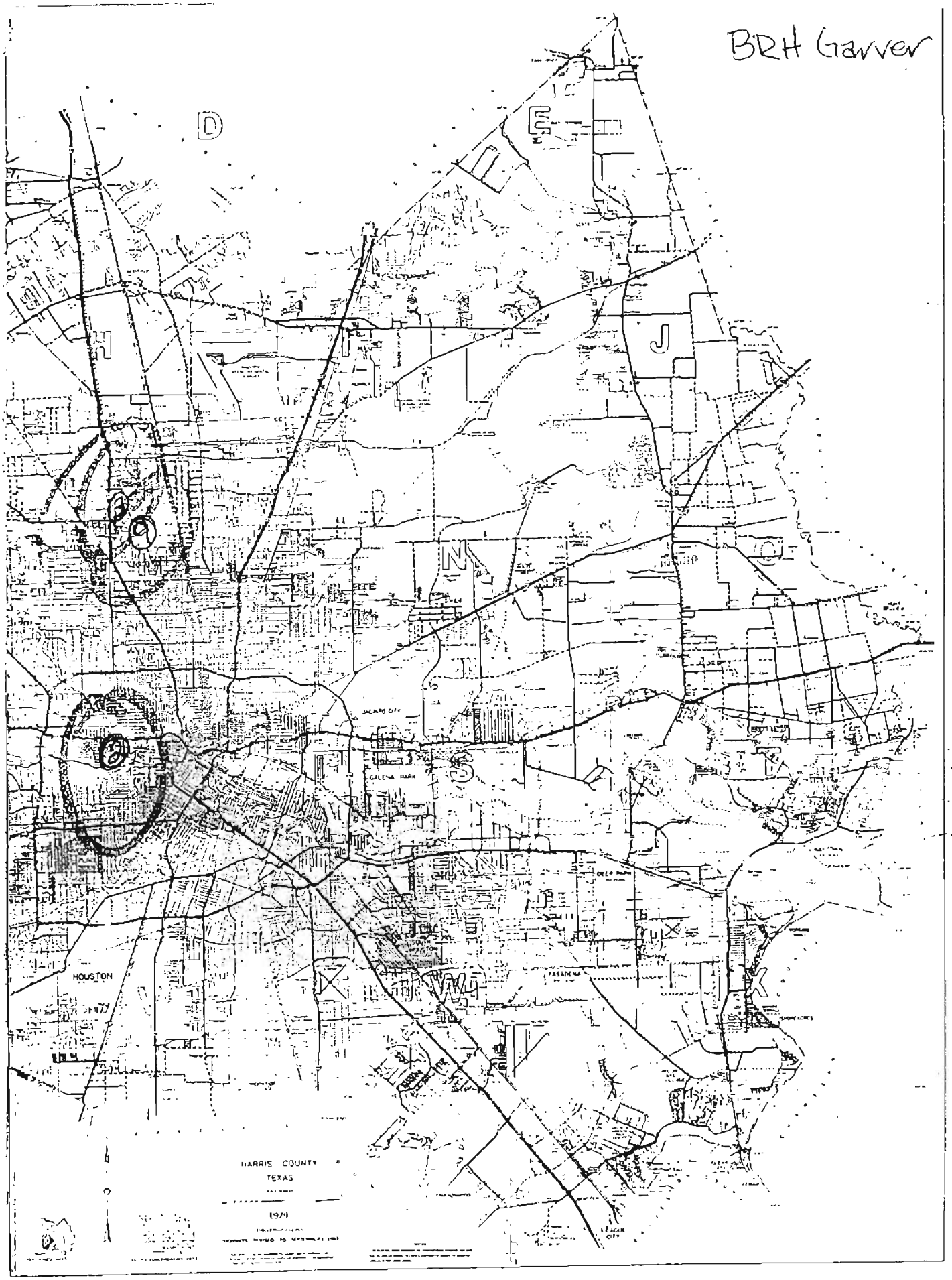
Signed ____ (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. 2 Located on map 6513-4

WD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY


BRH Garver
HOUSTON
HARRIS COUNTY
TEXAS
1979

copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

...NTION OWNER: *Confidentiality ...llege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-371-6299

OWNER BRH GARVER (Name) ADDRESS 5402 LAWNDALE (Street or RFD) HOUSTON (City) TX (State) (Zip)

ADDRESS OF WELL: County HARRIS WASHINGTON AVE & FOWLER RD. (Street or RFD) HOUSTON (City) (State) (Zip) STATE WELL # 65-13-9

3) TYPE OF WORK (Check): ☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Monitor ☐ Environmental Soil Boring ☐ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☑ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5) X N

6) WELL LOG:
Date Drilling: Started 4-7 19 95 Completed 4-7 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
15 1/4	Surface	50

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☑ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Other

From (ft.)	To (ft.)	Description and color of formation material
0	17	TOP SOIL & CLAY
17	23	SAND & CLAY STREAKS
23	50	CLAY

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☑ Gravel Packed ☐ Other
If Gravel Packed give interval ... from 15 ft. to 50 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
10	N	PVC	0	35	
10	N	PVC SCREENS	35	50	.020

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 0 ft. to 15 ft. No. of sacks used 8
ft. to ft. No. of sacks used
Method used TRIMME,
Cemented by BUSSELL & SON INC.
Distance to septic system field lines ft.
Method of verification of above distance

JUN 26 199

13) TYPE PUMP:
☐ Turbine ☐ Jet ☑ Submersible ☐ Cylinder ☐ Other
Depth to pump bowls, cylinder, jet, etc., ft.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☑ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☐ Approved Alternative Procedure Used [Rule 338.71]

14) WELL TESTS:
Type test: ☐ Pump ☐ Bailer ☑ Jetted ☑ Estimated
Yield: gpm with ft. drawdown after hrs.

11) WATER LEVEL:
Static level ft. below land surface Date 4-7-95
Artesian flow gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☑ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? ☐ Yes ☑ No

12) PACKERS: Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME BUSSELL & SON INC. (Type or print) WELL DRILLER'S LICENSE NO. 2035

ADDRESS P O Box 874 (Street or RFD) Tomball (City) TX (State) 77377-0874 (Zip)

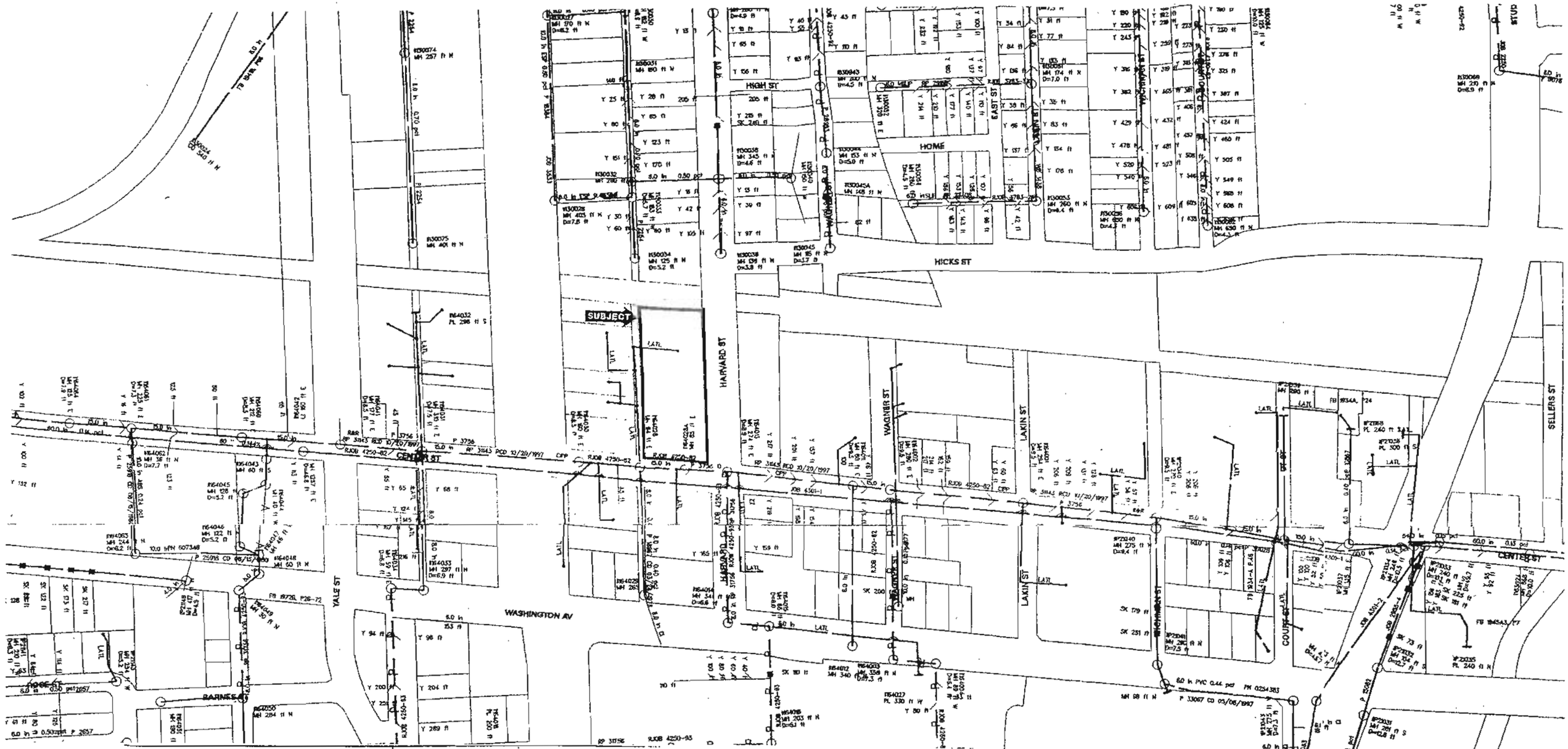
(Signed) (Licensed Well Driller)

(Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 09-01-93)

TNRCC COPY



WASTE WATER LINES		WASTE WATER SYMBOLS			
EXISTING		AIR RELEASE MANHOLE (FM OR SLDG)		MANHOLE	
PROPOSED	P	AIR VALVE (FM OR SLDG)		PLUG WITH DISTANCE	
ABANDONED	A	CLEANOUT WITH DISTANCE		REDUCER (FM OR SLDG)	
CASING		CROSSOVER		STACK WITH DISTANCE	
REHABILITATED		PERMANENT FLOW METER		STUB WITH DISTANCE	
PROPOSED SIGHAR		WW INTERCONNECT		TEE WITH DISTANCE	
		LIFT STATION OR PUMP STATION		TEST STATION (CATHODIC PROTECTION)	
		TREATMENT PLANT			
		ENDOMIAL FITTING			
		VACUUM VALVE (FM OR SLDG)			
		VALVE (FM OR SLDG)			
		VALVE IN MANHOLE (FM OR SLDG)			
		WYE WITH DISTANCE			

5357C

CITY OF HOUSTON

Department of Public Works & Engineering

Public Utilities Group - Planning and Operations Support Division

Graphic and Engineering Management Branch

For changes or modifications to this map, please see your supervisor or contact GEMB at (713)521-0960.

Scale: 1" = 200'

5357A

CITY OF HOUSTON

Department of Public Works & Engineering

Public Utilities Group - Planning and Operations Support Division

Graphic and Engineering Management Branch

THIS MAP REPRESENTS THE BEST INFORMATION AVAILABLE TO THE CITY. THE CITY DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS. [illegible]

For changes or modifications to this map, please see your supervisor or contact GEMB at 713/526-9960.

Scale: 1" = 200'

WATER LINES		WATER SYMBOLS					
EXISTING		AIR VALVE (ALL)		MANHOLE		UNMETERED SPRINKLER	
PROPOSED	P	BLOW-OFF VALVE		METER		UNUSUAL FITTING	S
ABANDONED	A	BUTTERFLY VALVE		PLUG		VALVE	
CASING		CROSSOVER		PRESSURE REDUCTION STATION	PR	VALVE IN MANHOLE	
		ELEVATED STORAGE TANK	ES	REDUCER		WATER PUMP STATION	WP
		FIRE HYDRANT		TAPPING SLEEVE & VALVE		WATER WELL	WELL

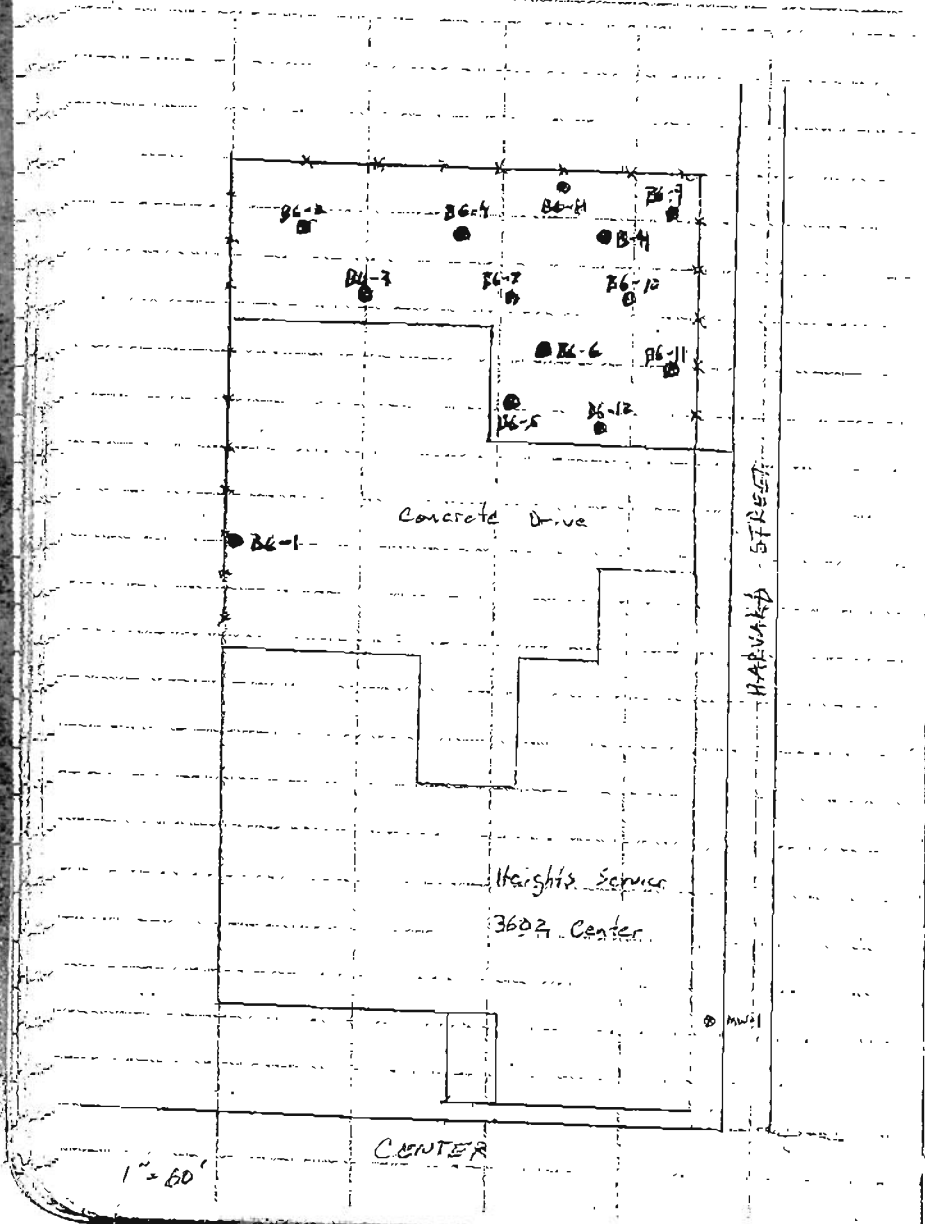
APPENDIX E

Field Notes

6 Location 3602 Center, Houston Date 4/13/95

Project / Client Malcolm Pirnie / City of Houston

985-128



Location _____ Date _____ 65

Project / Client _____

Client: Malcolm Pirnie / City of Houston

Site: Heights Service Center

Address: 3602 Center, Houston Texas

Contractor: HNJ & Associates

Driller: Pat Stevens

Scope of work: Install temporary well at MW-1 location, collect background samples, collect contamination samples at BG area. Conduct micropurge and sample groundwater

Location _____ Date _____

Project / Client _____

MW-1 lithology

0 — Asphalt
2 — Fill
CH
Clay
CL
16
MH Clayey Silt
18.75
CL Clay
20
SM Sand - moist
22
CL Clay
23.5
SM/SP Sand - saturated
24.5
CL Clay
30

Well Installation

1
3 sac
med chips
9
13
11 sac
20/40 silica
15 ft
0.01 screen
28

11:30 Decon Equipment

Location _____ Date _____

Project / Client _____

12:45 Set-Up for Background Sampling

B6-1	0-0.25	Caliche
	0.25-2	Dirt/Fill
B6-2	0-1.75	Shell
	1.75-2	Dirt
B6-3	0-1	Caliche
	1-3	Black Silty Clay - no odor
B6-4	0-0.5	Shell
	0.5-2	Black Silty Clay - fill
B6-5	0-1	Caliche
	1-2	Black Silty Clay - fill
B6-6	0-0.5	Caliche
	0.5-2	Black Silty Clay - some asphalt
B6-7	0-1	Shell
	1-2	Sand / Clay / Gravel

Location _____ Date _____

Project / Client _____

B6-8	0-1	Shell Caliche	
	1-2	Sand	
B6-9	0-1	Gravel	
	1-2	Black Silty Clay	
B6-10	0-1	Gravel	
	1-2	Black Silty Clay	
B6-11	0-1	Shell	
	1-2	Black Silty Clay	
B6-12	0-1	Shell	
	1-2	Black Silty Clay	

Boring B-4 Area Lithology

0-1	Shell / Caliche	
1-5.25	Clay	dark brown we odor
5.25	Wood peices @ 3-4" diameter	
5.25-9	Clay	Grey/Green
9-10.25	Clay	Grey mottled Green/orange
10.25-12	Silty clay	Green mottled orange

Location _____

Project / Client _____

Samples collected

MW-1A	4/12/99	10:21	16-18	Total Cr, SPLP Cr
B6-1A	4/13/99	13:10	0-0.5	Total Pb
B6-1B	4/13/99	13:15	1-1.5	Total Pb
B6-2A	4/13/99	13:26	0-0.5	Total Pb
B6-2B	4/13/99	13:31	1.5-2	Total Pb
B6-3A	4/13/99	13:38	0-0.5	Total Pb
B6-3B	4/13/99	13:41	1-1.5	Total Pb
B6-4A	4/13/99	13:48	0-0.5	Total Pb
B6-4B	4/13/99	13:51	1-1.5	Total Pb
B6-5A	4/13/99	13:57	0-0.5	Total Pb
B6-5B	4/13/99	13:56	1-1.5	Total Pb
B6-6A	4/13/99	14:02	0-0.5	Total Pb
B6-6B	4/13/99	14:04	1-1.5	Total Pb
B6-7A	4/13/99	14:10	0-0.5	Total Pb
B6-7B	4/13/99	14:12	1-1.5	Total Pb
B6-8A	4/13/99	14:16	0-0.5	Total Pb
B6-8B	4/13/99	14:18	1-1.5	Total Pb
B6-9A	4/13/99	14:22	0-0.5	Total Pb
B6-9B	4/13/99	14:24	1-1.5	Total Pb
B6-10A	4/13/99	14:30	0-0.5	Total Pb
B6-10B	4/13/99	14:32	1-1.5	Total Pb

Location _____ Date _____

Project / Client _____

Samples Collected

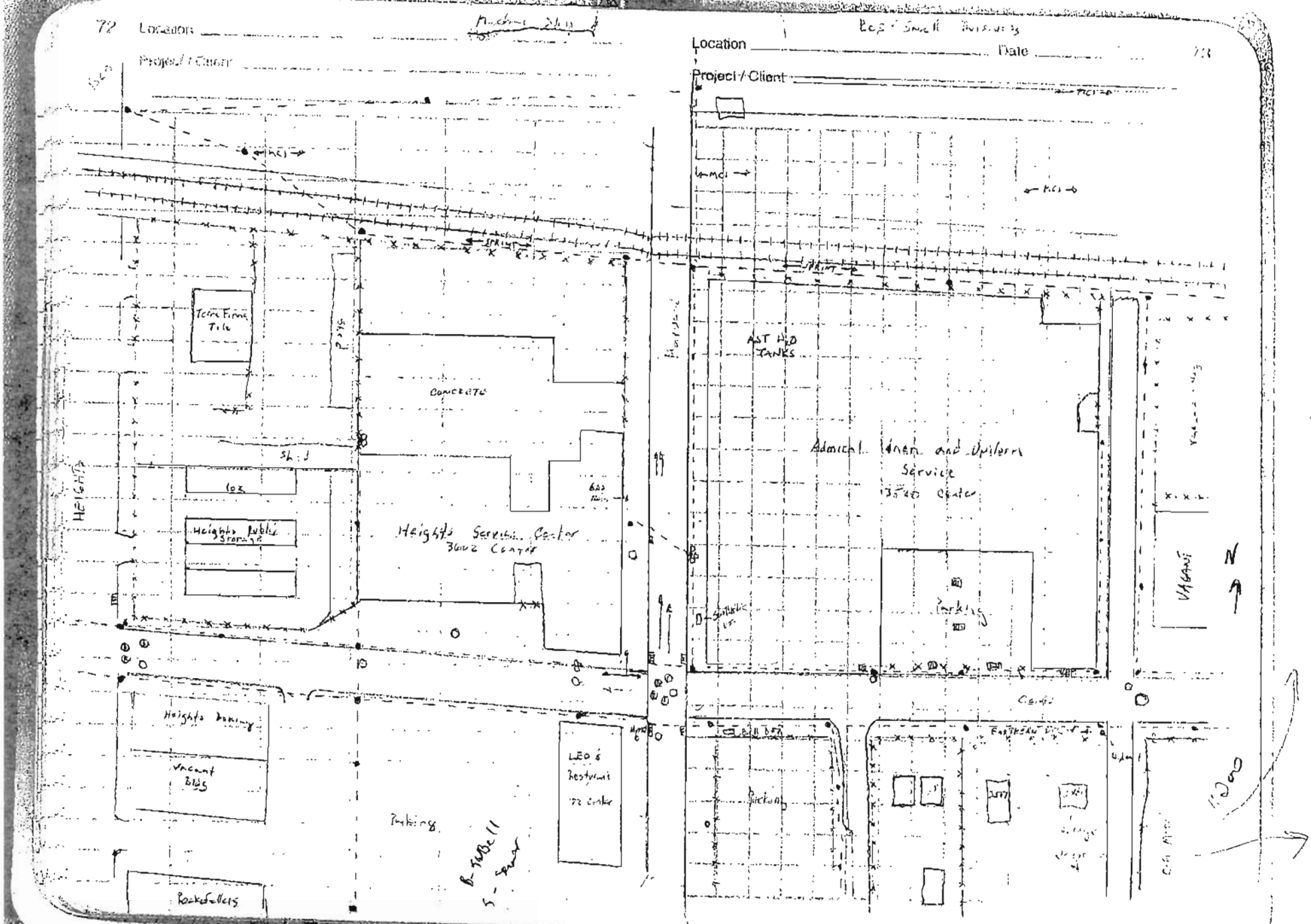
B6-11A	4/13/99	14:35	0-0.5	Total Pb
B6-11B	4/13/99	14:37	1-1.5	Total Pb
B6-12A	4/13/99	14:41	0-0.5	Total Pb
B6-12B	4/13/99	14:43	1-1.5	Total Pb
B4-A	4/13/99	14:56	0-2	TPH, SPLP 418.1
B4-B	4/13/99	15:07	6-8	TPH, SPLP 418.1
WS-1	4/13/99	15:40	—	BTEX, TPH, Total Pb

clean up site
place temporary flush mount cover on well
lock gate

Location 3600 Center, Houston Date 4/14/99

Project / Client Hakeem Pirie / City of Houston
Heights Service Center 925-128

Scope: ① Micro-Purge Temporary well MW-1
Sample for total lead
② Conduct receptor survey


72
Location
Project / Client
Location
Date
Project / Client
Terra Firma Tile
Concrete
Shed
Heights Public Storage
Heights Service Center
3602 Center
Heights Parking
Vacant Bldg
Parking
LEO's Restaurant
72 Center
Rockefellers
AST H2O TANKS
Admiral Linen and Uniform Service
3540 Center
Parking
Parking
Vagani
N

Temporary

Monitoring Well Yield Evaluation

Malcolm Pirnie/City of Houston
Heights Service Center
5602 Center, Houston Texas

Well No. [illegible]		Yield	[illegible]	
[illegible]	Water Level (ft BTOC)		Water Level (ft BTOC)	Comments
Static - Setup				
Static Before Test	24.97			
Time of Start:				
Time				
Recovery 0:00 3:55	27.31			Removed pump
0:10	27.30			
0:20	27.29			
0:30	27.29			
0:40	27.25			
0:50	27.23			
1:00	27.20			
1:20	27.17			
1:40	27.14			
2:00	27.12			
2:30	27.09			
3:00	27.06			
3:30	27.04			
4:00	27.02			
5:00	26.995			
~~10:00~~ 6:00	26.965			
~~15:00~~ 7:00	26.94			
~~20:00~~ 8:00	26.975			
~~25:00~~ 9:00	26.90			
~~30:00~~ 10:00	26.89			
~~40:00~~ 12:00	26.84			
~~50:00~~ 14:00	26.81			
~~60:00~~ 16:00	26.785			
~~1:15:00~~ 18:00	26.75			
~~1:30:00~~ 20:00	26.72			
~~1:45:00~~ 25:00	26.655			
~~2:00:00~~ 30:00	26.59			
35:00	26.52			
40:00	26.46			
45:00	26.39			
50:00	26.34			
55:00	26.29			
60:00	26.23			

Calibrate as follows: 150 gallons / day X day / 1440 min X 3.785411784 L / gallons X mL / 10^{-3} L = 394.31 mL / Min

Monitoring Well Yield Evaluation

Well No: MW116-4		Yield	MW116-6	
	Water Level, ft BTOC		Water Level, ft BTOC	Comments
Static - Setup				
Static Before Test				
Time of Start:				
Time				
0:00	70:00	26.13		
0:10	80:00	26.09		
0:20	90:00	25.96		
0:30	100:00	25.90		
0:40	110:00	25.83		
0:50	120:00	25.76		
1:00				
1:20				
1:40				
2:00				
2:30				
3:00				
3:30				
4:00				
5:00				
6:00				
7:00				
8:00				
9:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
20:00				
25:00				
30:00				
40:00				
50:00				
60:00				
1:15:00				
1:30:00				
1:45:00				
2:00:00				

Monitoring Well # MW-1
Well Development - Well MicroPurge Log

Bottom - 27.37'

Client: Malcolm Pirnie / Cott
Project: Heights Svc Center
Location: 3602 Center St., Houston

Date: April 15, 1999
Field Personnel: W. Honeycutt, T. Heverly
Weather: Clear, 70s

Time (Minutes)	Elapsed Time (Minutes)	Temp (deg. F)	Sp. Cond (+/- 3%) (m-hos)	TDS (+/- 3%) (ppm)	D.O. (+/- 10%) (mg/L)	PH (+/- 0.1) (S.U.)	ORP (+/- 10mV) (mV)	Turburity (< 10NTU) (+/- 10%) (NTU)	Depth to Water (ft BTOC)	Comments
5	No	Flow -	Filling hose						25.00	Static Water Level - 24.90'
10	"	"	" "						25.01	Adjusted pump rate
15	"	"	" "						25.09	
20	"	"	" "						25.09	
25	"	"	" "						25.11	Adjusted pump rate.
30	"	"	" "						25.15	
35	"	"	" "						25.18	
40	"	"	" "						25.22	
45	"	"	" "						25.28	Adjusted pump rate
50	"	"	" "						25.30	
55	"	"	" "						25.38	Adjusted pump rate
1:00	"	"	" "						25.32	
1:05	"	"	" "						25.28	
1:10	"	"	" "						25.25	
1:15	"	"	" "						25.22	
1:20	"	"	" "						25.20	
1:25	"	"	" "						25.25	
1:30	"	"	" "						25.29	
1:35	"	"	" "						25.36	
1:40										Flow @ 1:37, Flow rate - 50 ml
1:45		76.84	1045	677	9.57	7.21	266.9	9.70	25.58	
1:50										
1:55										
2:00	No flow, allowing water levels to recover									

Monitoring Well # mw-1
Well Development - Well MicroPurge Log

Client: Malcolm Pirnie / Conl
Project: Heights Sue Center
Location: 3602 Center St, Houston

Date: April 15, 1999
Field Personnel: W. Hemphill, T. Heverly
Weather: Clear, 70s

Time (Minutes)	Elapsed Time (Minutes)	Temp (deg. F)	Sp. Cond (+/- 3%) (m-hos)	TDS (+/- 3%) (ppm)	D.O. (+/- 10%) (mg/L)	PH (+/- 0.1) (S.U.)	ORP (+/- 10mV) (mV)	Turburity (< 10NTU) (+/- 10%) (NTU)	Depth to Water (ft BTOC)	Comments
5		Water	Flowing							
10										
~~15~~ 2:15		78.54	1047	688	9.62	7.21	266.5	7.0	25.43	
20										
25										
~~30~~ 2:30		78.54	1047	681	9.41	7.16	268.2	7.4	26.59	Flow rate - 500 ml/min
35										
40										
~~45~~ 2:45		79.49	1047	681	9.41	7.12	269.1	4.9	25.67	Adjusted flow rate
50										Flow rate - <10 ml/min
55										
~~1:00~~ 3:00		79.49	1051	683	9.91	7.13	273.1	4.1	25.56	
1:05										
1:10										
~~1:15~~ 3:15		78.76	1050	693	9.83	7.13	272.3	2.5	25.49	
1:20										
1:25										
~~1:30~~ 3:30		80.2	1085	685	9.59	7.12	279.6	10.1	25.94	
1:35										
1:40										
~~1:45~~ 3:45		no flow								
1:50										
1:55										
~~2:00~~ 4:00										

Monitoring Well # mw-1
Well Development - Well MicroPurge Log

Client: Malcolm Pirnie / Lotl
Project: Heights Sue Ctr
Location: 3602 Center St., Houston

Date: April 15, 1999
Field Personnel: W. Honeycutt, T. Heverly
Weather: Clear, 70s

Time (Minutes)	Elapsed Time (Minutes)	Temp (deg. F)	Sp. Cond (+/- 3%) (m-hos)	TDS (+/- 3%) (ppm)	D.O. (+/- 10%) (mg/L)	PH (+/- 0.1) (S.U.)	ORP (+/- 10mV) (mV)	Turburity (< 10NTU) (+/- 10%) (NTU)	Depth to Water (ft BTOC)	Comments
5										
10										
~~15~~ 4:15		75.65	1053	685	9.90	7.09	285.9	4.7	25.63	Flow rate - 50ml/min
20										
25										
~~30~~ 4:30		No flow								
35										
40										
~~45~~ 4:45		75.81	1044	679	9.69	7.07	284.7	3.9	25.78	
~~50~~ 4:50		75.78	1042	677	9.47	7.05	286.6	4.0	25.95	
~~55~~ 4:55		75.61	1042	678	9.95	7.05	286.7	3.0	25.79	
~~1:00~~ 5:00		75.02	1044	679	9.45	7.04	288.2	1.3	25.77	
~~1:05~~ 5:05		74.02	1045	679	9.79	7.04	287.5	1.2	25.74	
~~1:10~~ 5:10		73.47	1043	677	9.59	7.04	286.3	1.0	25.74	
1:15										
1:20										
~~1:25~~ 5:25		74.03	1036	673	9.89	7.04	276.6	2.7	26.07	Flow rate <50ml/min
~~1:30~~ 5:30		73.93	1036	673	9.68	7.03	275.6	2.1	26.05	
~~1:35~~ 5:35		73.86	1034	672	9.63	7.03	276.8	1.8	26.11	
1:40										Sampled well
1:45										
1:50	Total	Volume	Purged -	2.6 gals.						
1:55										
2:00										

6 Location _____ Date _____

Project / Client COH - Heights Service Ctr.

Scope: Plug & Abandon temporary well.

Weather: sunny, highs in upper 80s.

CCI crew: M. Goelz

HVJ crew: Pat Stevens (driller)

Location Heights, TX Date 4-27-99 7

Project / Client City of Houston - Harvard + Center Street

1520 arrived on site & met HVJ drilling crew. set up over temp. well & prepared to remove casing
successfully removed casing & screen from hole.
plugged hole with 2 sacks of concrete mix (4000 PSI grade).
completed surface with concrete mix
1600 departed site.

Location MP/COH Date 7/30/99

Project / Client 985-128

Scope: Collect four shallow soil samples for lead analysis.

Weather: mostly sunny, mid 80s

CCI personnel: MBG

Bandy personnel: Allen Hawkins, Richard Brady, Roscoe Markley

COH - Joh Bess, Public Works
713-641-9933
mobile 713-824-8419

Sample ID	Depth	Time	Analyses Requested
BG-1A	0-0.5	0850	Pb
BG-1B	1-1.5	0900	Pb
BG-14	2-2.5	0915	Pb
BG-15	1-1.5	1940	Pb
BG-13	1-1.5	0930	Pb
WS-073099	—	1045	Pb RCI, TPH (mg)

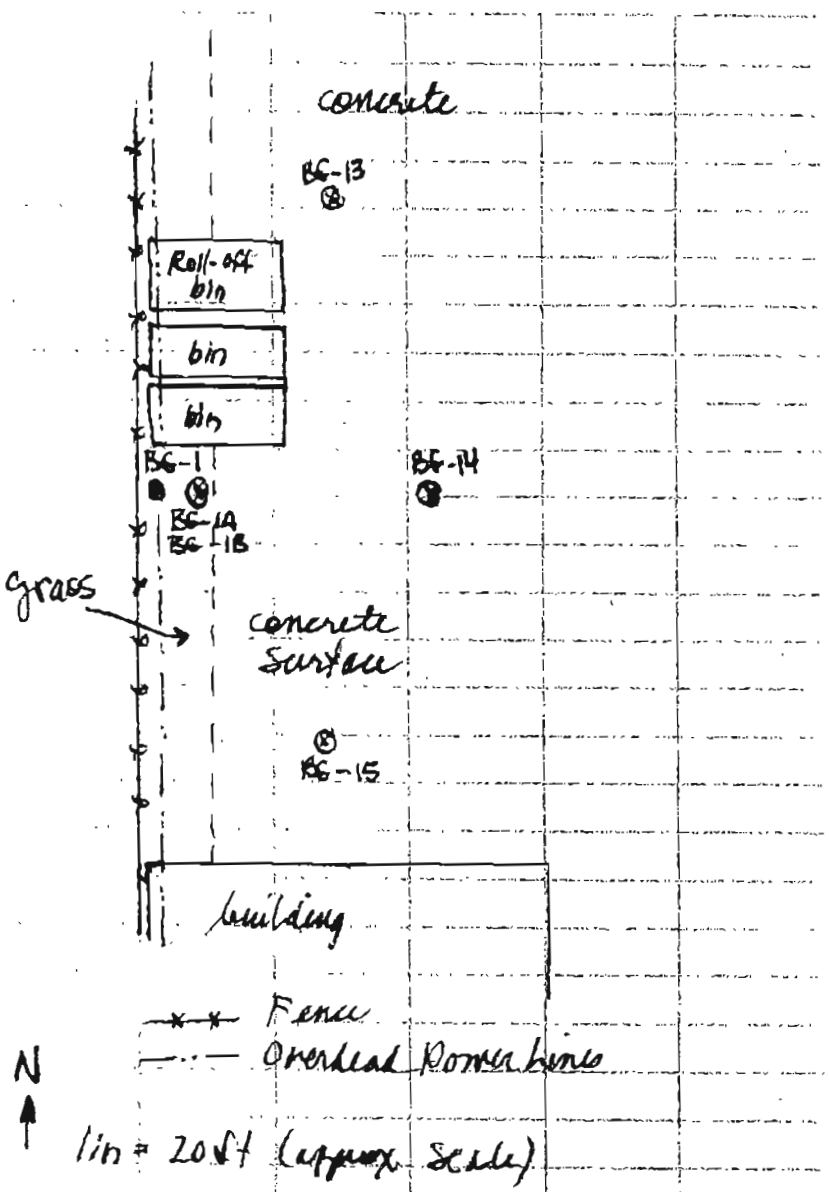
Location Heights Service Center 7/30/99

Project / Client MP/COH - Addl'l Site Asst. (Phase III) Sample for Lead

7:30 arrived on site. gate locked. lock has been replaced with COH lock
call to John Bess, voice mail
8:00 call to Bess - no answer
8:15 call to Bess, voice mail
8:20 Bandy arrived onsite cut lock, didn't bring drums.
8:30 set up at BG-1 decon sampling equip conducted safety mtg
8:45 began sampling BG-1
9:00 began sampling BG-14
9:20 began sampling BG-13
9:35 began sampling BG-15
9:45 decon equip & cleaned/mopped site all boring filled with bentonite with concrete cap.
10:00 Bandy departed site containerized soil cuttings in 55 gallon drum (1/3 full) on site. Now approx. 1/2 full. Stored onsite.
10:05 departed site to purchase new lock.

Location MP/COH Date 7/30/99

Project / Client 985-128



Location Waipio Service Center Date 7/30/99

Project / Client MP/COH - Addt'l Site Asst. (Phase II) Sample for Lead

10:30 arrived back at site, replaced lock & left to deliver sample to Xenco
call to office - Wendell
1040 arrived back on site to collect Waste Char. Sample.
1045 collected sample
1100 Reginald Hicks of COH Solid Waste arrived on site with new lock. gave Hicks key for lock purchased this morning & left same lock in place. (Lock cut this morning belonged to Public Works)
There are 2 1/2 full 55-gallon drums of Soil Cuttings & 1 full (?) drum of development / decon water on site.
11:10 departed site for Xenco
11:45 arrived at Xenco
rec'd call from John Bess - explained situation with lock. Bess will coord. with Hicks to replace the lock.
11:50 relinquished Samples

END OF REPORT

All Input Values Necessary to Obtain a Soil Target Concentration Protective of Groundwater Should be Entered in Column B

Contaminant:

Quick Converter:		
(cm)	(in)	
		0.00
(cm)	(ft)	
		0.00

Net Infiltration Estimate and Soil Moisture Parameters

Input Parameters From Lookup Tables:

Soil Type:	Clay
Average Annual Precipitation (in/yr):	48
Infiltration Scaling Factor (yr/cm):	0.00018
Kvs - Soil Hydraulic Conductivity (cm/sec):	1.00E-07

Infiltration Scaling Factors (yr/cm)	
Sand	0.0018
Silt	0.0009
Clay	0.00018

Net Infiltration Estimate (cm/yr):	2.676
Upperbound Infiltration Rate (cm/yr)	3.150
Lesser of Values Above	2.676

Equilibrium Patitioning

Input Parameters From Lookup Tables or Site Specific Data:

Soil Bulk Density (g/cm3):	1.8
Total Porosity of Soil (cm3/cm3):	0.36
Volumetric H2O Content in Soil (cm3/cm3):	0.34
Volumetric Air Content in Soil (cm3/cm3):	0.02
Thickness of Impacted Soil (ft)	4
Length from top of Impacted Soil to GW (ft):	23
Fraction of Organic Carbon in Soil (g/g)	0.002
Koc - Carbon Partition Coefficient (cm3/g)	0.00E+00
Henry's Law Constant (cm3/cm3)	0.00E+00
Kd - Soil-water Sorption Constant (cm3/g)	1.83E+03

Default Soil Moisture Parameters and Hydraulic Conductivity

	Total	Porosity H2O-Soil	Porosity Air-Soil	Kvs (cm/sec)
SW - Sand, clean, well-graded	0.41	0.08	0.33	1E-02
SP - Sand, clean, poorly-graded	0.41	0.08	0.33	1E-02
SM - Sand, silty	0.41	0.12	0.29	1E-03
SC - Sand, clayey	0.38	0.23	0.15	1E-05
ML - Silt, sandy	0.43	0.26	0.17	1E-05
ML - Silt	0.46	0.3	0.16	1E-05
MH - Silt, clayey	0.36	0.24	0.12	1E-05
CL - Clay, sandy, low plasticity	0.38	0.31	0.07	1E-06
CL - Clay, silty, low plasticity	0.36	0.34	0.02	1E-07
CH - Clay, high plasticity	0.38	0.38	0	1E-08

Soil-water Sorption Coefficient (cm3/g)	
Organic COC	0.00
Inorganic COC	1830.00
Greater of Values Above	1830.00
Bulk water Partitioning Coefficient	3294.34
Soil-leachate factor (Kg/L)	0.00054639

Leachate/Groundwater Dilution Factor

Hydraulic Gradient in Groundwater (ft/ft)	0.01
Width of Impacted Soil in GW Flow Dir. (ft)	100
Saturated Thickness of GW Unit (ft)	3
Hydraulic Conductivity of GW Unit (cm/sec)	1.00E-06

Groundwater Darcy Velocity (cm/yr)	0.32
Groundwater Mixing Zone Thickness (cm)	414.53
Saturated Thickness of GW Unit (cm)	91.44
Lesser of Values Above	91.44
Leachate-groundwater Dilution Factor	1.00

Target Soil Concentration

Risk-based Level in H2O Zone (mg/L)	1.5

Target Soil Concentration (mg/Kg)	15841.132

Appendix F

Waste Disposal Manifests

GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

Se e Agreement on File? [X] YES [ ] NO — Profile Number: WMI

[ ] Hazardous [X] Non-Hazardous [ ] TSCA — Renewal Date: / /

A. Waste Generator Information

1. Generator Name: City of Houston
2. SIC Code:
3. Facility Street Address: 3602 Center St.
4. Phone: (713) 837-0075, Leah Flanagan
5. Facility City: Houston
6. State/Province: Texas
7. Zip/Postal Code: 77007
8. Generator USEPA/Federal ID #: N/A
9. County: Harris
10. State/Province ID #: N/A
11. Customer Name: USA Environmental Services
12. Customer Phone: (281) 464-6889
13. Customer Contact: Matt Gilbert
14. Customer Fax: 281 922-4554
15. Billing Address 100 Genoa Red Bluff Houston, TX 77034 [ ] Same as above

B. Waste Stream Information

1. Description
   a. Name of Waste: Soil Cuttings
   b. Process Generating Waste: Investigation of soil media during a Phase III Environmental Site Assessment of a vehicle maintenance and painting facility.

c. Color	d. Strong odor (describe):	e. Physical state @ 70°F	f. Layers	g. Free liquid range
Tan + Red	None	[X] Solid [ ] Liquid [ ] Gas [ ] Sludge [ ] Other	[X] Single Layer [ ] Multi-layer	to 0 %
				h. pH: Range 6 to 9 %

i. Liquid Flash Point: [ ] <73°F [ ] 73-99°F [ ] 100-139°F [ ] 140-199°F [ ] ≥ 200°F [ ] Not applicable

Chemical Composition (List all constituents (including halogenated organics, debris, and UHC's) present in any concentration and submit representative analysis).

Constituents	Concentration Range	Constituents	Concentration Range
TPH	N.D. to 210 mg/kg	Chromium	N.D. to 13.8 mg/kg
Barium	12.8 to 74.3 mg/kg	Lead	0.91 to 201 mg/kg
Cadmium	N.D. to 2.58 mg/kg	Soil	Remaining Amt.

TOTAL COMPOSITION MUST EQUAL OR EXCEED 100%

k. [ ] Oxidizer [ ] Pyrophoric [ ] Explosive [ ] Radioactive [ ] Carcinogen [ ] Infectious [ ] Shock Sensitive [ ] Water Reactive

l. Does the waste represented by this profile contain any of the carcinogens which require OSHA notification? (list in Section B.1.j) ..... [ ] YES [X] NO

m. Does the waste represented by this profile contain dioxins? (list in Section B.1.j) ..... [ ] YES [X] NO

n. Does the waste represented by this profile contain asbestos? ..... [ ] YES [X] NO
If yes ..... [ ] friable [ ] non-friable

o. Does the waste represented by this profile contain benzene? ..... [ ] YES [X] NO
If yes, concentration _____ ppm
Is the waste subject to the benzene waste operations NESHAP? ..... [ ] YES [X] NO

p. Is the waste subject to RCRA Subpart CC controls? ..... [ ] YES [X] NO
If yes, volatile organic concentration _____ ppmw

q. Does the waste contain any Class I or Class II ozone-depleting substances? ..... [ ] YES [X] NO

r. Does the waste contain debris? (list in Section B.1.j) ..... [ ] YES [X] NO

2. Quantity of Waste
Estimated Annual Volume Three [ ] Tons [ ] Yards [X] Drums [ ] Other (specify) _____

3. Shipping Information
Packaging:
[ ] Bulk Solid; Type/Size. _____ [ ] Bulk Liquid; Type/Size _____
[X] Drum; Type; Size: Steel; 55-gal [ ] Other: _____

b. Shipping Frequency: Units _____ Per: [ ] Month [ ] Quarter [ ] Year [ ] One time [ ] Other _____

c. Is this a U.S. Department of Transportation (USDOT) Hazardous Material? (If no, skip d, e, and f) ..... [ ] YES [ ] NO

GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

d. Reportable Quantity (lbs.; kgs.): _____ e. Hazard Class/ID #: _____
f. USDOT Shipping Name: _____
g. Personal Protective Equipment Requirements: _____
h. Transporter/Transfer Station: _____

C. Generator's Certification (Please check appropriate responses, sign and date below)

1. Is this a USEPA hazardous waste (40 CFR Part 261)? If the answer is no, skip to 2 ☐YES ☒NO
   a. If yes, identify ALL USEPA listed and characteristic waste code numbers (D, F, K, P, U) _____
   b. If a characteristic hazardous waste, do underlying hazardous constituents (UHCs) apply? (if yes, list in Section B.1.j) ☐YES ☐NO
   c. Does this waste contain debris? (if yes, list size and type in Chemical Composition - B.1.) ☐YES ☐NO

2. Is this a state hazardous waste? ☐YES ☒NO
   Identify ALL state hazardous waste codes _____

3. Is the waste from a CERCLA (40 CFR 300, Appendix B) or state mandated clean-up? ☐YES ☒NO
   If yes, attach Record of Decision (ROD), 104/106 or 122 order or court order that governs site clean-up activity. For state mandated clean-up, provide relevant documentation.

4. Does the waste represented by this waste profile sheet contain radioactive material, or is disposal regulated by the Nuclear Regulatory Commission? ☐YES ☒NO

5. Does the waste represented by this waste profile sheet contain concentrations of Polychlorinated Biphenyls (PCBs) regulated by 40 CFR 761? (if yes, list in Chemical Composition - B.1.j) ☐YES ☒NO
   a. If yes, were the PCBs imported into the U.S.? ☐YES ☐NO

6. Do the waste profile sheet and all attachments contain true and accurate descriptions of the waste material, and has all relevant information within the possession of the Generator regarding known or suspected hazards pertaining to the waste been disclosed to the Contractor? ☒YES ☐NO

7. Will all changes which occur in the character of the waste be identified by the Generator and disclosed to the Contractor prior to providing the waste to the Contractor? ☒YES ☐NO

☒Check here if a Certificate of Destruction or Disposal is required.

Any sample submitted is representative as defined in 40 CFR 261 - Appendix I or by using an equivalent method. I authorize WMI to obtain a sample from any waste shipment for purposes of recertification. If this certification is made by a broker, the undersigned signs as authorized agent of the generator and has confirmed the information contained in this Profile Sheet from information provided by the generator and additional information as it has determined to be reasonably necessary. If approved for management, Contractor has all the necessary permits and licenses for the waste that has been characterized and identified by this approved profile.

Certification Signature: R S Flanagan Title: Project Manager
Name (Type or Print): Jean S. Flanagan Company Name: City of Houston Date: 10.06.99
☐Check if additional information is attached. Indicate the number of attached pages _____

D. WMI Management Decision **FOR WMI USE ONLY**

1. Management Method ☐Landfill ☐Non-hazardous Solidification ☐Bioremediation ☐Incineration ☐Hazardous Stabilization ☐Other (Specify) _____
2. Proposed Ultimate Management Facility: _____
3. Precautions, Special Handling Procedures, or Limitation on Approval: _____

4. Waste Form _____ 5. Source _____ 6. System Type _____

Special Waste Decision ☐Approved ☐Disapproved
Salesperson's Signature: _____ Date: _____
Division Approval Signature (Optional): _____ Date _____
Special Waste Approvals Person Signature. _____ Date. _____

Please note that for the City of Houston soil cuttings generated from 3602 Center Street, the following analytical reports and sample identification numbers are representative of the waste for metals, BTEX and TPH concentrations:

XENCO Analytical Report Number 91502, Sample Identification number WS-1

XENCO Analytical Report Number 93099, Sample Identification number WS-073099

The concentration for the remaining volatiles and semi-volatiles for this particular waste are represented by the samples listed in XENCO Analytical Report Number 1-81919.

TANWIR BADAR
(Name)

Tanwir
(Signature)

Deputy Asst Director
(Title)

3/1/00
(Date)

Material Characterization Form

Please complete all applicable items on this form to enable ChemSep, Inc. to determine the general characteristics and the appropriate regulatory classification of the material. If a particular item does not apply please indicate with the notation N.A.

1. Generator Information

Company Name: City of Houston
Address: 611 Walker, 14th Floor
City: Houston
State: TX Zip: 77002
Contact: (Leah Flanagan) Wendall Honeycutt CCI
Phone #: (713) 837-6075) 281/474-7455
Fax #: (713/837-0112) 281/474-4571
EPA I.D. #: N/A

2. Billing Information

Company Name: USA Environmental Services
Address: 100 Genoa Red Bluff
City: Houston
State: Texas Zip: 77034
Contact: Matt Gilbert/Ann Elmore
Phone #: 281 464-6889 or 281 481-7808
Fax #: 281 922-4554

3. Material Classification

Process Generating the Material: Cleaning of sampling equipment during a Phase II Environmental Site Assessment

Is the Material Hazardous Per RCRA?	( ) Yes	(X) No
Has the Material Been Mixed With a Hazardous Waste?	( ) Yes	(X) No
Is the Material "Used Oil" per 40CFR, 279?	( ) Yes	(X) No
R, Is the Material an Off-Spec Fuel Product?	( ) Yes	(X) No
his an Underground Storage Tank Fluid?	( ) Yes	(X) No

4. Physical Characteristics

Color: Clear to red
Odor: None
pH: 6 - 9 S.U.
Flash Point: > 130 °F

Viscosity:
(X) Low
( ) Medium
( ) Heavy

Layers:
(X) Single
( ) Bilayered
( ) Multilayered

Specific Gravity:
( ) <1
( ) >1
X = 1

5. Composition

Percent Oil: 0%
Percent Water: 99%
Percent Solids: 1%

Arsenic: _____
Lead: _____
Cadmium: _____

Chromium: _____
Halogens: _____
PCB's: _____

6. Shipping Information

Quantity: 10 gals
Transporters Name: _____
Contact: _____

Method of Shipment: (X) Drums ( ) Bulk
EPA I.D.# _____
Phone # _____

I hereby certify and warrant that the information supplied on this form and on any attachments represents a complete and accurate identification and description of the material. I further certify and warrant that this information is the result of an analysis of a representative sample of the material obtained and analyzed in accordance with U.S. EPA approved test procedures or by the application of knowledge of the process generating the material.

Signature: L Flanagan (Generators Representative)
Title: Proj Mgr
Date: 12-21-99

Boxed Area for ChemSep Use)

Approved By	Date	List Attachments

2-Drums

Shipping Manifest
ChemSep, Inc.

No. 3122

P.O. Box 1590
LaPorte, Tx. 77572

Telephone: (281) 474-4210 Fax: (281) 474-4226

GENERATOR

Facility Name: Ballfort Detention Basin

Facility Address: ~~S.H. 288 and W. Ballfort Avenue~~ Hughes Service Center 3802 Broadway St. Houston TX. 770

Contact: Leah Flanagan/Wendell Honeycutt Phone#: 713/837-0875/281/474-7455

Material Classification (per Material Characterization Form): Sampling equipment cleaning fluids

Quantity in Gallons: 10

I certify that the material being transferred on this shipment is not a hazardous waste as defined in 40 CFR Part 261, nor does it contain any PCB's or halogenated solvents.

Signature: L Flanagan (Generators Representative) Title: Proj Mgr

Date: 12-21-99

TRANSPORTER

Company Name: U.S.A. ENVIRONMENTAL

Phone #: 1 800 772 4497 Truck #: 423

EPA I.D. #: TXR 000025006 State I.D. #: 8062

Drivers Name: Alfonso Rangel DOT #: ~~423~~ 739764

Signature: Date: 4-13-00

RECEIVING FACILITY

Name: ChemSep, Inc. Pasadena, TX 77507

Address: 10920 Bayport Blvd. Phone #: (281) 474-4210

EPA ID# TXR000031286 TNRCC#:A85602

ChemSep Job #

Facility Operators Name: Michael Cooks

Signature: Date: 4-27-00

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
P... Box 13087
A...n, Texas 78711-3087

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039.

167481

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
City of Houston
611 Walker 11th Floor
Houston, TX 77002
Height Service Center
3602 Center Street
Houston, TX 77007

4. Generator's Phone (713) 837-0075

5. Transporter 1 Company Name: USA Environmental
6. US EPA ID Number: TXR000035676

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address
10. US EPA ID Number: TXD...

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, ID Number and Packing Group)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. Non-regulated material - Soil cuttings	3	D.M	1500	P
	b.				
	c.				
	d.				

J. Additional Descriptions for Materials Listed Above: AT-11790

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked, and labelled/placarded, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
Leon S Flanagan	[signature]	10	06	99

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[illegible]	04	13	00

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Donald O'Mortex	[signature]	04	26	00

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month
A. Sweeta	[signature]	4

GENERATOR

TRANSPORTER

FACILITY

APPENDIX G

Soil Boring Logs and Well Construction Diagrams

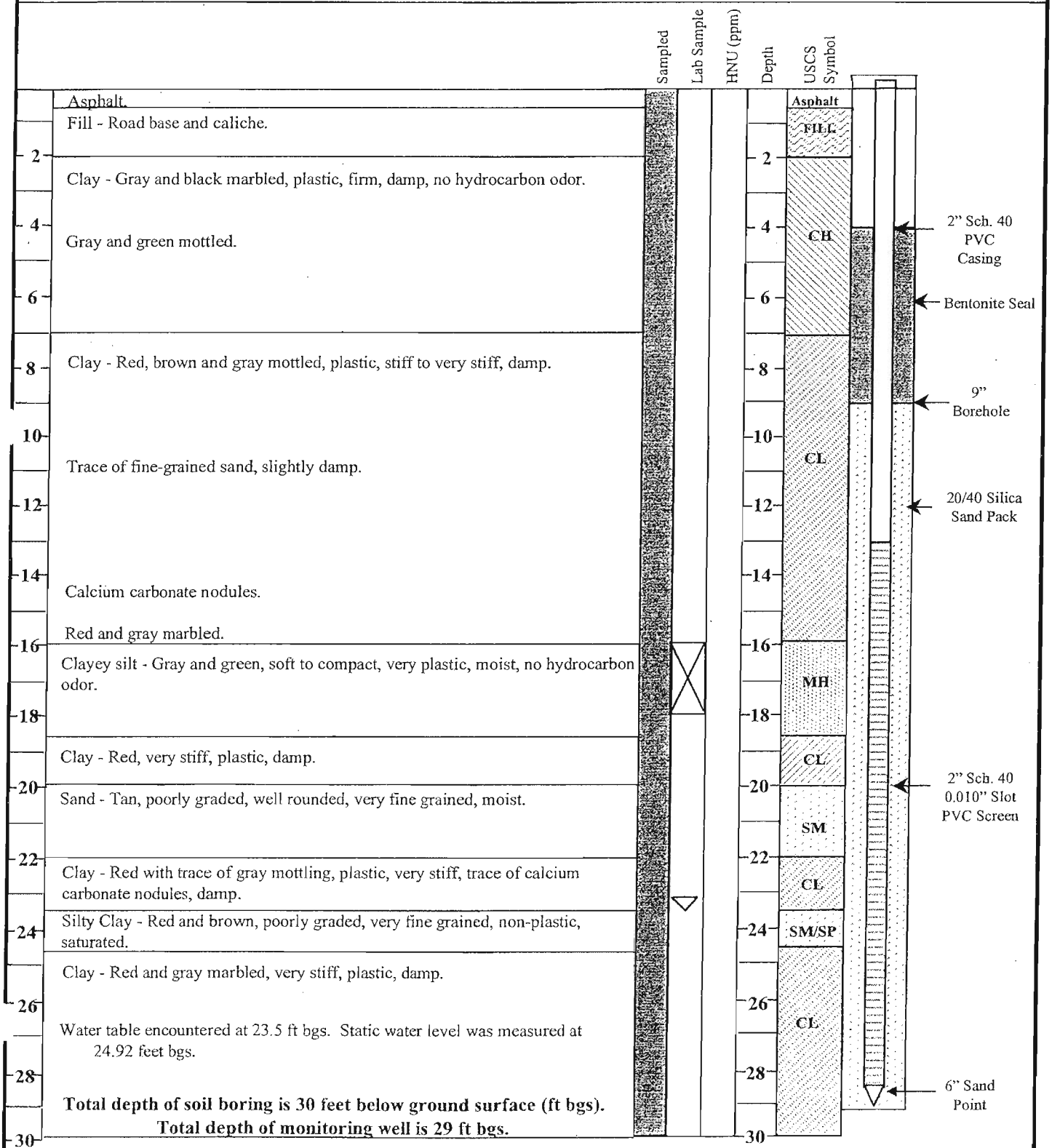
CORRIGAN CONSULTING, INC.

TEMPORARY MONITORING WELL LOG

Well No.: MW-1A

Project:	City of Houston		
Project No.:	98S-128	Well Location:	Southeast Portion of Property
Site:	Heights Service Center	Date Drilled:	April 15, 1999
Location:	Houston, Texas	Drilling Method:	Hollow Stem Auger
Logged by:	Tod Heverly	Sample Method:	Split Spoon
Drilling Co.:	HVJ Associates, Inc.	Top-of-Casing Elevation:	Not Applicable
Driller:	Pat Stevens		

Soil Description

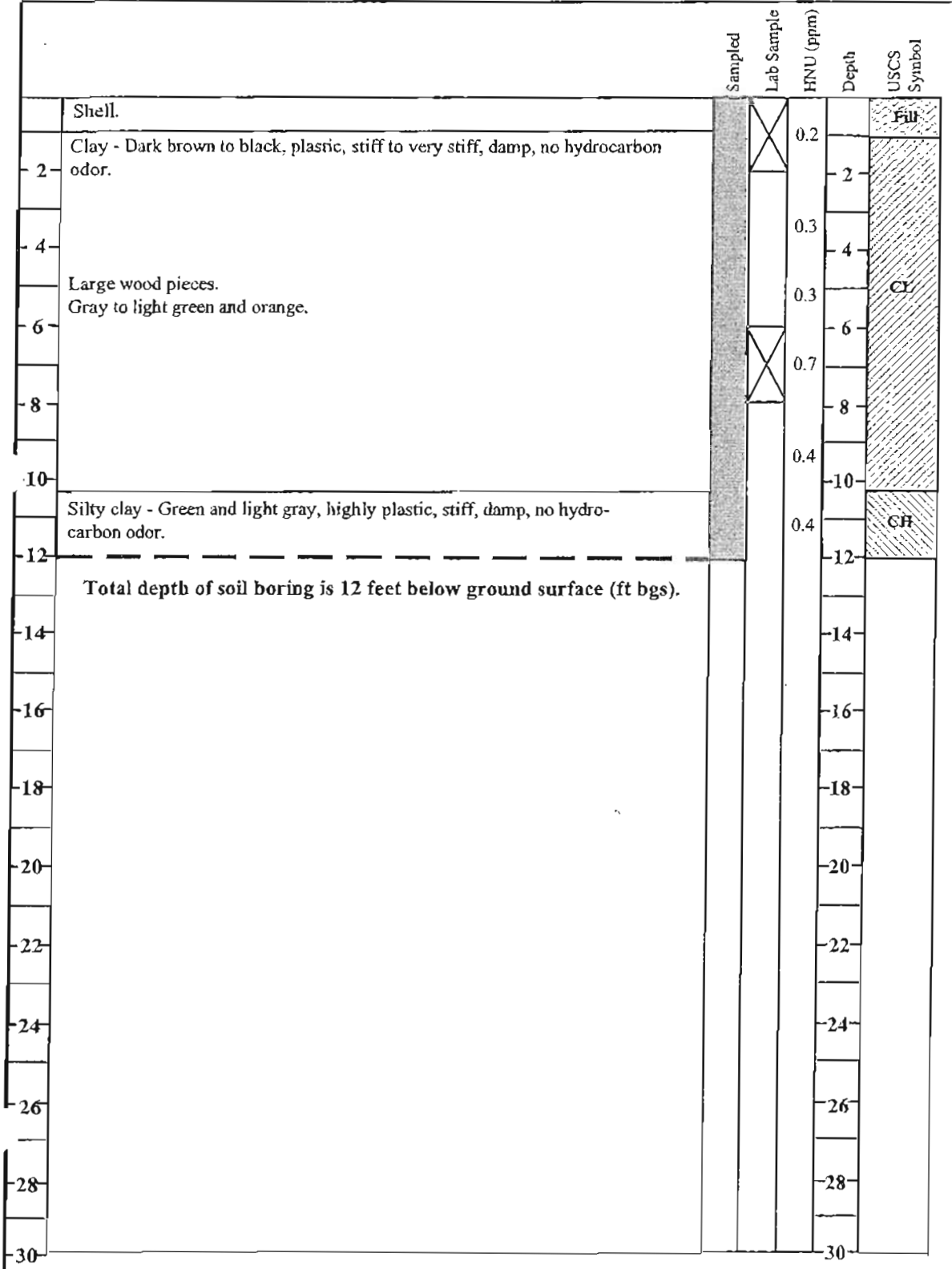


CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: B-4A

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Property Boundary
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-1A

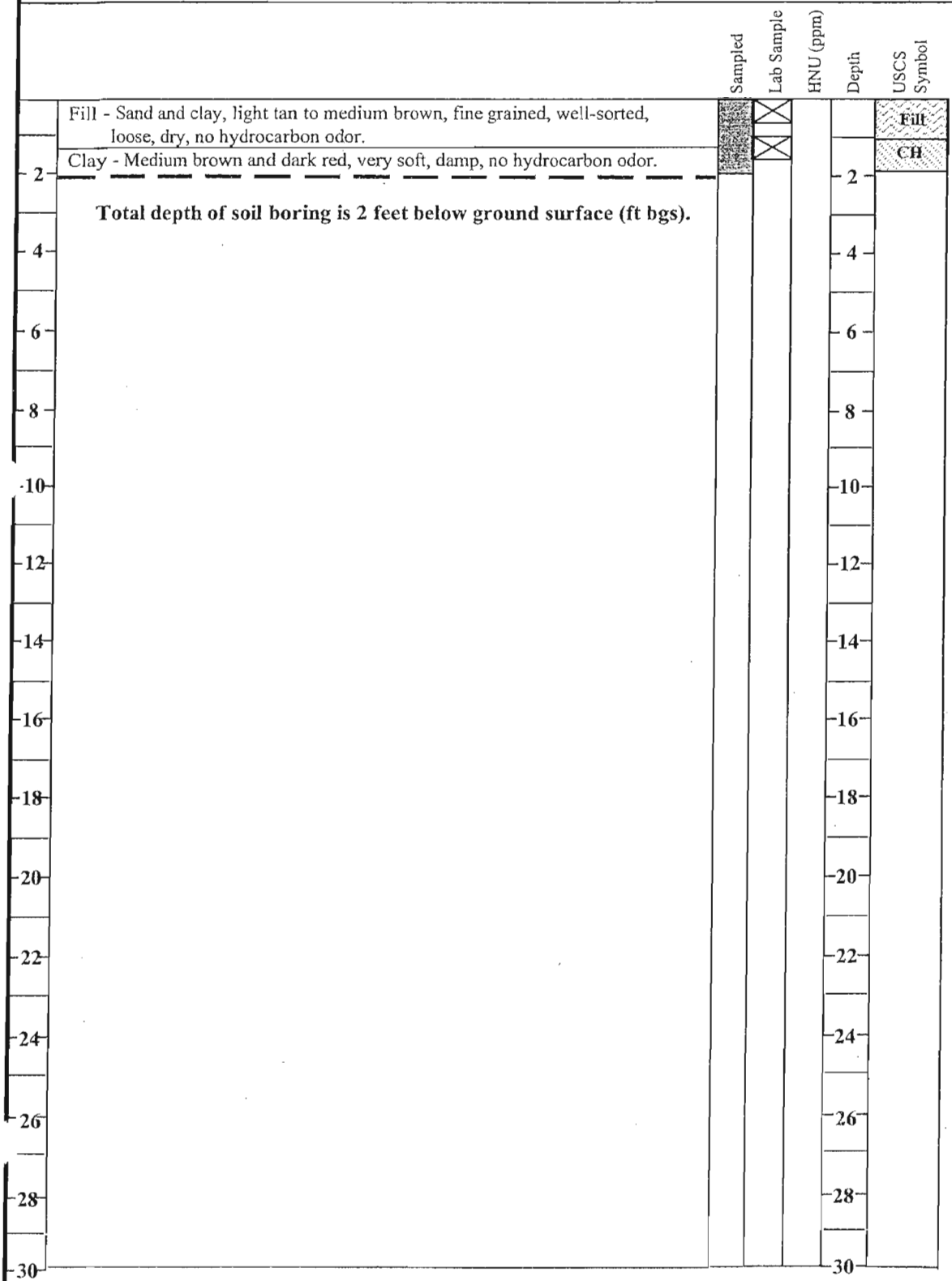
Client:	City of Houston	Drilling Co.:	Bandy and Associates
Project:	Heights Service Center	Driller:	Allen Hawkins
Project No.:	98S-128	Boring Location:	West Property Boundary
Location:	Houston, Texas	Date Drilled:	July 30, 1999
Logged by:	Melinda Goelz	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Fill - Sand and clay, light tan to medium brown, fine grained, well-sorted, loose, dry, no hydrocarbon odor.

Clay - Medium brown and dark red, very soft, damp, no hydrocarbon odor.

Total depth of soil boring is 2 feet below ground surface (ft bgs).



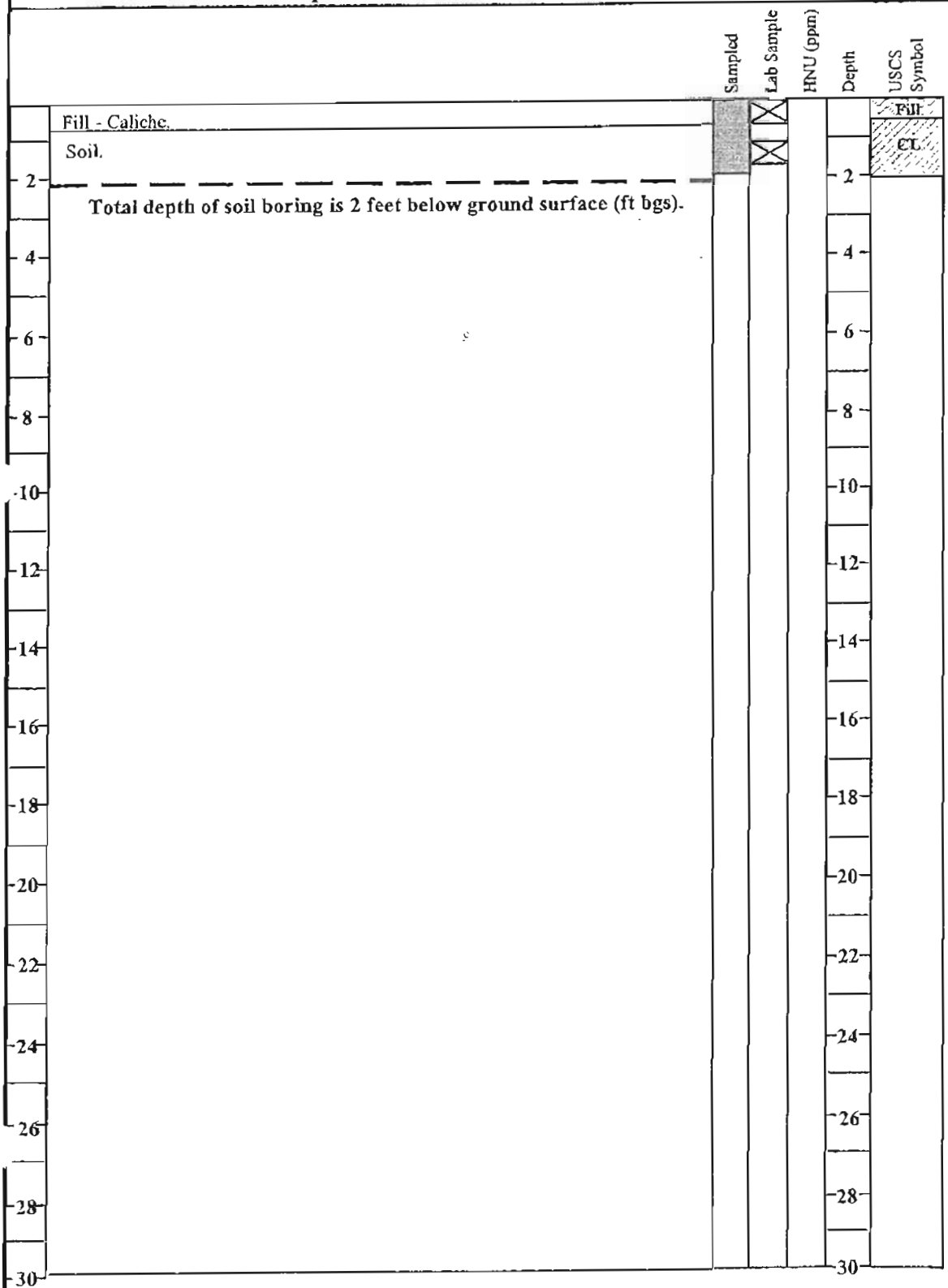
CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-1

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

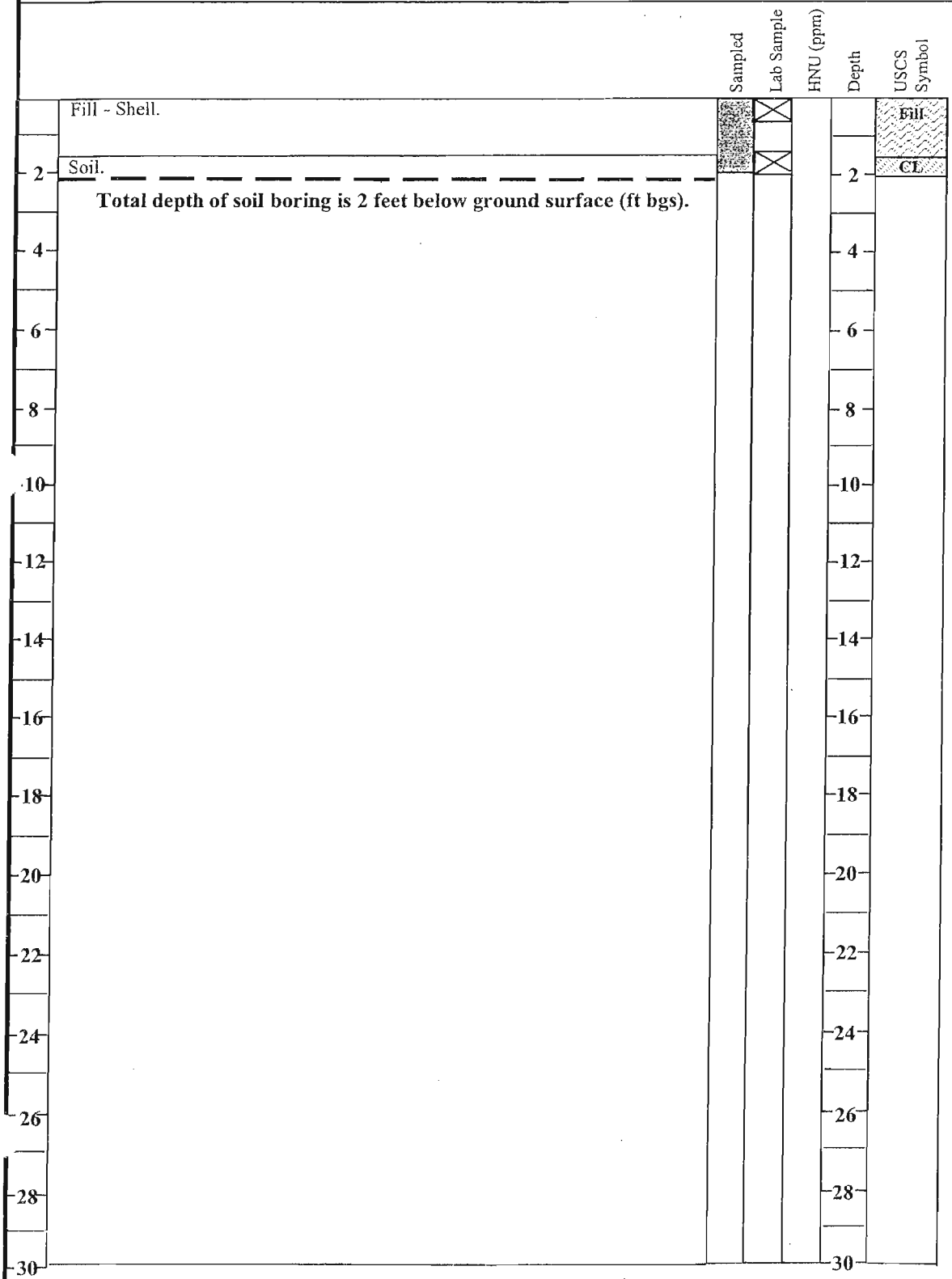


CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-2

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

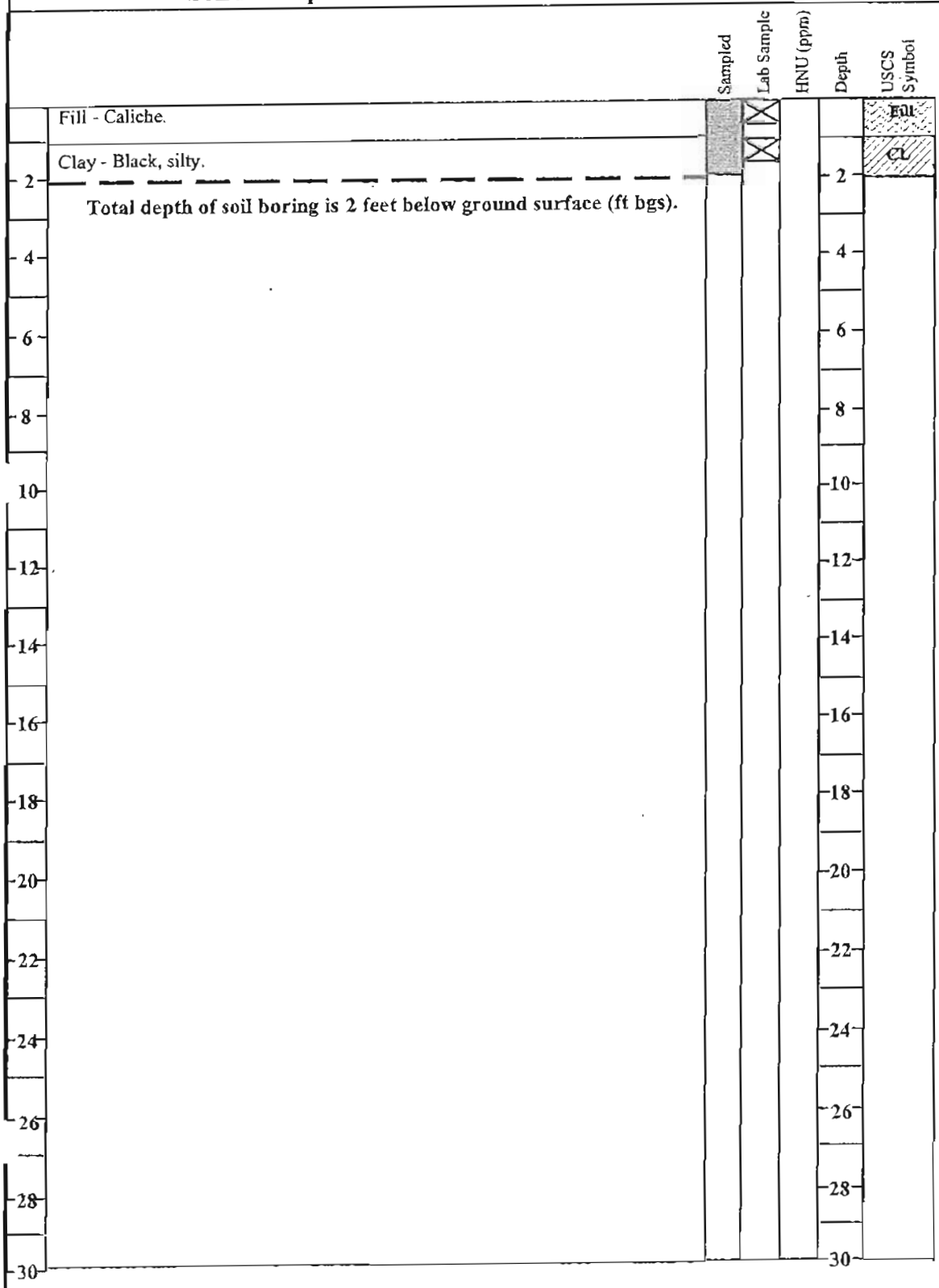


CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-3

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Properry
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

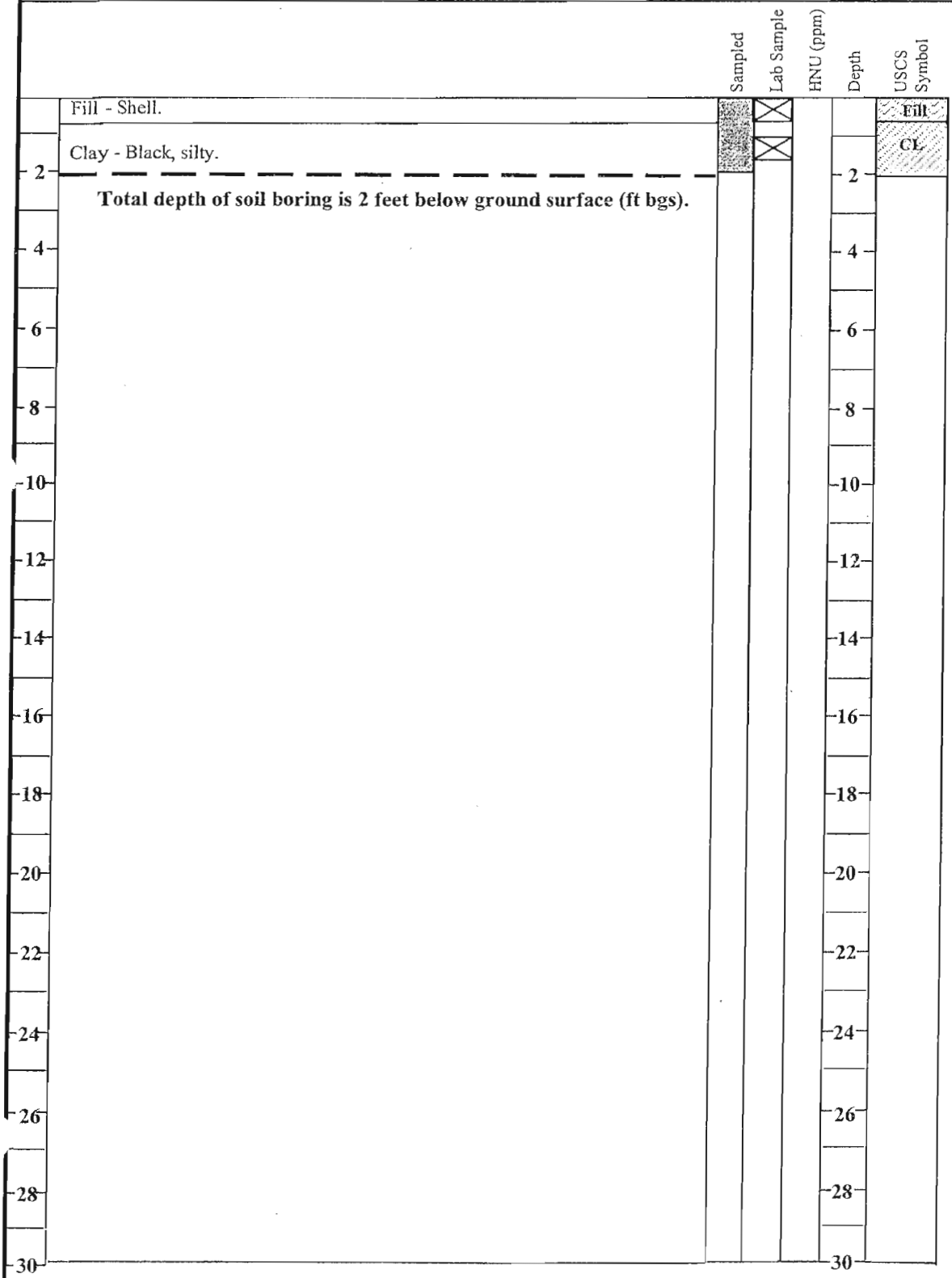


CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-4

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



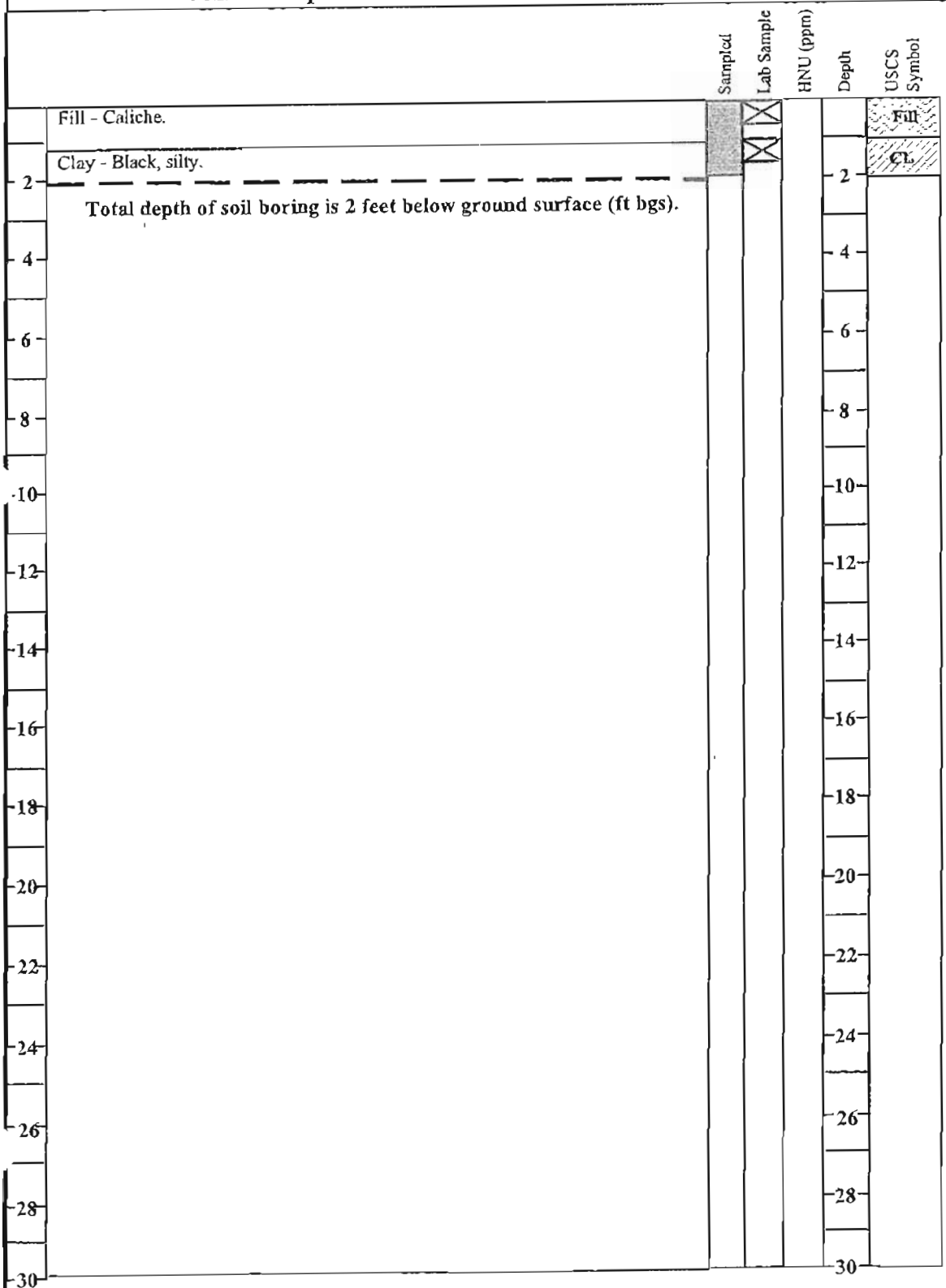
CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-5

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

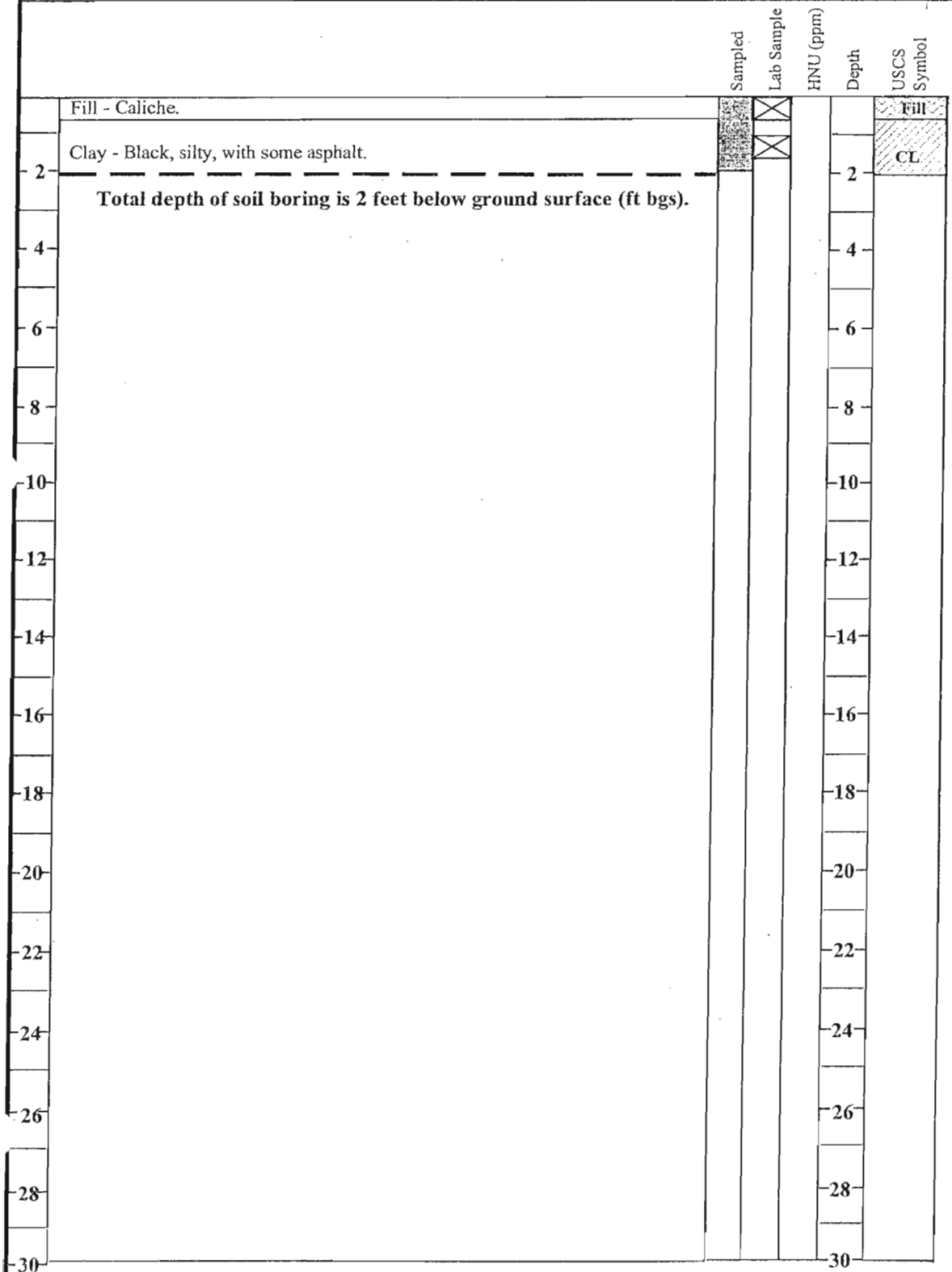


CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-6

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



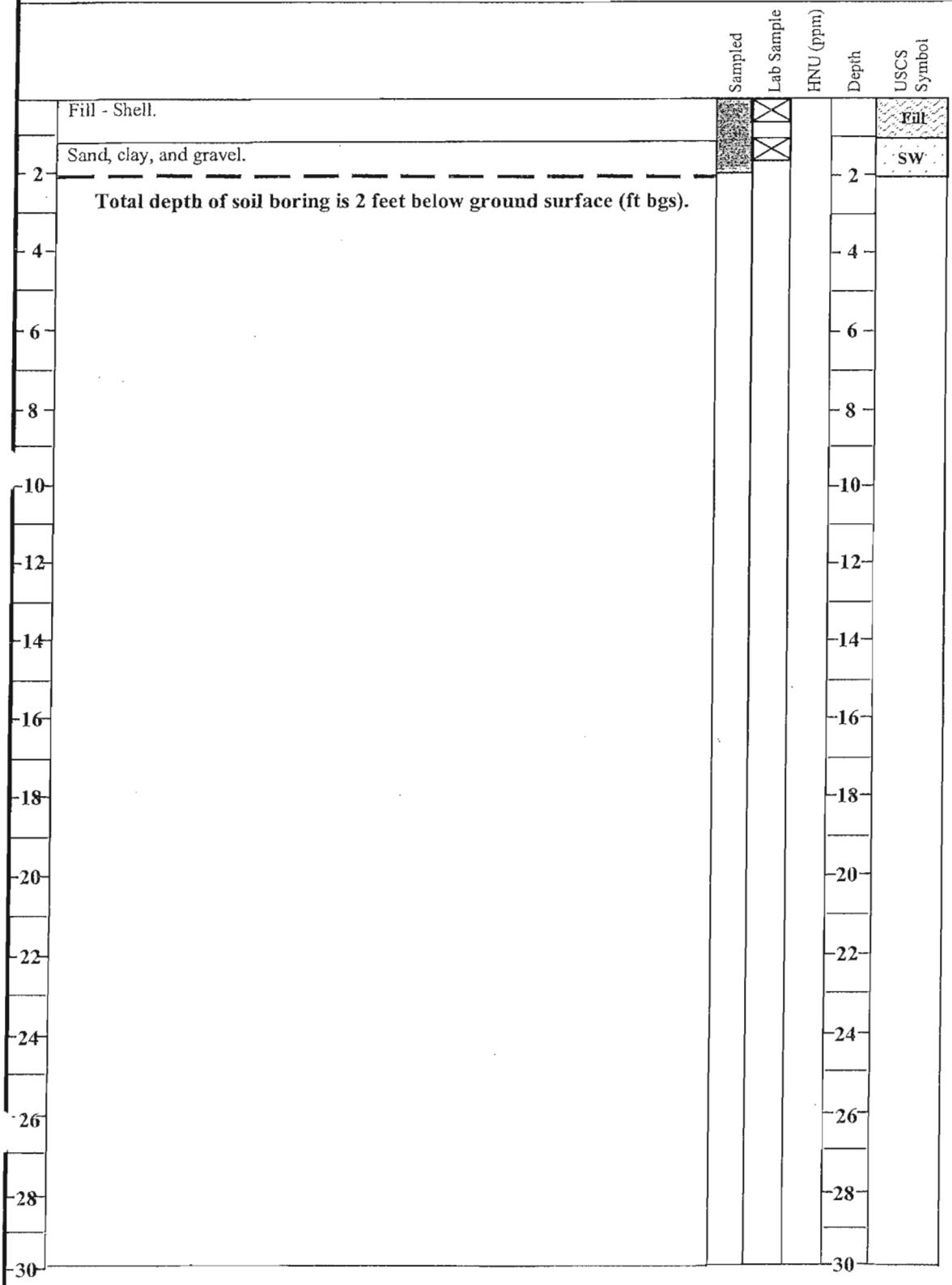
CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-7

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-8

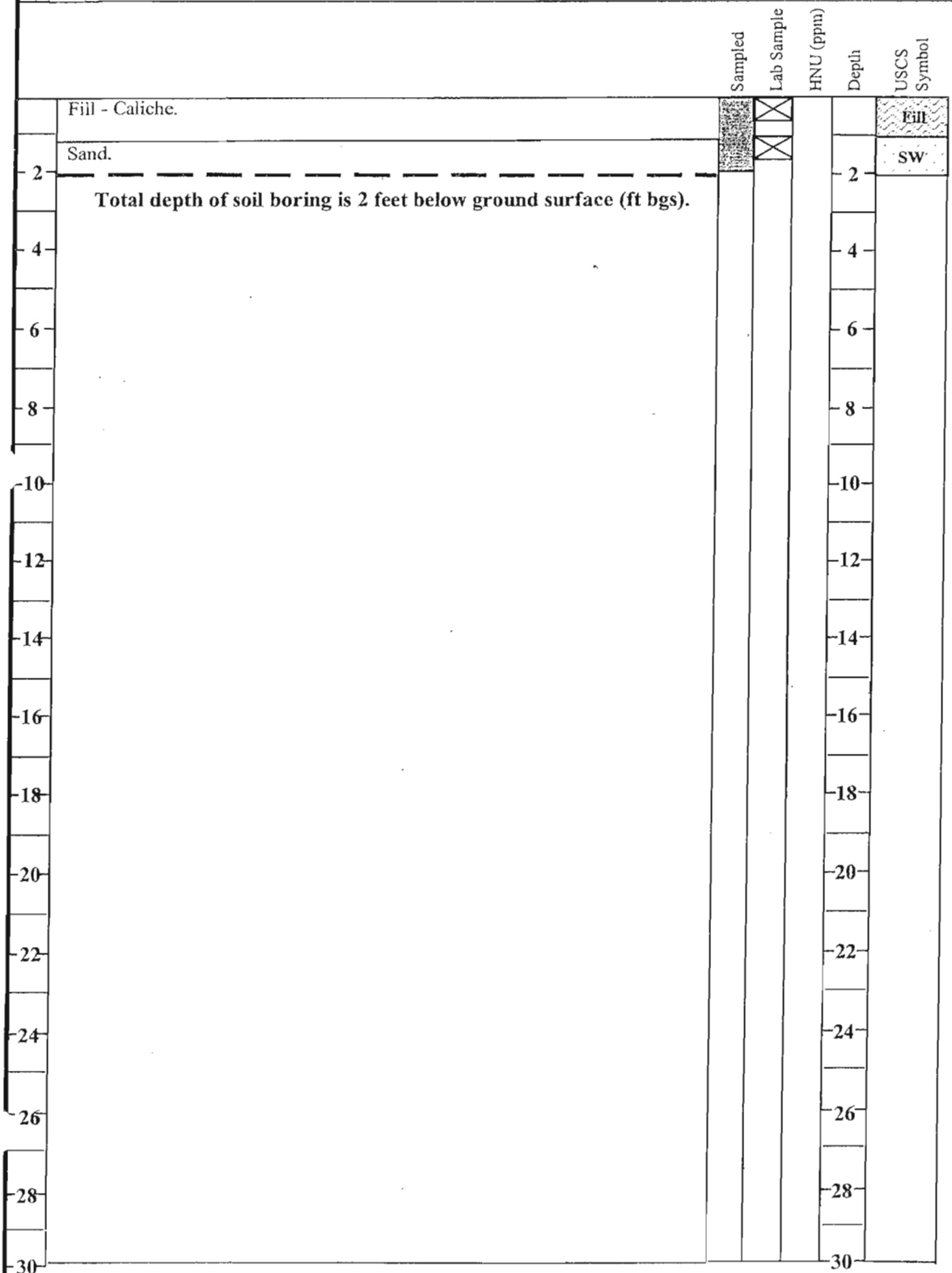
Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Fill - Caliche.

Sand.

Total depth of soil boring is 2 feet below ground surface (ft bgs).



CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-9

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Sampled | Lab Sample | HNU (ppm) | Depth | USCS Symbol

Fill - Gravel. — Fill

Clay - Black, silty. — CL

Total depth of soil boring is 2 feet below ground surface (ft bgs).

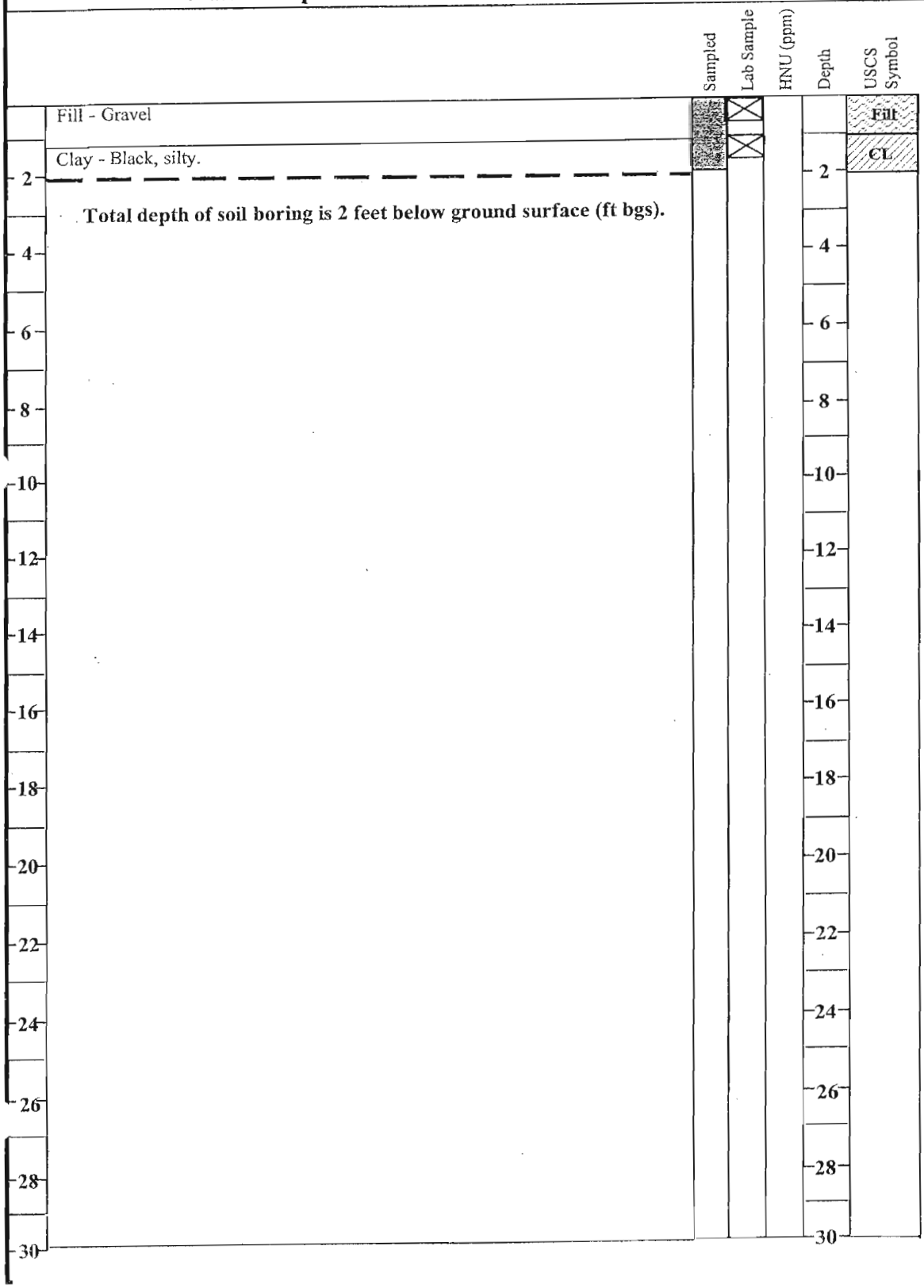
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-10

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



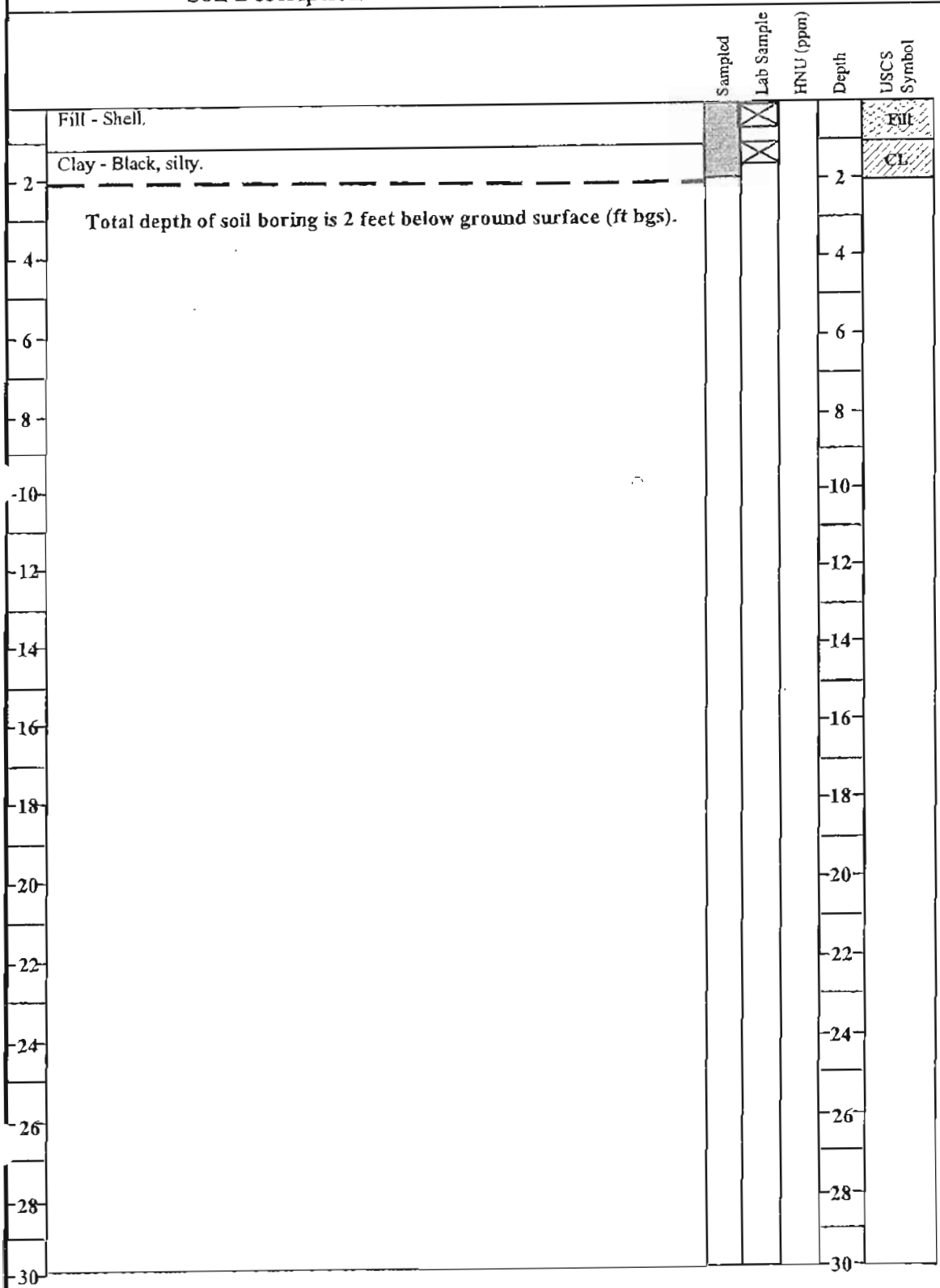
CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-11

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



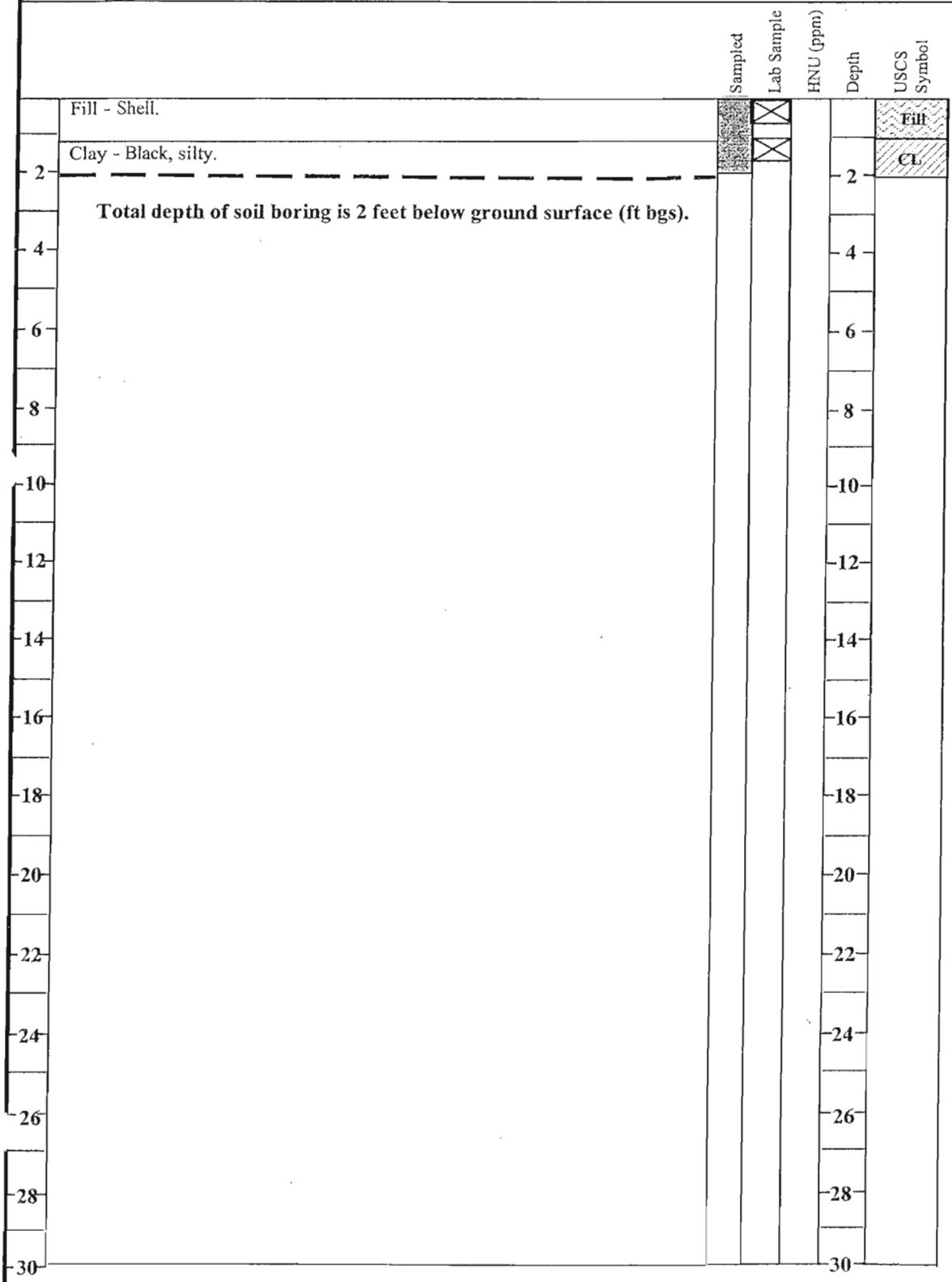
CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-12

Client:	City of Houston	Drilling Co.:	HVJ Associates, Inc.
Project:	Heights Service Center	Driller:	Pat Stevens
Project No.:	98S-128	Boring Location:	North Portion of Property
Location:	Houston, Texas	Date Drilled:	April 15, 1999
Logged by:	Tod Heverly	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description



CORRIGAN CONSULTING, INC.

SOIL BORING LOG

Boring No.: BG-13

Client:	City of Houston	Drilling Co.:	Bandy and Associates
Project:	Heights Service Center	Driller:	Allen Hawkins
Project No.:	98S-128	Boring Location:	West Property Boundary
Location:	Houston, Texas	Date Drilled:	July 30, 1999
Logged by:	Melinda Goelz	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Depth	Soil Description	Sampled	Lab Sample	HNU (ppm)	Depth	USCS Symbol
	Fill - Sand, clay, shell and gravel, light brown to tan, poorly sorted, very soft, very loose, damp, slight hydrocarbon odor.					Fill
	Clay - Medium brown, light yellow and dark gray, medium plasticity, stiff, damp, no hydrocarbon odor.		X			CH
2	**Total depth of soil boring is 2 feet below ground surface (ft bgs).**				2	
4					4	
6					6	
8					8	
10					10	
12					12	
14					14	
16					16	
18					18	
20					20	
22					22	
24					24	
26					26	
28					28	
30					30	

CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-14

Client:	City of Houston	Drilling Co.:	Bandy and Associates
Project:	Heights Service Center	Driller:	Allen Hawkins
Project No.:	98S-128	Boring Location:	West Property Boundary
Location:	Houston, Texas	Date Drilled:	July 30, 1999
Logged by:	Melinda Goelz	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Depth	Soil Description	Sampled	Lab Sample	HNU (ppm)	USCS Symbol
0	Asphalt and Concrete Fill - Sand and clay, medium brown, poorly sorted, soft, very loose, dry, no hydrocarbon odor.				Fill
2	Clay - Medium brown to medium light gray, plastic, stiff, damp.		X		CH
3	**Total depth of soil boring is 3 feet below ground surface (ft bgs).**				

4 6 8 10 12 14 16 18 20 22 24 26 28 30

CORRIGAN CONSULTING, INC.

SOIL BORING LOG
Boring No.: BG-15

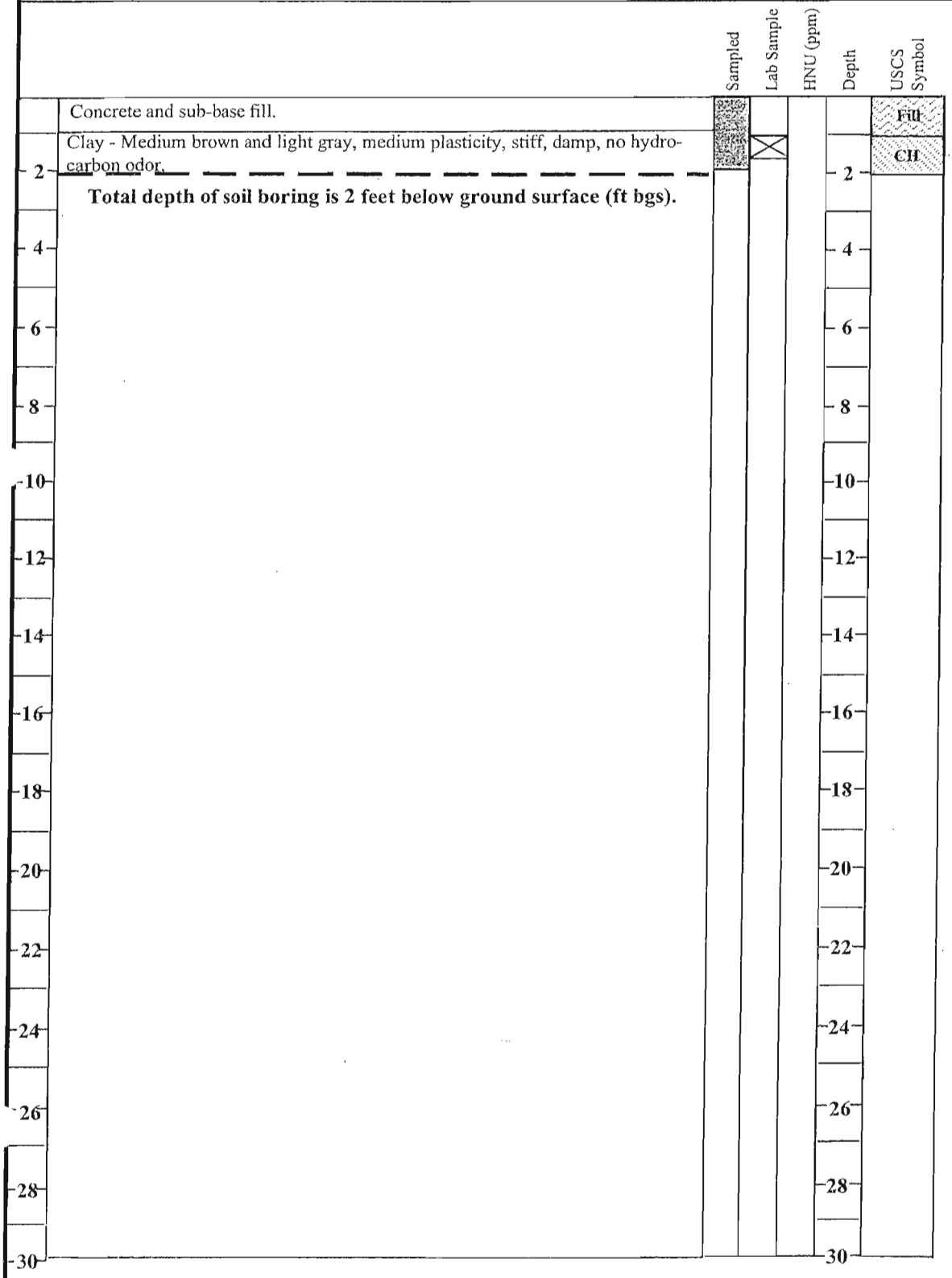
Client:	City of Houston	Drilling Co.:	Bandy and Associates
Project:	Heights Service Center	Driller:	Allen Hawkins
Project No.:	98S-128	Boring Location:	West Property Boundary
Location:	Houston, Texas	Date Drilled:	July 30, 1999
Logged by:	Melinda Goelz	Drilling Method:	Hollow Stem Auger
		Sample Method:	Split Spoon

Soil Description

Concrete and sub-base fill.

Clay - Medium brown and light gray, medium plasticity, stiff, damp, no hydrocarbon odor.

Total depth of soil boring is 2 feet below ground surface (ft bgs).



APPENDIX H

Laboratory Reports

XENCO Laboratories

RECEIVED
JUN 2 2 1998
BY:

June 18, 1998

Mr. Wendall Honeycutt
Corrigan Consulting, Inc.
1909 Capri Lane
SeaBrook, TX 77586

Re: Semi-volatile Analysis for the Analytical Report Numbered 1-81919

Mr. Honeycutt:

Per your request, we have reviewed the semi-volatile data for the above referenced analytical report against the TNRCC appendix II Risk Reduction Standards (RRS). All semi-volatile data reported for these samples were non-detected (ND) or less than the RRS. The sample numbered 181919-001 was reported with elevated reporting limits due to non-target analytes.

If you have any questions, please contact Brent Barron (CSM) or myself at your convenience.

Eddie L. Clemons, II
QA/ QC Director

XC: B. Barron
E. Builes
File

11381 Meadowglen, Suite L
Houston, Texas 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Rd., Ste. D
Dallas, Texas 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, TX 78238
210-509-3334 phone
210-509-3335 fax
Austin (512) 306-9049

e-mail - xenco@xenco.com - website - http://www.xenco.com

Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: 3602 Center, Houston,TX

Project Name: MP/COH Heights Service Center

XENCO COC#: -91502
Date Received in Lab: Apr 13, 1999 18:40 by OR
XENCO contact : Karen Olson/Brent Barron

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
29			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:10		Apr 26, 1999 by EZ	Apr 26, 1999 11:40 by EZ
30	BG-7B	91502-015	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:12		Apr 30, 1999 by JOS	Apr 30, 1999 13:15 by MAB
31			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:12		Apr 30, 1999 by EZ	Apr 30, 1999 15:40 by EZ
32	BG-8A	91502-016	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:16		Apr 14, 1999 by ALO	Apr 15, 1999 13:48 by MAB
33			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:16		Apr 26, 1999 by EZ	Apr 26, 1999 11:45 by EZ
34	BG-8B	91502-017	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:18		Apr 30, 1999 by JOS	Apr 30, 1999 13:18 by MAB
35			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:18		Apr 30, 1999 by EZ	Apr 30, 1999 15:45 by EZ
36	BG-9A	91502-018	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:22		Apr 14, 1999 by ALO	Apr 15, 1999 13:52 by MAB
37			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:22		Apr 26, 1999 by EZ	Apr 26, 1999 11:50 by EZ
38	BG-9B	91502-019	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:24		Apr 30, 1999 by JOS	Apr 30, 1999 13:21 by MAB
39			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:24		Apr 30, 1999 by EZ	Apr 30, 1999 15:50 by EZ
40	BG-10A	91502-020	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:30		Apr 14, 1999 by ALO	Apr 15, 1999 13:55 by MAB
41			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:30		Apr 26, 1999 by EZ	Apr 26, 1999 11:55 by EZ
42	BG-10B	91502-021	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:32		Apr 30, 1999 by JOS	Apr 30, 1999 13:29 by MAB
43			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:32		Apr 30, 1999 by EZ	Apr 30, 1999 15:55 by EZ
44	BG-11A	91502-022	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:35		Apr 14, 1999 by ALO	Apr 15, 1999 13:59 by MAB
45			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:35		Apr 26, 1999 by EZ	Apr 26, 1999 12:00 by EZ
46	BG-11B	91502-023	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:37		Apr 30, 1999 by JOS	Apr 30, 1999 13:32 by MAB
47			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:37		Apr 30, 1999 by EZ	Apr 30, 1999 16:00 by EZ
48	BG-12A	91502-024	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:41		Apr 14, 1999 by ALO	Apr 15, 1999 14:10 by MAB
49			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:41		Apr 26, 1999 by EZ	Apr 26, 1999 12:10 by EZ
50	BG-12B	91502-025	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:43		Apr 30, 1999 by JOS	Apr 30, 1999 13:35 by MAB
51			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:43		Apr 30, 1999 by EZ	Apr 30, 1999 16:05 by EZ
52	B4-A	91502-026	TPH	EPA 418.1	mg/kg	10 days	Apr 13, 1999 14:56		Apr 15, 1999 by EZ	Apr 15, 1999 12:30 by EZ
53			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:56		Apr 26, 1999 by EZ	Apr 26, 1999 12:15 by EZ
54	B4-B	91502-027	TPH	EPA 418.1	mg/kg	10 days	Apr 13, 1999 15:07		Apr 15, 1999 by EZ	Apr 15, 1999 12:35 by EZ
55			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 15:07		Apr 26, 1999 by EZ	Apr 26, 1999 12:20 by EZ
56	WS-1	91502-028	BTEX	SW-846	ppm	10 days	Apr 13, 1999 15:40		Apr 26, 1999 by OSR	Apr 27, 1999 08:10 by OS

XENCO Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: 3602 Center, Houston,TX

Project Name: MP/COH Heights Service Center

XENCO COC#: -91502
Date Received in Lab: Apr 13, 1999 18:40 by OR
XENCO contact : Karen Olson/Brent Barron

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Addition Requested	Extraction	Analysis
1	MW-1A	91502-001	RCRA Metals	EPA 6020	mg/kg	Standard	Apr 13, 1999 10:21		May 17, 1999 by JOS	May 17, 1999 17:30 by MAB
2			SPLP Metals	SW846-1312/60	mg/L	Standard	Apr 13, 1999 10:21		May 14, 1999 by JOS	May 14, 1999 16:12 by MAB
3			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 10:21		May 24, 1999 by EZ	May 24, 1999 13:05 by EZ
4	BG-1A	91502-002	Pb ICP-MS	EPA6020	mg/kg	10 days	Apr 13, 1999 13:10		Apr 14, 1999 by ALO	Apr 15, 1999 13:00 by MAB
5			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 13:10		Apr 26, 1999 by EZ	Apr 26, 1999 11:05 by EZ
6	BG-1B	91502-003	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 13:15		Apr 30, 1999 by JOS	Apr 30, 1999 12:46 by MAB
7			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 13:15		Apr 30, 1999 by EZ	Apr 30, 1999 15:05 by EZ
8	BG-2A	91502-004	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 13:26		Apr 14, 1999 by ALO	Apr 15, 1999 13:04 by MAB
9			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 13:26		Apr 26, 1999 by EZ	Apr 26, 1999 11:15 by EZ
10	BG-2B	91502-005	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 13:31		Apr 30, 1999 by JOS	Apr 30, 1999 13:00 by MAB
11			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 13:31		Apr 30, 1999 by EZ	Apr 30, 1999 15:15 by EZ
12	BG-3A	91502-006	Pb ICP-MS	EPA6020	mg/kg	10 days	Apr 13, 1999 13:38		Apr 14, 1999 by ALO	Apr 15, 1999 13:07 by MAB
13			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 13:38		Apr 26, 1999 by EZ	Apr 26, 1999 11:20 by EZ
14	BG-3B	91502-007	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 13:44		Apr 30, 1999 by JOS	Apr 30, 1999 13:03 by MAB
15			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 13:44		Apr 30, 1999 by EZ	Apr 30, 1999 15:20 by EZ
16	BG-4A	91502-008	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 13:48		Apr 14, 1999 by ALO	Apr 15, 1999 13:11 by MAB
17			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 13:48		Apr 26, 1999 by EZ	Apr 26, 1999 11:25 by EZ
18	BG-4B	91502-009	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 13:51		Apr 30, 1999 by JOS	Apr 30, 1999 13:06 by MAB
19			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 13:51		Apr 30, 1999 by EZ	Apr 30, 1999 15:25 by EZ
20	BG-5A	91502-010	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 13:54		Apr 14, 1999 by ALO	Apr 15, 1999 13:30 by MAB
21			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 13:54		Apr 26, 1999 by EZ	Apr 26, 1999 11:30 by EZ
22	BG-5B	91502-011	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 13:56		Apr 30, 1999 by JOS	Apr 30, 1999 13:09 by MAB
23			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 13:56		Apr 30, 1999 by EZ	Apr 30, 1999 15:30 by EZ
24	BG-6A	91502-012	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:02		Apr 14, 1999 by ALO	Apr 15, 1999 13:41 by MAB
25			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 14:02		Apr 26, 1999 by EZ	Apr 26, 1999 11:35 by EZ
26	BG-6B	91502-013	Pb ICP-MS	EPA 6020	mg/kg	7 days	Apr 13, 1999 14:04		Apr 30, 1999 by JOS	Apr 30, 1999 13:12 by MAB
27			Moisture	ASTM 2216-71	%	7 days	Apr 13, 1999 14:04		Apr 30, 1999 by EZ	Apr 30, 1999 15:35 by EZ
28	BG-7A	91502-014	Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 14:10		Apr 14, 1999 by ALO	Apr 15, 1999 13:44 by MAB

XENCO Laboratories

☐ 5309 Wurzbach Road, Suite 104, San Antonio, TX 78238 210-509-3334
☐ 11078 Morrison Road, Suite D, Dallas, TX 75229 972-481-9999

On-LINE Help & Technical Services at XENCO.com

Company COC No: Work Order No:

Company: Corrigan Consulting Inc	Phone: 281 474-4755
Project Name: ☒ Previously done at XENCO — MP/COH Heights Service Center	Project ID: 985-128
Location: 3602 Center, Houston TX	
Project Manager (PM): Wendell Honeycutt	Project Director (PD): Roxie Voran
Fax Results to ☒ PM and / or	Fax: 281 474-4501
Invoice to ☐ Accounting ☒ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:	
Quote No.	P.O No ☐ Call for a P.O.
Special DLs (RR I RR II DW QAPP See Lab PM Call Proj. PM)	
Specifications	
Sampler Name: Todd C. Heverly	Signature: Todd C. H[illegible]

Lab Only: 91502-H

TAT: 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d Standard TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days

Lab Only Additions: From: Rcv by: Date; From: Rcv by: Date; From: Rcv by: Date

	Sample ID	Sampling Date	Time	Depth ft' in" m	Matrix APSW	Composite	Grab	# Containers	Container Size	Type	Preservatives	BTEX by 8020 8021 8260 602 624 Other	BTEX-MTBE by 8020 8021 8260 602 624 Other	TPH by TX1005 418.1 8015GRO 8015DRO 8015JetF	PAHs by 8270 8100 8310	METALS by 6010 8RCRA Tot Pb TCLP8 13PP 23TAL See List	VOAs by 8260 624 BTEX MTBE PPs TCL See List Call PM	SVOAs by 8270 625 PAHs BN&A TCL PPs See List Call PM	SPLP TPH 418.1	TAT 5h 12h 20h 24h 48h 3d 5d 7d 10d 14d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Analysis	Remarks
1	BG-10B	4/13/99	14:32	1-1.5	S		X	1	4	GA	N					X						X	
2	BG-11A	4/13/99	14:35	0-0.5	S		X	1	4	GA	N					X				X			
3	BG-11B	4/13/99	14:37	1-1.5	S		X	1	4	GA	N					X						X	
4	BG-12A	4/13/99	14:41	0-0.5	S		X	1	4	GA	N					X				X			
5	BG-12B	4/13/99	14:43	1-1.5	S		X	1	4	GA	N					X						X	
6	B4-A	4/13/99	14:56	0-2	S	X		2	4	GA	N			X					X	X			Hold SPLP TPH
7	B4-B	4/13/99	15:07	6-8	S	X		2	4	GA	N			X					X	X			Hold SPLP TPH
8	WS-1	4/13/99	15:40	--	S	X		2	4	GA	N	X		X		X				X			
9	END OF RECORD																						
10																							

	Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1	Todd C. H[illegible] TH		4/13/99 15:40
2			
3		Lab: [illegible]	4/13/99 18:40

Total Containers per COC:
Rush TATs Fax Due: Final Fax Due:
Final Report Data Package Due Date:
Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

Preservatives - Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO4 pH<2 (N), NaOH+Asbc Acid (NAA), ZnAc+NaOH (ZA), (Cool,<4C) (C4), None (N), See Label (SL), Other (O) _____

SIZE: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (.5), Tedlar Bag (B), Wipe (W), Other _____ **TYPE** Glass Amb (GA), Glass Clear (GC), Plastic (P), Other (O) _____

XENCO Laboratories

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

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD
On-LINE Help & Technical Services at XENCO.com

23800

Company COC No: Work Order No: Page 2 of 3

Company	Corrigan Consulting Inc	**Phone**	281 474-7455
Project Name	☐ Previously done at XENCO MP/Woodlands Heights Service Center	**Project ID**	985-128
Location	3602 Center, Houston, TX		
Project Manager (PM)	Wendell Honeycutt	**Project Director (PD)**	Pete Moran
Fax Results to	☒ PM and / or	**Fax**	281-474-4581
Invoice to	☐ Accounting ☒ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:		
Quote No.		**P.O No**	☐ Call for a P.O.
Special DLs	(RR I RR II DW QAPP See Lab PM Call Proj. PM)		
Specifications			

Lab Only: 91502-H

TAT: 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d Standard TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days

Sampler Name Ted Cleveland Signature Ted C. Cleveland

	Sample ID	Sampling Date	Time	Depth ft' in" m	Matrix A P S W	Composite	Grab	# Containers	Container Size	Type	Preservatives
1	B6-5B	4/13/99	13:56	1-1.5	S		X	1	4	GA	N
2	B6-6A	4/13/99	14:02	0-0.5	S		X	1	4	GA	N
3	B6-6B	4/13/99	14:04	1-1.5	S		X	1	4	GA	N
4	B6-7A	4/13/99	14:10	0-0.5	S		X	1	4	GA	N
5	B6-7B	4/13/99	14:12	1-1.5	S		X	1	4	GA	N
6	B6-8A	4/13/99	14:16	0-0.5	S		X	1	4	GA	N
7	B6-8B	4/13/99	14:18	1-1.5	S		X	1	4	GA	N
8	B6-9A	4/13/99	14:22	0-0.5	S		X	1	4	GA	N
9	B6-9B	4/13/99	14:24	1-1.5	S		X	1	4	GA	N
10	B6-10A	4/13/99	14:30	0-0.5	S		X	1	4	GA	N

	BTEX by 8020 8021	BTEX-MTBE by 8020 8021	TPH by TX1005 418.1	PAHs by 8270 8100 8310	METALS by 6010 8RCRA (TCLP) TCLP8 13PP 23TAL See List	VOAs by 8260 624	SVOAs by 8270 625	PAHs BN&A	TCL PPs	See List Call PM
1					X					
2					X					
3					X					
4					X					
5					X					
6					X					
7					X					
8					X					
9					X					
10					X					

	BTEX by 8020 8021	BTEX-MTBE by 8020 8021	TPH by TX1005 418.1	PAHs by 8270 8100 8310	METALS by 6010 8RCRA (TCLP) TCLP8 13PP 23TAL See List	VOAs by 8260 624	SVOAs by 8270 625	PAHs BN&A	TCL PPs	See List Call PM
1					X					
2					X					
3					X					
4					X					
5					X					
6					X					
7					X					
8					X					
9					X					
10					X					

	TAT 5h 12h 20h 24h 48h 3d 5d 7d (10d) 14d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Analysis	Remarks
1			X	
2	X			
3			X	
4	X			
5			X	
6	X			
7			X	
8	X			
9			X	
10	X			

Lab Only Additions: From: Rcv by: Date

Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1 Ted C. Cleveland TC		4/13/99 13:40
2		
3	Lab: Rosa Reed	4/13/99 18:40

Total Containers per COC:
Rush TATs Fax Due: Final Fax Due:
Final Report Data Package Due Date:
Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

Preservative Various (**V**), HCl pH<2 (**H**), H2SO4 pH<2 (**S**), HNO4 pH<2 (**N**), NaOH+Asbc Acid (**NAA**), ZnAc+NaOH (**ZA**), (Cool,<4C) (**C4**), None (**N**), See Label (**SL**), Other (**O**) ___

SIZE: 4oz ((**8**), 32oz (**32**), 40ml VOA (**V**), 1L (1), 500ml (.5), Tedlar Bag (**B**), Wipe (**W**), (___ **TYPE** Glass Amb (**GA**), Glass Clear (**GC**), Plastic (**P**), Other (**O**

XENCO Laboratories

☐ 11078 Morrison Road, Suite D, Dallas, TX 75229 972-481-9999

☐ 5309 Wurzbach Road, Suite 104, San Antonio, TX 78238 210-509-3334

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

On-LINE Help & Technical Services at XENCO.com

ompany COC No: Work Order No: 7821

Company	Corrigan Consulting Inc
Phone	281 474-7455
Project Name	☒ Previously done at XENCO — MP/OOH Heights Service Center
Project ID	985-128
Location	3602 Center, Houston, TX
Project Manager (PM)	Wendell Honeycutt
Project Director (PD)	Rose Voran
Fax Results to	☒ PM and / or
Fax	281 474-4504
Invoice to	☐ Accounting ☒ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:
Quote No.	P.O No ☐ Call for a P.O.
Special DLs	(RR I RR II DW QAPP See Lab PM Call Proj. PM)
Specifications	
Sampler Name	Ted C. Heady
Signature	

Lab Only: 91502-H

Lab Only Additions: From: / Rcv by: / Date

TAT: 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d Standard TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days

	Sample ID	Sampling Date	Time	Depth ft In m	Matrix A P S W	Composite	Grab	# Containers	Container Size	Type	Preservatives	BTEX by 8020 8021 8260 602 624 Other	BTEX-MTBE by 8020 8021 8260 602 624 Other	TPH by TX1005 418.1 8015GRO 8015DRO 8015Jeff	PAHs by 8270 8100 8310	METALS by 6010 8RCRA (Tot Pb) TCLP8 13PP 23TAL See List	VOAs by 8260 624 BTEX MTBE PPs TCL See List Call PM	SVOAs by 8270 625 PAHs BN&A TCL PPs See List Call PM	Total Chromium	SPLP Chromium	TAT 5h 12h 20h 24h 48h 3d 5d 7d (10d) 14d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Analysis	Remarks
1	MW-1A	4/13/99	12:41	16-18	S		X	2	4	GA	N								X	X			X	
2	B6-1A	4/13/99	13:10	0-0.5	S		X	1	4	GA	N					X					X			
3	B6-1B	4/13/99	13:15	1-1.5	S		X	1	4	GC	N					X							X	
4	B6-2A	4/13/99	13:26	0-0.5	S		X	1	4	GC	N					X					X			
5	B6-2B	4/13/99	13:31	1.5-2	S		X	1	4	GA	N					X							X	
6	B6-3A	4/13/99	13:38	0-0.5	S		X	1	4	GA	N					X					X			
7	B6-3B	4/13/99	13:44	1-1.5	S		X	1	4	GA	N					X							X	
8	B6-4A	4/13/99	13:48	0-0.5	S		X	1	4	GA	N					X					X			
9	B6-4B	4/13/99	13:51	1-1.5	S		X	1	4	GA	N					X							X	
10	B6-5A	4/13/99	13:54	0-0.5	S		X	1	4	GA	N					X					X			

Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1		4/13/99 18:20
2		
3	Lab:	4/13/99 18:40

Total Containers per COC: 32

Rush TATs Fax Due: Final Fax Due:

Final Report Data Package Due Date:

Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

Preservatives - Various (**V**), HCl pH<2 (**H**), H2SO4 pH<2 (**S**), HNO4 pH<2 (**N**), NaOH+Asbc Acid (**NAA**), ZnAc+NaOH (**ZA**), (Cool,<4C) (**C4**), None (**N**), See Label (**SL**), Other (**O**) _____

SIZE: 4oz (**4**), 8oz (**8**), 32oz (**32**), 40ml VOA (**V**), 1L (1), 500ml (**.5**), Tedlar Bag (**B**), Wipe (**W**), Other _____ **TYPE** Glass Amb (**GA**), Glass Clear (**GC**), Plastic (**P**), Other (**O**) _____

XENCO Laboratories

11381 Meadowglen Suite L
Houston, Texas 77082-2647
(281) 589-0692 Fax: (281) 589-0695
Houston · Dallas · San Antonio · Latin America

May 24, 1999

Project Manager: Wendall Honeycutt
Corrigan Consulting, Inc.
1909 Capri Lane
Seabrook, TX 77586

Reference: **XENCO Report No.: -91502**
Project Name: MP/COH Heights Service Center
Project ID: 98S-128
Project Address: 3602 Center, Houston,TX

Dear Wendall Honeycutt:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with XENCO Chain of Custody Number -91502.H All results being reported to you apply only to the samples analyzed, properly identified with a Laboratory ID number. This letter documents the official transmission of the contents of the report and validates the information contained within.

All the results for the quality control samples passed thorough examination. Also, all parameters for data reduction and validation checked satisfactorily. 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.

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 3 years in our archives and after that time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. -91502H will be filed for 60 days, and after that time they will be properly disposed of 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).

XENCO operates under the A2LA guidelines. Our Quality System meets ISO/IEC Guide 25 requirements which is strictly implemented and enforced through our standard QA/QC procedures.

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.

Sincerely,

Eddie L. Clemons, II
QA/QC Manager

ANALYTICAL REPORT -91502

for

Corrigan Consulting, Inc.

Project Manager: Wendall Honeycutt

Project Name: MP/COH Heights Service Center

Project Id: 98S-128

RECEIVED
JUN 11 1999
BY:

May 24, 1999

XENCO Laboratories

HOUSTON - DALLAS - SAN ANTONIO

11381 Meadowglen Lane Suite L * Houston, Texas 77082-2647
Phone (281) 589-0692 Fax (281) 589-0695

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A07C97

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: May 22, 1998 14:45
Date Analyzed: May 22, 1998 12:35
QA/QC Manager: Eddie Clemons, B.S.

Analyst: EZ
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 181919- 009 / **Parameter**	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	%	%	%	
Total Petroleum Hydrocarbons	< 7.50	202	217	201	7.50	20.0	7.2	100.7	108.2	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Sunil Ajal M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A07C97

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: May 22, 1998 14:45
Date Analyzed: May 22, 1998 11:50
QA/QC Manager: Eddie Clemons, B.S.

Analyst: EZ
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result	[B] Blank Spike Result	[C] Blank Spike Amount	[D] Detection Limit	[E] QC LIMITS Blank Spike Recovery	[F] Recovery Range	[G] Qualifier
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	
Total Petroleum Hydrocarbons	< 7.50	184	201	7.50	91.7	65-135	

nk S Recovery [E] = 100*(B-A)/(C)
. = ı iculated, data below detection limit
. = Below detection limit
esults are based on MDL and validated for QC purposes only

Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A02B54

SW846-8270 PAHs by GC-MS

Date Validated: May 29, 1998 08:21
Date Analyzed: May 28, 1998 19:52
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY

Q.C. Sample ID 181889-002 / Parameter	[A] Sample Result mg/Kg	[B] Matrix Spike Result mg/Kg	[C] Matrix Spike Duplicate Result mg/Kg	[D] Matrix Spike Amount mg/Kg	[E] Detection Limit mg/Kg	Matrix Limit Relative Difference %	[F] QC Spike Relative Difference %	[G] QC Matrix Spike Recovery %	[H] QC M.S.D. Recovery %	[I] Matrix Spike Recovery Range %	[J] Qualifier
Acenaphthene	0.680	3.487	3.447	3.333	0.133	19.0	1.2	84.2	83.0	31-137	
4-Chloro-3-Methylphenol	< 0.253	2.347	2.513	3.333	0.253	33.0	6.8	70.4	75.4	26-103	
2-Chlorophenol	< 0.333	2.720	2.853	3.333	0.333	28.7	4.8	81.6	85.6	25-102	
1,4-Dichlorobenzene	< 0.280	3.053	3.053	3.333	0.280	32.1	0.0	91.6	91.6	28-104	
2,4-Dinitrotoluene	< 0.333	2.687	2.713	3.333	0.333	21.8	1.0	80.6	81.4	28-89	
N-Nitroso-di-n-propylamine	< 0.267	2.920	2.960	3.333	0.267	55.4	1.4	87.6	88.8	41-126	
4-Nitrophenol	< 0.267	< 0.267	< 0.267	3.333	0.267	47.2	—	—	—	11-114	A
Pentachlorophenol	< 0.573	2.540	2.820	3.333	0.573	48.9	10.4	76.2	84.6	17-109	
Phenol	< 0.247	2.360	2.500	3.333	0.247	22.6	5.8	70.8	75.0	26-90	
Pyrene	< 0.133	3.193	3.220	3.333	0.133	25.2	0.8	95.8	96.6	35-142	
1,2,4-Trichlorobenzene	< 0.360	3.140	3.173	3.333	0.360	23.0	1.0	94.2	95.2	38-107	

(A) Low recovery attributed to sample matrix effect
Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results [illegible]sed on MDL and validated for QC purposes

for Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A02B54

SW846-8270 PAHs by GC-MS

Date Validated: May 29, 1998 08:21
Date Analyzed: May 28, 1998 17:20
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result mg/Kg	[B] Blank Spike Result mg/Kg	[C] Blank Spike Amount mg/Kg	[D] Detection Limit mg/Kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Acenaphthene	< 0.133	3.333	3.333	0.133	100.0	31-137	
4-Chloro-3-Methylphenol	< 0.253	2.907	3.333	0.253	87.2	26-103	
2-Chlorophenol	< 0.333	3.320	3.333	0.333	99.6	25-102	
1,4-Dichlorobenzene	< 0.280	3.373	3.333	0.280	101.2	28-104	
2,4-Dinitrotoluene	< 0.333	2.927	3.333	0.333	87.8	28-89	
N-Nitroso-di-n-propylamine	< 0.267	3.260	3.333	0.267	97.8	41-126	
4-Nitrophenol	< 0.267	1.953	3.333	0.267	58.6	11-114	
P lorophenol	< 0.573	2.220	3.333	0.573	66.6	17-109	
Phenol	< 0.247	2.860	3.333	0.247	85.8	26-90	
Pyrene	< 0.133	3.653	3.333	0.133	109.6	35-142	
1,2,4-Trichlorobenzene	< 0.360	3.393	3.333	0.360	101.8	38-107	

ınk Recovery [E] = 100*(B-A)/(C)
). = alculated, data below detection limit
). = Below detection limit
results are based on MDL and validated for QC purposes only

Sunil Ajani M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A01B72

SW846- 8260 Volatile Organic Analysis

Date Validated: Jun 3, 1998 13:45
Date Analyzed: Jun 1, 1998 12:26
QA/QC Manager: Eddie Clemons, B.S.

Analyst: CE
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/Kg	[B] Blank Spike Result mg/Kg	[C] Blank Spike Amount mg/Kg	[D] Detection Limit mg/Kg	[E] QC LIMITS Blank Spike Recovery %	[F] Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.0579	0.0500	0.0010	115.8	66-142	
Chlorobenzene	< 0.0010	0.0532	0.0500	0.0010	106.4	60-133	
1,1-Dichloroethene	< 0.0040	0.0590	0.0500	0.0040	118.0	59-172	
Toluene	< 0.0010	0.0581	0.0500	0.0010	116.2	59-139	
Trichloroethene	< 0.0030	0.0546	0.0500	0.0030	109.2	62-137	

lank Spike Recovery [E] = 100*(B-A)/(C)
I.C. = Not calculated, data below detection limit
'.D. = Below detection limit
ll results are based on MDL and validated for QC purposes only

Sunil Ajal, M.S.
Technical Director

Laboratori

Certificate Of Quality C..trol for Batch : 18A01B72

SW846- 8260 Volatile Organic Analysis

Date Validated: Jun 3, 1998 13:45
Date Analyzed: Jun 1, 1998 15:56
QA/QC Manager: Eddie Clemons, B.S.

Analyst: CE
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 181901- 004	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
Parameter	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	%	%	%	%	%	
Benzene	< 0.0010	0.0478	0.0493	0.0500	0.0010	20.0	3.1	95.6	98.6	66-142	
Chlorobenzene	< 0.0010	0.0465	0.0470	0.0500	0.0010	20.0	1.1	93.0	94.0	60-133	
1,1-Dichloroethene	< 0.0040	0.0363	0.0396	0.0500	0.0040	25.0	8.7	72.6	79.2	59-172	
Toluene	0.0029	0.0505	0.0526	0.0500	0.0010	20.0	4.1	95.2	99.4	59-139	
Trichloroethene	< 0.0030	0.0436	0.0440	0.0500	0.0030	20.0	0.9	87.2	88.0	62-137	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A23B57

SW846- 8260 Volatile Organic Analysis

Date Validated: May 30, 1998 17:15
Date Analyzed: May 26, 1998 13:52
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 181884- 001	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
Parameter	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	%	%	%	%	%	
enzene	< 0.0010	0.0477	0.0490	0.0500	0.0010	20.0	2.7	95.4	98.0	66-142	
hlorobenzene	< 0.0010	0.0477	0.0509	0.0500	0.0010	20.0	6.5	95.4	101.8	60-133	
,1-Dichloroethene	< 0.0040	0.0460	0.0485	0.0500	0.0040	25.0	5.3	92.0	97.0	59-172	
oluene	< 0.0010	0.0466	0.0494	0.0500	0.0010	20.0	5.8	93.2	98.8	59-139	
richloroethene	< 0.0030	0.0450	0.0488	0.0500	0.0030	20.0	8.1	90.0	97.6	62-137	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A23B57

SW846- 8260 Volatile Organic Analysis

Date Validated: May 30, 1998 17:15
Date Analyzed: May 26, 1998 13:16
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/Kg	[B] Blank Spike Result mg/Kg	[C] Blank Spike Amount mg/Kg	[D] Detection Limit mg/Kg	[E] QC LIMITS Blank Spike Recovery %	[F] Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.0450	0.0500	0.0010	90.0	66-142	
Chlorobenzene	< 0.0010	0.0466	0.0500	0.0010	93.2	60-133	
1,1-Dichloroethene	< 0.0040	0.0393	0.0500	0.0040	78.6	59-172	
Toluene	< 0.0010	0.0434	0.0500	0.0010	86.8	59-139	
Trichloroethene	< 0.0030	0.0515	0.0500	0.0030	103.0	62-137	

: S[illegible]covery [E] = 100*(B-A)/(C)
= Not calculated, data below detection limit
= Below detection limit
sults are based on MDL and validated for QC purposes only

Sunil Ajaj, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A23B56

SW846- 8260 Volatile Organic Analysis

Date Validated: May 28, 1998 13:15
Date Analyzed: May 27, 1998 14:26
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 181901- 001	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
Parameter	mg/L	mg/L	mg/L	mg/L	mg/L	%	%	%	%	%	
enzene	< 0.0010	0.0451	0.0456	0.0500	0.0010	20.0	1.1	90.2	91.2	66-142	
hlorobenzene	< 0.0010	0.0455	0.0473	0.0500	0.0010	20.0	3.9	91.0	94.6	60-133	
,1-Dichloroethene	< 0.0040	0.0425	0.0450	0.0500	0.0040	25.0	5.7	85.0	90.0	59-172	
oluene	< 0.0010	0.0438	0.0459	0.0500	0.0010	20.0	4.7	87.6	91.8	59-139	
richloroethene	< 0.0030	0.0447	0.0442	0.0500	0.0030	20.0	1.1	89.4	88.4	62-137	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A23B56

SW846- 8260 Volatile Organic Analysis

Date Validated: May 28, 1998 13:15
Date Analyzed: May 27, 1998 11:59
QA/QC Manager: Eddie Clemons, B.S.

Analyst: LC
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Detection Limit mg/L	[E] QC LIMITS Blank Spike Recovery %	[F] QC LIMITS Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.0482	0.0500	0.0010	96.4	66-142	
Chlorobenzene	< 0.0010	0.0465	0.0500	0.0010	93.0	60-133	
1,1-Dichloroethene	< 0.0040	0.0485	0.0500	0.0040	97.0	59-172	
Toluene	< 0.0010	0.0452	0.0500	0.0010	90.4	59-139	
Trichloroethene	< 0.0030	0.0501	0.0500	0.0030	100.2	62-137	

< S ecovery [E] = 100*(B-A)/(C)
= No calculated, data below detection limit
= Below detection limit
sults are based on MDL and validated for QC purposes only

Sunil Ajai, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A06C50

SW- 846 7421 Lead (Graphite Furnace)

Date Validated: Jul 7, 1998 11:32
Date Analyzed: Jul 7, 1998 11:18

Analyst: CG
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 181919- 009	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Lead	4.615	4.752	0.125	2.9	25.0	47.500	50.00	85.8	70-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results sed on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A06C50

SW- 846 7421 Lead (Graphite Furnace)

Date Validated: Jul 7, 1998 11:32
Date Analyzed: Jul 7, 1998 11:00

Analyst: CG
Matrix: Solid

	BLANK SPIKE ANALYSIS						
	[A]	[B]	[C]	[D]	[E]	[F]	[G]
	Blank	Blank Spike	Blank		QC	LIMITS	
Parameter	Result	Result	Spike Amount	Detection Limit	Blank Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	mg/kg	%	%	
Lead	< 0.125	42.000	50.000	0.125	84.0	70-125	

lan : Recovery [E] = 100*(B-A)/(C)
.C. = ...ot calculated, data below detection limit
.D. = Below detection limit
ll results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A06B89

SW- 846 7421 Lead (Graphite Furnace)

Date Validated: May 27, 1998 11:33
Date Analyzed: May 26, 1998 15:12
QA/QC Manager: Eddie Clemons, B.S.

Analyst: MB
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Lead	< 0.125	53.000	50.000	0.125	106.0	70-125	

nk Spike Recovery [E] = 100*(B-A)/(C)
. = Not calculated, data below detection limit
. = Below detection limit
esults are based on MDL and validated for QC purposes only

Sunil Ajal, M.S.
Technical Director

Certificate Of Quality ntrol for Batch : 18A06C39

EPA 1312/239.2 SPLP Lead

Date Validated: Jun 24, 1998 19:00
Date Analyzed: Jun 24, 1998 18:33

Analyst: CG
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 181919- 001	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G] Qualifier
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	
	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Lead	0.0322	0.0340	0.0025	5.4	25.0	1.0300	1.000	99.8	75-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Houston · Dallas · San Antonio

Eddie L. Clemons, II
Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A06C39

EPA 1312/239.2 SPLP Lead

Date Validated: Jun 24, 1998 19:00
Date Analyzed: Jun 24, 1998 18:16

Analyst: CG
Matrix: Solid

BLANK SPIKE ANALYSIS

Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Detection Limit mg/L	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Lead	< 0.0025	1.0225	1.0000	0.0025	102.3	75-125	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
B.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemens, II
QA/QC Manager

Certificate Of Quality ntrol for Batch : 18A18E57

EPA 6010 Total Lead

Date Validated: Jun 26, 1998 13:34
Date Analyzed: Jun 26, 1998 12:21

Analyst: CG
Matrix: Solid

Q.C. Sample ID 181919- 005	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[G]
				QC	LIMITS			QC	LIMITS	
Parameter	Sample Result	Duplicate Result	Detection Limit	Relative Difference	Relative Difference	Matrix Spike Result	Matrix Spike Amount	Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Lead	9.300	8.375	2.500	10.5	30.0	49.975	50.00	81.4	65-135	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemens, II
~~QA/QC~~ Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A18E57

EPA 6010 Total Lead

Date Validated: Jun 26, 1998 13:34
Date Analyzed: Jun 26, 1998 11:36

Analyst: CG
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Lead	< 2.500	50.450	50.000	2.500	100.9	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
B.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

Certificate Of Quality ntrol for Batch : 18A18E61

SW846- 1312/6010 SPLP Metals

Date Validated: Jun 26, 1998 15:25
Date Analyzed: Jun 26, 1998 14:01

Analyst: CG
Matrix: Solid

Q.C. Sample ID 181919- 001	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[G]
				QC	LIMITS			QC	LIMITS	
Parameter	Sample Result	Duplicate Result	Detection Limit	Relative Difference	Relative Difference	Matrix Spike Result	Matrix Spike Amount	Matrix Spike Recovery	Recovery Range	Qualifier
	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Cadmium	< 0.0100	< 0.0100	0.0100	N.C	30.0	0.2085	0.200	104.3	65-135	

Relative Difference (D) = 200*(B-A)/(B+A)
Matrix Spike Recovery (H) = 100*(F-A)/(G)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A18E61

SW846- 1312/6010 SPLP Metals

Date Validated: Jun 26, 1998 15:25
Date Analyzed: Jun 26, 1998 13:54

Analyst: CG
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Detection Limit mg/L	[E] QC LIMITS Blank Spike Recovery %	[F] QC LIMITS Recovery Range %	[G] Qualifier
Cadmium	< 0.0100	0.2290	0.2000	0.0100	114.5	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

Certificate Of Quality Control for Batch : 18A18E56

EPA 6010 Total Arsenic

Date Validated: Jun 26, 1998 13:34
Date Analyzed: Jun 26, 1998 12:21

Analyst: CG
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 181919- 005	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Arsenic	< 5.000	< 5.000	5.000	N.C	30.0	35.725	50.00	71.5	65-135	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A18E56

EPA 6010 Total Arsenic

Date Validated: Jun 26, 1998 13:34
Date Analyzed: Jun 26, 1998 11:36

Analyst: CG
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 5.000	47.900	50.000	5.000	95.8	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

Certificate Of Quality Control for Batch : 18A18D58

SW846/6010 RCRA Metals

Date Validated: May 26, 1998 11:02
Date Analyzed: May 22, 1998 13:35
QA/QC Manager: Eddie Clemons, B.S.

Analyst: MB
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 181901- 001	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Arsenic	< 5.00	< 5.00	5.00	N.C	30.0	40.15	50.0	80.3	65-135	
Barium	36.60	36.90	2.00	0.8	30.0	62.15	25.0	102.2	65-135	
Cadmium	< 1.000	1.050	1.000	N.C	30.0	8.025	10.00	80.3	65-135	
Chromium	3.85	3.70	2.50	4.0	30.0	23.62	25.0	79.1	65-135	
Lead	41.20	41.00	2.50	0.5	30.0	75.15	50.0	67.9	65-135	
Selenium	< 5.00	< 5.00	5.00	N.C	30.0	27.30	50.0	54.6	65-135	A
Silver	< 2.000	< 2.000	2.000	N.C	30.0	43.200	40.00	108.0	65-135	

(A) Post-digestion spike within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Sunil Ajmani, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A18D58

SW846/6010 RCRA Metals

Date Validated: May 26, 1998 11:02
Date Analyzed: May 22, 1998 15:56
QA/QC Manager: Eddie Clemons, B.S.

Analyst: MB
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 181891- 001	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[G]
	Sample	Duplicate		QC	LIMITS	Matrix Spike	Matrix	QC	LIMITS	
Parameter	Result	Result	Detection Limit	Relative Difference	Relative Difference	Result	Spike Amount	Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Arsenic	< 10.00	< 10.00	10.00	N.C	30.0	69.45	100	69.5	65-135	
Barium	63.40	61.05	4.00	3.8	30.0	97.25	50.0	67.7	65-135	
Cadmium	< 2.000	< 2.000	2.000	N.C	30.0	16.000	20.00	80.0	65-135	
Chromium	6.70	6.70	5.00	0.0	30.0	44.90	50.0	76.4	65-135	
Lead	11.35	11.45	5.00	0.9	30.0	87.00	100	75.7	65-135	
Selenium	< 10.00	< 10.00	10.00	N.C	30.0	77.85	100	77.9	65-135	
Silver	< 4.000	< 4.000	4.000	N.C	30.0	51.000	80.00	63.8	65-135	A

(A) Post-digestion spike within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results a ied on MDL and validated for QC purposes only

Sunil Ajar, M.S.
Technical Director

XENCO Laboratories

Certificate Of Quality Control for Batch : 18A18D58

SW846/6010 RCRA Metals

Date Validated: May 26, 1998 11:02
Date Analyzed: May 22, 1998 13:15
QA/QC Manager: Eddie Clemons, B.S.

Analyst: MB
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 5.00	46.72	50.00	5.00	93.4	65-135	
Barium	< 2.00	24.48	25.00	2.00	97.9	65-135	
Cadmium	< 1.000	9.600	10.000	1.000	96.0	65-135	
Chromium	< 2.50	24.35	25.00	2.50	97.4	65-135	
Lead	< 2.50	47.78	50.00	2.50	95.6	65-135	
Selenium	< 5.00	48.85	50.00	5.00	97.7	65-135	
Silver	< 2.000	33.475	40.000	2.000	83.7	65-135	

ank Recovery [E] = 100*(B-A)/(C)
C. = alculated, data below detection limit
D. = Below detection limit
results are based on MDL and validated for QC purposes only

Sunil Ajar, M.S.
Technical Director

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: COH Heights Service Center
Date Received in Lab : May 21, 1998 18:20
Project Manager: Wendall Honeycutt
Date Reported: Jul 7, 1998
Project Location: Houston, TX
XENCO contact : Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:* / *Field ID:* / *Depth:* / *Matrix:* / *Sampled:*	181919 007 SB6-A 3-4' Solid 05/21/98 16:15	181919 009 SB7-A 3-4' Solid 05/21/98 16:30				
Total Lead EPA 6010	*Analyzed:* / *Units:*	06/26/98 mg/kg R.L.					
Lead		3.20 (2.50)					
Lead (Graphite Furnace) EPA 7421	*Analyzed:* / *Units:*		07/07/98 mg/kg R.L.				
Lead			4.62 (0.50)				
Total Petroleum Hydrocarbons EPA 418.1	*Analyzed:* / *Units:*	05/22/98 mg/kg R.L.	05/22/98 mg/kg R.L.				
Total Petroleum Hydrocarbons		< 10.4 (10.4)	< 10.0 (10.0)				

This report summary, and the entire report it represents, has been made for the exclusive and confidential use of Corrigan Consulting, Inc..
The interpretations and results expressed through this analytical report represent the best judgment of XENCO Laboratories.
XENCO Laboratories, however, assumes no responsibility and makes no warranty to the end use of the data hereby presented.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: COH Heights Service Center
Date Received in Lab : May 21, 1998 18:20
Project Manager: Wendall Honeycutt
Date Reported: Jul 7, 1998
Project Location: Houston, TX
XENCO contact : Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001		181919 002		181919 003		181919 004		181919 005		181919 006	
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A		SB5-B	
	Depth:	1-2'		1-2'		1-2'		1-2'		3-4'		5-6'	
	Matrix:	Solid		Solid		Solid		Solid		Solid		Solid	
	Sampled:	05/21/98 15:45		05/21/98 15:50		05/21/98 15:30		05/21/98 15:19		05/21/98 16:00		05/21/98 16:10	
EPA 8270	*Analyzed:*	05/28/98	R.L.	05/28/98	R.L.	05/29/98	R.L.	05/29/98	R.L.				
	Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg					
2,4,6-Trichlorophenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)				
bis [2-Chloroethoxy] methane		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)				
bis [2-Chloroethyl] ether		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)				
bis [2-Chloroisopropyl] ether		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)				
bis [2-Ethylhexyl] phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)				
SPLP Lead 1312/239.2	*Analyzed:*	06/24/98	R.L.										
	Units:	mg/L											
Lead		0.032	(0.005)										
Total Petroleum Hydrocarbons EPA 418.1	*Analyzed:*	05/22/98	R.L.	05/22/98	R.L.	05/22/98	R.L.	05/22/98	R.L.	05/22/98	R.L.		
	Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg			
Total Petroleum Hydrocarbons		210	(10.0)	72.3	(10.0)	21.7	(10.0)	14.5	(10.0)	14.5	(10.0)		

This report summary, and the entire report it represents, has been made for the exclusive and confidential use of Corrigan Consulting, Inc..
The interpretations and results expressed through this analytical report represent the best judgment of XENCO Laboratories.
XENCO Laboratories, however, assumes no responsibility and makes no warranty to the end use of the data hereby presented.

Eddie L. Clemons, II
LA QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: COH Heights Service Center
Date Received in Lab : May 21, 1998 18:20
Project Manager: Wendall Honeycutt
Date Reported: Jul 7, 1998
Project Location: Houston, TX
XENCO contact : Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001		181919 002		181919 003		181919 004		181919 005	181919 006
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB5-B
	Depth:	1-2'		1-2'		1-2'		1-2'		3-4'	5-6'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	05/21/98 15:45		05/21/98 15:50		05/21/98 15:30		05/21/98 15:19		05/21/98 16:00	05/21/98 16:10
	Analyzed:	05/28/98		05/28/98		05/29/98		05/29/98			
EPA 8270	*Units:*	mg/Kg	R.L.	mg/Kg	R.L.	mg/Kg	R.L.	mg/Kg	R.L.		
Hexachlorobutadiene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Hexachlorocyclopentadiene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Hexachloroethane		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Indeno(1,2,3-cd)pyrene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Isophorone		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Methylnaphthalene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Methylphenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4-Methylphenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
N-Nitroso-di-n-propylamine		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
N-Nitrosodiphenylamine		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Naphthalene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Nitroaniline		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
3-Nitroaniline		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
4-Nitroaniline		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
Nitrobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Nitrophenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4-Nitrophenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Pentachlorophenol		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
Phenanthrene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Phenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Pyrene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Pyridine		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
1,2,4-Trichlorobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2,4,5-Trichlorophenol		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		

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XENCO L tories, however, assumes no responsibility and makes no warranty to the end use of th hereby presented.

Eddie L. Clemons, II
QA/Q anager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128 | ***Project Name: COH Heights Service Center*** | **Date Received in Lab :** May 21, 1998 18:20

Project Manager: Wendall Honeycutt | **Date Reported:** Jul 7, 1998

Project Location: Houston, TX | **XENCO contact :** Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001		181919 002		181919 003		181919 004		181919 005	181919 006
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB5-B
	Depth:	1-2'		1-2'		1-2'		1-2'		3-4'	5-6'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	05/21/98 15:45		05/21/98 15:50		05/21/98 15:30		05/21/98 15:19		05/21/98 16:00	05/21/98 16:10
EPA 8270	*Analyzed:*	05/28/98	R.L.	05/28/98	R.L.	05/29/98	R.L.	05/29/98	R.L.		
	Units:	mg/Kg		mg/Kg		mg/Kg		mg/Kg			
4-Chloroaniline		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Chloronaphthalene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2-Chlorophenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4-Chlorophenyl-phenyl ether		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Chrysene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Di-n-butyl phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Di-n-octyl phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Dibenzo(a,h)anthracene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Dibenzofuran		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
1,2-Dichlorobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
1,3-Dichlorobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
1,4-Dichlorobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
3,3'-Dichlorobenzidine		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2,4-Dichlorophenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Diethyl phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2,4-Dimethylphenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Dimethyl phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4,6-Dinitro-2-methylphenol		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
2,4-Dinitrophenol		< 8.3	(8.3)	< 0.83	(0.83)	< 0.83	(0.83)	< 0.83	(0.83)		
2,4-Dinitrotoluene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
2,6-Dinitrotoluene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Fluoranthene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Fluorene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Hexachlorobenzene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		

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Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: COH Heights Service Center
Date Received in Lab : May 21, 1998 18:20
Project Manager: Wendall Honeycutt
Date Reported: Jul 7, 1998
Project Location: Houston, TX
XENCO contact : Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001		181919 002		181919 003		181919 004		181919 005	181919 006
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB5-B
	Depth:	1-2'		1-2'		1-2'		1-2'		3-4'	5-6'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	05/21/98 15:45		05/21/98 15:50		05/21/98 15:30		05/21/98 15:19		05/21/98 16:00	05/21/98 16:10
EPA 8260	*Analyzed:*	05/26/98	R.L.	05/26/98	R.L.	06/01/98	R.L.	05/27/98	R.L.		
	Units:	mg/kg		mg/kg		mg/Kg		mg/kg			
m,p-Xylenes		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
n-Butylbenzene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
n-Propylbenzene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
o-Xylene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
p-Isopropyltoluene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
sec-Butylbenzene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
tert-Butylbenzene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
trans-1,2-Dichloroethene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
trans-1,3-Dichloropropene		< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)	< 0.005	(0.005)		
Semivolatiles (SVOCs TCL)	*Analyzed:*	05/28/98	R.L.	05/28/98	R.L.	05/29/98	R.L.	05/29/98	R.L.		
EPA 8270	*Units:*	mg/Kg		mg/Kg		mg/Kg		mg/Kg			
Acenaphthene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Acenaphthylene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Anthracene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Benzo(a)anthracene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Benzo(a)pyrene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Benzo(b)fluoranthene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Benzo(g,h,i)perylene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Benzo(k)fluoranthene		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4-Bromophenyl-phenylether		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Butyl benzyl phthalate		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
Carbazole		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		
4-Chloro-3-Methylphenol		< 3.3	(3.3)	< 0.33	(0.33)	< 0.33	(0.33)	< 0.33	(0.33)		

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Eddie L. Clemons, II
QA/C anager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: COH Heights Service Center
Date Received in Lab : May 21, 1998 18:20
Project Manager: Wendall Honeycutt
Date Reported: Jul 7, 1998
Project Location: Houston, TX
XENCO contact : Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001	181919 002	181919 003	181919 004	181919 005	181919 006
	Field ID:	SB1-A	SB2-A	SB3-A	SB4-A	SB5-A	SB5-B
	Depth:	1-2'	1-2'	1-2'	1-2'	3-4'	5-6'
	Matrix:	Solid	Solid	Solid	Solid	Solid	Solid
	Sampled:	05/21/98 15:45	05/21/98 15:50	05/21/98 15:30	05/21/98 15:19	05/21/98 16:00	05/21/98 16:10
	Analyzed:	05/26/98	05/26/98	06/01/98	05/27/98		
EPA 8260	*Units:*	mg/kg R.L.	mg/kg R.L.	mg/Kg R.L.	mg/kg R.L.		
1,1-Dichloropropene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Ethylbenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Hexachlorobutadiene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Isopropylbenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
MTBE		< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)		
Methylene chloride		< 0.015 (0.015)	< 0.015 (0.015)	< 0.015 (0.015)	< 0.015 (0.015)		
Naphthalene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Styrene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1,1,2-Tetrachloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1,2,2-Tetrachloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Tetrachloroethene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Toluene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2,3-Trichlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2,4-Trichlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1,1-Trichloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1,2-Trichloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Trichloroethene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Trichlorofluoromethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2,3-Trichloropropane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2,4-Trimethylbenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,3,5-Trimethylbenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Vinyl chloride		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
cis-1,2-Dichloroethene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
cis-1,3-Dichloropropene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		

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QA/QC Manager

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Corrigan Consulting, Inc.

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Date Received in Lab : May 21, 1998 18:20
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Analysis Requested	*Lab ID:*	181919 001	181919 002	181919 003	181919 004	181919 005	181919 006
	Field ID:	SB1-A	SB2-A	SB3-A	SB4-A	SB5-A	SB5-B
	Depth:	1-2'	1-2'	1-2'	1-2'	3-4'	5-6'
	Matrix:	Solid	Solid	Solid	Solid	Solid	Solid
	Sampled:	05/21/98 15:45	05/21/98 15:50	05/21/98 15:30	05/21/98 15:19	05/21/98 16:00	05/21/98 16:10
	Analyzed:	05/26/98	05/26/98	06/01/98	05/27/98		
EPA 8260	*Units:*	mg/kg R.L.	mg/kg R.L.	mg/Kg R.L.	mg/kg R.L.		
Bromodichloromethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Bromoform		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Bromomethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Carbon Tetrachloride		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Chlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Chloroethane		< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)		
Chloroform		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Chloromethane		< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)	< 0.010 (0.010)		
2-Chlorotoluene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
4-Chlorotoluene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2-Dibromo-3-chloropropane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Dibromochloromethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2-Dibromoethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Dibromomethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2-Dichlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,3-Dichlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,4-Dichlorobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Dichlorodifluoromethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1-Dichloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2-Dichloroethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,1-Dichloroethene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,2-Dichloropropane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
1,3-Dichloropropane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
2,2-Dichloropropane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		

This report summary, and the entire report it represents, has been made for the exclusive and confidential use of Corrigan Consulting, Inc..
The interpretations and results expressed through this analytical report represent the best judgment of XENCO Laboratories.
XENCO ...atories, however, assumes no responsibility and makes no warranty to the end use of t... ...a hereby presented.

Eddie L. Clemons, II
QA/C ...anager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY 1-81919

Corrigan Consulting, Inc.

Project ID: 98S-128 | *Project Name: COH Heights Service Center* | **Date Received in Lab :** May 21, 1998 18:20

Project Manager: Wendall Honeycutt | **Date Reported:** Jul 7, 1998

Project Location: Houston, TX | **XENCO contact :** Brent Barron/Eddie Clemons

Analysis Requested	*Lab ID:*	181919 001	181919 002	181919 003	181919 004	181919 005	181919 006
	Field ID:	SB1-A	SB2-A	SB3-A	SB4-A	SB5-A	SB5-B
	Depth:	1-2'	1-2'	1-2'	1-2'	3-4'	5-6'
	Matrix:	Solid	Solid	Solid	Solid	Solid	Solid
	Sampled:	05/21/98 15:45	05/21/98 15:50	05/21/98 15:30	05/21/98 15:19	05/21/98 16:00	05/21/98 16:10
Total Arsenic EPA 6010	*Analyzed:*	06/26/98	06/26/98	06/26/98	06/26/98	06/26/98	
	Units:	mg/kg R.L.	mg/kg R.L.	mg/kg R.L.	mg/kg R.L.	mg/kg R.L.	
Arsenic		< 5.00 (5.00)	< 5.00 (5.00)	< 5.00 (5.00)	< 5.00 (5.00)	< 5.00 (5.00)	
Total Lead EPA 6010	*Analyzed:*					06/26/98	06/26/98
	Units:					mg/kg R.L.	mg/kg R.L.
Lead						9.30 (2.50)	5.62 (2.50)
RCRA Metals EPA 6010	*Analyzed:*	05/22/98	05/22/98	05/22/98	05/22/98		
	Units:	mg/kg R.L.	mg/kg R.L.	mg/kg R.L.	mg/kg R.L.		
Barium		29.5 (2.0)	79.3 (2.0)	31.8 (2.0)	12.8 (2.0)		
Cadmium		2.58 (0.50)	2.28 (0.50)	0.60 (0.50)	< 0.50 (0.50)		
Chromium		4.8 (2.5)	5.4 (2.5)	2.7 (2.5)	< 2.5 (2.5)		
Lead		117 (2.5)	99.1 (2.5)	31.6 (2.5)			
SPLP Metals EPA1312/6010	*Analyzed:*	06/26/98					
	Units:	mg/L R.L.					
Cadmium		< 0.005 (0.005)					
Lead (Graphite Furnace) EPA 7421	*Analyzed:*				05/26/98		
	Units:				mg/kg R.L.		
Lead					0.91 (0.50)		
Volatile Organic Analysis EPA 8260	*Analyzed:*	05/26/98	05/26/98	06/01/98	05/27/98		
	Units:	mg/kg R.L.	mg/kg R.L.	mg/Kg R.L.	mg/kg R.L.		
Benzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Bromobenzene		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		
Bromochloromethane		< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)	< 0.005 (0.005)		

This report summary, and the entire report it represents, has been made for the exclusive and confidential use of Corrigan Consulting, Inc..
The interpretations and results expressed through this analytical report represent the best judgment of XENCO Laboratories.
XENCO Laboratories, however, assumes no responsibility and makes no warranty to the end use of the data hereby presented.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: Houston, TX

Project Name: COH Heights Service Center

XENCO COC#: 1-81919
Date Received in Lab: May 21, 1998 18:20 by AS
XENCO contact : Brent Barron/Eddie Clemons

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
29			Lead (ICP)	EPA 6010	mg/kg	ASAP	May 21, 1998 16:15	Jun25,1998 17:15	Jun 25, 1998 by AO	Jun 26, 1998 12:29 by CG
30	SB7-A Soil Boring	181919-009	TPH	EPA 418.1	mg/kg	24 hours	May 21, 1998 16:30		May 22, 1998 by EZ	May 22, 1998 12:35 by EZ
31			Pb (GF/SW)	SW-846 7421	mg/kg	ASAP	May 21, 1998 16:30	Jul 1,1998 09:00	Jul 6, 1998 by AO	Jul 7, 1998 11:12 by CG

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: Houston, TX

Project Name: COH Heights Service Center

XENCO COC#: 1-81919
Date Received in Lab: May 21, 1998 18:20 by AS
XENCO contact : Brent Barron/Eddie Clemons

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
1	SB1-A Soil Boring	181919-001	TPH	EPA 418.1	mg/kg	Standard	May 21, 1998 15:45		May 22, 1998 by EZ	May 22, 1998 12:05 by EZ
2			VOA (8260)	SW846-8260	mg/kg	Standard	May 21, 1998 15:45		May 26, 1998 by LC	May 26, 1998 18:06 by LC
3			SV-TCL	SW846-8270	mg/kg	Standard	May 21, 1998 15:45		May 22, 1998 by SS	May 28, 1998 22:23 by LC
4			RCRA Metals	SW846/6010	mg/kg	Standard	May 21, 1998 15:45		May 22, 1998 by AO	May 22, 1998 16:51 by MB
5			Tot. Arsenic	EPA 6010	mg/kg	3 days	May 21, 1998 15:45	Jun23,1998 16:30	Jun 25, 1998 by AO	Jun 26, 1998 11:44 by CG
6			SPLP Metals	SW846-1312/60	mg/L	3 days	May 21, 1998 15:45	Jun23,1998 16:30	Jun 23, 1998 by AO	Jun 26, 1998 13:59 by CG
7			Pb (GF),SPLP	EPA 1312/239.2	mg/L	3 days	May 21, 1998 15:45	Jun23,1998 16:30	Jun 23, 1998 by AO	Jun 24, 1998 18:27 by CG
8	SB2-A Soil Boring	181919-002	TPH	EPA 418.1	mg/kg	Standard	May 21, 1998 15:50		May 22, 1998 by EZ	May 22, 1998 12:10 by EZ
9			VOA (8260)	SW846-8260	mg/kg	Standard	May 21, 1998 15:50		May 26, 1998 by LC	May 26, 1998 18:42 by LC
10			SV-TCL	SW846-8270	mg/kg	Standard	May 21, 1998 15:50		May 22, 1998 by SS	May 28, 1998 23:15 by LC
11			RCRA Metals	SW846/6010	mg/kg	Standard	May 21, 1998 15:50		May 22, 1998 by AO	May 22, 1998 17:09 by MB
12			Tot. Arsenic	EPA 6010	mg/kg	3 days	May 21, 1998 15:50	Jun23,1998 16:30	Jun 25, 1998 by AO	Jun 26, 1998 11:48 by CG
13	SB3-A Soil Boring	181919-003	TPH	EPA 418.1	mg/kg	Standard	May 21, 1998 15:30		May 22, 1998 by EZ	May 22, 1998 12:15 by EZ
14			VOA (8260)	SW846-8260	mg/kg	Standard	May 21, 1998 15:30		Jun 1, 1998 by CE	Jun 1, 1998 19:26 by CE
15			SV-TCL	SW846-8270	mg/kg	Standard	May 21, 1998 15:30		May 22, 1998 by SS	May 29, 1998 00:04 by LC
16			RCRA Metals	SW846/6010	mg/kg	Standard	May 21, 1998 15:30		May 22, 1998 by AO	May 22, 1998 17:16 by MB
17			Tot. Arsenic	EPA 6010	mg/kg	3 days	May 21, 1998 15:30	Jun23,1998 16:30	Jun 25, 1998 by AO	Jun 26, 1998 11:52 by CG
18	SB4-A Soil Boring	181919-004	TPH	EPA 418.1	mg/kg	Standard	May 21, 1998 15:19		May 22, 1998 by EZ	May 22, 1998 12:20 by EZ
19			VOA (8260)	SW846-8260	mg/kg	Standard	May 21, 1998 15:19		May 27, 1998 by LC	May 27, 1998 13:12 by LC
20			SV-TCL	SW846-8270	mg/kg	Standard	May 21, 1998 15:19		May 22, 1998 by SS	May 29, 1998 00:54 by LC
21			RCRA Metals	SW846/6010	mg/kg	Standard	May 21, 1998 15:19		May 22, 1998 by AO	May 22, 1998 17:23 by MB
22			Pb (GF/SW)	SW-846 7421	mg/kg	Standard	May 21, 1998 15:19		May 22, 1998 by AO	May 26, 1998 15:42 by MB
23			Tot. Arsenic	EPA 6010	mg/kg	3 days	May 21, 1998 15:19	Jun23,1998 16:30	Jun 25, 1998 by AO	Jun 26, 1998 11:56 by CG
24	SB5-A Soil Boring	181919-005	TPH	EPA 418.1	mg/kg	24 hours	May 21, 1998 16:00		May 22, 1998 by EZ	May 22, 1998 12:25 by EZ
25			Lead (ICP)	EPA 6010	mg/kg	ASAP	May 21, 1998 16:00	Jun25,1998 17:15	Jun 25, 1998 by AO	Jun 26, 1998 12:00 by CG
26			Tot. Arsenic	EPA 6010	mg/kg	ASAP	May 21, 1998 16:00	Jun25,1998 17:15	Jun 25, 1998 by AO	Jun 26, 1998 12:00 by CG
27	SB5-B Soil Boring	181919-006	Lead (ICP)	EPA 6010	mg/kg	ASAP	May 21, 1998 16:10	Jun25,1998 17:15	Jun 25, 1998 by AO	Jun 26, 1998 12:25 by CG
28	SB6-A Soil Boring	181919-007	TPH	EPA 418.1	mg/kg	24 hours	May 21, 1998 16:15		May 22, 1998 by EZ	May 22, 1998 12:30 by EZ

XENCO Laboratories
11381 Meadowglen Suite L Houston, Texas 77082
(713) 589-0692 Fax (713) 589-0695

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Lab. Batch # 181919-H

Contractor: Corbean Consulting
Phone (281) 474-7455
Address: 1909 Carri Ln Seabrook, TX 77586
Project Name: City of Houston Heights Service Center
Project Director: John Herrmann
Project Location: Houston, Texas
Project Manager: Wendell Kennedy III
Sampler Signature:
Project No.: 985-128

No. coolers this shipment: 1
Contractor COC #: —
Carrier: Xenco
Quote #: —
Airbill No.: —
P.O. No.: —

SAMPLE CHARACTERIZATION

Unl Dies Ker Unknown
Waste Oil
PIT No.: Tank No.:

	Field ID	Date	Time	Depth	Soil	Water	Comp	Grab	Container Size	Container Type P, G	Preservative Ice	Preservative Other	Sample Description	No of Containers Total	BTEX (5030/8020-602)	TPH (418.1)	VOCs 8260	Please Hold	Remarks	Lab Only ID #
1	SB6-A	5/21/98	16:5	3'-4'	X		X		4oz	G	X		Soil Boring 6A	2		X	X		Hold VOCs Samples 24 hour turn around for TPH	1
2	SB6-B	5/21/98	16:20	5'-6'	X		X		4oz	G	X		Soil Boring 6B	2		X	X		Hold Samples	2
3	SB7-A	5/21/98	16:30	3'-4'	X		X		4oz	G	X		Soil Boring 7A	2		X	X		24 hour turn around for TPH Hold VOC Sample	3
4	SB7-B	5/21/98	16:35	5'-6'	X		X		4oz	G	X		Soil Boring 7B	2		X	X		Hold Samples	4
5	SB8-A	5/21/98	16:45	3'-4'	X		X		4oz	G	X		Soil Boring 8A	2		X	X		Hold Samples	5
6	SB8-B	5/21/98	16:50	5'-6'	X		X		4oz	G	X		Soil Boring 8B	2		X	X		Hold Samples	6
7	SB9-A	5/21/98	17:00	3'-4'	X		X		4oz	G	X		Soil Boring 9A	2		X	X		Hold Samples	7
8	SB9-B	5/21/98	17:05	5'-6'	X		X		4oz	G	X		Soil Boring 9B	2		X	X		Hold Samples	8
9	SB10-A	5/21/98	17:10	3'-4'	X		X		4oz	G	X		Soil Boring 10A	2		X	X		Hold Samples	9
10	SB10-B	5/21/98	17:15	5'-6'	X		X		4oz	G	X		Soil Boring 10B	2		X	X		Hold Samples	10

Turn-around: ASAP / 24 hrs / 48 hrs / Standard

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
[signature]	5/21/98	17:19	Angel Morales	5/21/98	17:19
Angel Morales	5/21/98	18:20	Received For Laboratory by [signature]	5/21/98	18:20

Remarks: Achieve RR #2 Detection Limits

Pink (Contr... Yellow & White (Lab).

* Pre-sc... uling is recommended

Precision ... ytical Services

Labor ies
(713) 589-0692 Fax (713) 589-0695

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Lab. Batch 31919-H

Contractor: CORNERSTONE CONSULTING Phone ( ) 474-

Address: 1909 CHAPEL LN SEABROOK, TX 77586

Project Name: CITY OF HOUSTON HEIGHTS SERVICE CENTER Project Director: JOHN HERRMANN

Project Location: HOUSTON, TX Project Manager: CHARLIE HENNESSY

Sampler Signature: Project No. 955-129

No. coolers this shipment: 1 Contractor COC #:

Carrier: KENCO Quote #: -

Airbill No. P.O. No: -

SAMPLE CHARACTERIZATION

	Field ID	Date	Time	DEPTH	BOIL	WATER	COMP	GRAB	Container Size	Container Type P, G	Preservative Ice	Preservative Other	Matrix: Soil, Dies, Ker, Unknown; Waste Oil; PIT No: Tank No: Sample Description	No of CONTAINERS Total	BTEX (5030/8020-602)	TPH (418.1)	TPH (TX1005)	VOC 8270	RCRA Cd Cr Pb 6010	Pb 7421/3	Please Hold	Turn-around: - ASAP, - 24 hrs, 48 hrs, Standard	Remarks	LAB ONLY ID #
1	SB1-A	5/21/98	14:45	1'-2'	X		X		4oz	G	X		Soil Boring 1A	2	X	X	X	X	X					1
2	SB1-B	5/21/98		3'-4'	X		X		4oz	G	X		Soil Boring 1B	2	X	X	X	X	X				HOLD SAMPLES NOT SAMPLED	2 (BSY)
3	SB2-A	5/21/98	15:00	1'-2'	X		X		4oz	G	X		Soil Boring 2A	2	X	X	X	X	X					3
4	SB2-B	5/21/98		3'-4'	X		X		4oz	G	X		Soil Boring 2B	2	X	X	X	X	X				NOT SAMPLED HOLD SAMPLES	4 (BSY)
5	SB3-A	5/21/98	15:30	1'-2'	X		X		4oz	G	X		Soil Boring 3A	2	X	X	X	X	X					5
6	SB3-B	5/21/98		3'-4'	X		X		4oz	G	X		Soil Boring 3B	2	X	X	X	X	X				NOT SAMPLED HOLD SAMPLES	6 (BSY)
7	SB4-A	5/21/98	15:19	1'-2'	X		X		4oz	G	X		Soil Boring 4A	2	X	X	X	X	X					7
8	SB4-B	5/21/98		3'-4'	X		X		4oz	G	X		Soil Boring 4B	2	X	X	X	X	X				NOT SAMPLED HOLD SAMPLES	8 (BSY)
9	SB5-A	5/21/98	16.00	3'-4'	X		X		4oz	G	X		Soil Boring 5A	2	X	X							HOLD FOR SAMPLE 24 HR FUTURE ANALYSIS FOR TPH	9
10	SB5-B	5/21/98	16:10	5'-6'	X		X		4oz	G	X		Soil Boring 5B	2	X	X							HOLD SAMPLES	10

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
	5/21/98	17:19	Angel Morales	17:19	5/21/98
Angel Morales	5/21/98	8:20			
			Received For Laboratory by: Glenn L. Smith	5/21/98	18:20

Remarks: ACHIEVE RCRA DETECTION LIMITS

Pink (Contractor), Yellow & White (Lab)

* Pre-scheduling is recommended

Precision Analytical Services

XENCO Laboratories

11381 Meadowglen Suite L
Houston, Texas 77082-2647
(281) 589-0692 Fax: (281) 589-0695
Houston - Dallas - San Antonio - Latin America

July 7, 1998

Project Manager: Wendall Honeycutt
Corrigan Consulting, Inc.
1909 Capri Lane
Seabrook, TX 77586

Reference: **XENCO Report No.: 1-81919**
Project Name: COH Heights Service Center
Project ID: 98S-128
Project Address: Houston, TX

Dear Wendall Honeycutt:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with XENCO Chain of Custody Number 1-81919. All results being reported to you apply only to the samples analyzed, properly identified with a Laboratory ID number. This letter documents the official transmission of the contents of the report and validates the information contained within.

All the results for the quality control samples passed thorough examination. Also, all parameters for data reduction and validation checked satisfactorily. 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.

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 3 years in our archives and after that time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. 1-81919 will be filed for 60 days, and after that time they will be properly disposed of 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).

XENCO operates under the A2LA guidelines. Our Quality System meets ISO/IEC Guide 25 requirements which is strictly implemented and enforced through our standard QA/QC procedures.

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.

Sincerely,

Eddie L. Clemons, II
QA/QC Manager

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!

RECEIVED
JUL 20 1998
BY:

ANALYTICAL REPORT 1-81919

for

Corrigan Consulting, Inc.

Project Manager: Wendall Honeycutt

Project Name: COH Heights Service Center

Project Id: 98S-128

July 7, 1998

XENCO Laboratories

HOUSTON - DALLAS - SAN ANTONIO

11381 Meadowglen Lane Suite L * Houston, Texas 77082-2647
Phone (281) 589-0692 Fax (281) 589-0695

XENCO Laboratories

CERTIFICATE OF ANALYSIS 1-81919

Project ID: 98S- 128
Project Manager: Wendall Honeycutt
Project Location: Houston, TX

Date Received in Lab: May 21, 1998
Date Report Faxed: June 16, 1998
Xenco contact: Brent Barron/ Eddie Clemons

Analysis Requested	Lab ID:	181919 001		181919 002		181919 003		181919 004		181919 005	181919 007
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB6-A
	Depth:	1-2'		1-2'		1-2'		1-2'		1-2'	1-2'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	5/21/98 15:45		5/21/98 15:50		5/21/98 15:30		5/21/98		5/21/98 16:00	5/21/98 16:15
Semivolatiles (SVOCs TCL)	Analyzed:	5/28/98	R.L.	5/28/98	R.L.	5/28/98	R.L.	5/29/98	R.L.		
EPA 8270	Units:	mg/Kg		mg/Kg		mg/Kg		MG/Kg			
Naphthalene		<3.3	409	<0.33	409	<0.33	409	<0.33	409		
2-Nitroaniline		<8.3	8.3	<0.83	0.83	<0.83	0.83	<0.83	0.83		
3-Nitroaniline		<8.3	8.3	<0.83	0.83	<0.83	0.83	<0.83	0.83		
4-Nitroaniline		<8.3	8.3	<0.83	0.83	<0.83	0.83	<0.83	0.83		
Nitrobenzene		<3.3	5.1	<0.33	5.1	<0.33	5.1	<0.33	5.1		
2-Nitrophenol		<3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
4-Nitrophenol		<3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Pentachlorophenol		<3.3	0.1	<0.33	0.1	<0.33	0.1	<0.33	0.1		
Phenanthrene		<3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Phenol		<3.3	6130	<0.33	6130	<0.33	6130	<0.33	6130		
Pyrene		<3.3	310	<0.33	310	<0.33	310	<0.33	310		
Pyridine		<3.3	10.2	<0.33	10.2	<0.33	10.2	<0.33	10.2		
1,2,4-Trichlorobenzene		<3.3	7	<0.33	7	<0.33	7	<0.33	7		
2,4,5-Trichlorophenol		<8.3	1020	<0.83	1020	<0.83	1020	<0.83	1020		
2,4,6-Trichlorophenol		<3.3	2.6	<0.33	2.6	<0.33	2.6	<0.33	2.6		
bis[2-Chloroethoxyl] methane		<3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
bis[2-Chloroethyl] ether		<3.3	0.026	<0.33	0.026	<0.33	0.026	<0.33	0.026		
bis[2-Chloroisopropyl] ether		<3.3	409	<0.33	409	<0.33	409	<0.33	409		
bis[2-Ethylhexyl]phthalate		<3.3	204	<0.33	204	<0.33	204	<0.33	204		

XENCO Laboratories

CERTIFICATE OF ANALYSIS 1-81919

Project ID: 98S- 128
Project Manager: Wendall Honeycutt
Project Location: Houston, TX

Date Received in Lab: May 21, 1998
Date Report Faxed: June 16, 1998
Xenco contact: Brent Barron/ Eddie Clemons

Analysis Requested	Lab ID:	181919 001		181919 002		181919 003		181919 004		181919 005	181919 007
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB6-A
	Depth:	1-2'		1-2'		1-2'		1-2'		1-2'	1-2'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	5/21/98 15:45		5/21/98 15:50		5/21/98 15:30		5/21/98		5/21/98 16:00	5/21/98 16:15
Semivolatiles (SVOCs TCL)	Analyzed:	5/28/98	R.L.	5/28/98	R.L.	5/28/98	R.L.	5/29/98	R.L.		
EPA 8270	Units:	mg/Kg		mg/Kg		mg/Kg		MG/Kg			
1,4-Dichlorobenzene		< 3.3	7.5	<0.33	7.5	<0.33	7.5	<0.33	7.5		
3,3'-Dichlorobenzidine		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2,4-Dichlorophenol		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Diethyl phthalate		< 3.3	8180	<0.33	8180	<0.33	8180	<0.33	8180		
2,4-Dimethylphenol		< 3.3	204	<0.33	204	<0.33	204	<0.33	204		
4, 6-Dinitro-2-methylphenol		<8.3	8.3	<0.83	0.83	<0.83	0.83	<0.83	0.83		
2,4-Dinitrophenol		<8.3	8.3	<0.83	0.83	<0.83	0.83	<0.83	0.83		
2,4-Dinitrotoluene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2,6-Dinitrotoluene		< 3.3	0.33	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Fluoranthene		< 3.3	409	<0.33	409	<0.33	409	<0.33	409		
Fluorene		< 3.3	409	<0.33	409	<0.33	409	<0.33	409		
Hexachlorobenzene		< 3.3	0.1	ND	0.1	ND	0.1	ND	0.1		
Hexachlorobutadiene		< 3.3	3.67	<0.33	3.67	<0.33	3.67	<0.33	3.67		
Hexachlorocyclopentadiene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Hexachloroethane		< 3.3	20.4	<0.33	20.4	<0.33	20.4	<0.33	20.4		
Indeno(1,2,3-cd)pyrene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Isophorone		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2-Methylnaphthalene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2-Methylphenol		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
4-Methylphenol		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
N-Nitroso-di-n-propylamine		< 3.3	0.0041	<0.33	0.0041	<0.33	0.0041	<0.33	0.0041		
N-Nitrosodiphenylamine		<8.3	0.0041	ND	0.0041	ND	0.0041	ND	0.0041		

XENCO Laboratories

CERTIFICATE OF ANALYSIS 1-81919

Project ID: 98S- 128
Project Manager: Wendall Honeycutt
Project Location: Houston, TX

Date Received in Lab: May 21, 1998
Date Report Faxed: June 16, 1998
Xenco contact: Brent Barron/ Eddie Clemons

Analysis Requested	Lab ID:	181919 001		181919 002		181919 003		181919 004		181919 005	181919 007
	Field ID:	SB1-A		SB2-A		SB3-A		SB4-A		SB5-A	SB6-A
	Depth:	1-2'		1-2'		1-2'		1-2'		1-2'	1-2'
	Matrix:	Solid		Solid		Solid		Solid		Solid	Solid
	Sampled:	5/21/98 15:45		5/21/98 15:50		5/21/98 15:30		5/21/98		5/21/98 16:00	5/21/98 16:15
Semivolatiles (SVOCs TCL)	Analyzed:	5/28/98	R.L.	5/28/98	R.L.	5/28/98	R.L.	5/29/98	R.L.		
EPA 8270	Units:	mg/Kg		mg/Kg		mg/Kg		MG/Kg			
Acenaphthene		< 3.3	613	<0.33	613	<0.33	613	<0.33	613		
Acenaphthylene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Anthracene		< 3.3	3070	<0.33	3070	<0.33	3070	<0.33	3070		
Benzo(a)anthracene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Benzo(a)pyrene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Benzo(b)fluoranthene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Benzo(g,h,i)perylene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Benzo(k)fluoranthene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
4-Bromophenyl-phenylether		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Butyl benzyl phthalate		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Carbazole		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
4-Chloro-3-Methylphenol		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
4-Chloroaniline		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2-Chloronaphthalene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
2-Chlorophenol		< 3.3	51.1	<0.33	51.1	<0.33	51.1	<0.33	51.1		
4-Chlorophenyl-phenyl ether		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Chrysene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Di-n-Butyl phthalate		< 3.3	1020	<0.33	1020	<0.33	1020	<0.33	1020		
Di-n-Octyl phthalate		< 3.3	204	<0.33	204	<0.33	204	<0.33	204		
Dibenzo(a,h)anthracene		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
Dibenzofuran		< 3.3	3.3	<0.33	0.33	<0.33	0.33	<0.33	0.33		
1,2-Dichlorobenzene		< 3.3	60	<0.33	60	<0.33	60	<0.33	60		
1,3-Dichlorobenzene		< 3.3	60	<0.33	60	<0.33	60	<0.33	60		

XENCO Laboratories

ANALYTICAL CHAIN OF CUSTODY REPORT
CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: 3602 Center, Houston,TX

Project Name: MP/COH Heights Service Center

XENCO COC#: -91502
Date Received in Lab: Apr 13, 1999 18:40 by OR
XENCO contact : Karen Olson/Brent Barron

	Field ID	Lab. ID	Method Name	Method ID	Units	Turn Around	Date and Time: Sample Collected	Date and Time: Addition Requested	Date and Time: Extraction	Date and Time: Analysis
57			TPH	EPA 418.1	mg/kg	10 days	Apr 13, 1999 15:40		Apr 15, 1999 by EZ	Apr 15, 1999 12:40 by EZ
58			Pb ICP-MS	EPA 6020	mg/kg	10 days	Apr 13, 1999 15:40		Apr 14, 1999 by ALO	Apr 15, 1999 14:14 by MAB
59			Moisture	ASTM 2216-71	%	24 hours	Apr 13, 1999 15:40		Apr 26, 1999 by EZ	Apr 26, 1999 12:25 by EZ

XENCO Laboratories
Case Narrative
TNRCC/MP/COH Heights Service Center
Project No. 98S-128

June 9, 1999
XENCO ID 91502
For Corrigan Consulting

Sample Receipt:

Twenty-eight samples were received at XENCO Laboratories on April 13, 1999 at 18:40 hours. These samples were intact and matched the chain of custody. The chain of custody was assigned XENCO ID number 91502. These soil samples were received in the proper containers for the analyses requested, on ice and the sample custody seals were intact. These samples were analyzed for target analytes in accordance with XENCO Laboratories SOP for Metals, BTEX and TPH.

Sample Receipt Non-conformances:

NA

Sample additions and corrections:

Thirteen of the twenty-eight samples were received on hold. On April 29, 1999 twelve of the samples were released for metals analyses. On May 13, 1999 the remaining sample was released for metals analyses. Samples analyses are reported on a dry weight basis.

Sample Preparation:

Soil samples for metals analyses were digested in accordance with XENCO Laboratories SOP MDGA-DGL-90066 (Method 3015). Soil sample MW-1A was tumbled for metals analysis using XENCO Laboratories SOP GENC-ORX-90030 (Method 1312). Soil sample WS-1 was purged for volatiles analysis using XENCO Laboratories SOP VOLA-VGC-90054 (Method 5030).

Sample Analysis and Results:

SOP MDGA-DGL-90060 (Method 6020): Precision, accuracy, and recovery data were within laboratory acceptance limits for all soil QC samples; with the exception of the RPD for Lead between the sample and sample duplicate. This QC failure is due to sample non-homogeneity. All other failing flags in the QC and Raw Data were for metals that were non-target analytes.

Eddie Clemons
QA/QC Director

Karen Olson
Project Manager

Sample Analysis and Results:

SOP GENC-ORX-90030 (Method 418.1): Precision, accuracy, and recovery data was within acceptance limits for all soil QC samples.

SOP VOLA-VGC-90050 (Method 8021): Precision, accuracy, and recovery data was within acceptance limits for all soil QC samples.

SOP GENC-ORX-90047 (Method 2216-71): Precision, accuracy, and recovery data was within acceptance limits for all soil QC samples.

Eddie Clemons
QA/QC Director

Karen Olson
Project Manager

Laboratories

CERTIFICATE OF ANALYSIS SUMMARY -91502

Corrigan Consulting, Inc.

Project ID: 98S-128 *Project Name: MP/COH Heights Service Center* **Date Received in Lab :** Apr 13, 1999 18:40

Project Manager: Wendall Honeycutt **Date Report Faxed:** May 25, 1999

Project Location: 3602 Center, Houston,TX **XENCO contact :** Karen Olson/Brent Barron

Analysis Requested		Lab ID: / Field ID: / Depth: / Matrix: / Sampled:	91502 001 MW-1A 16-18 Solid 04/13/99 10:21	91502 002 BG-1A 0-0.5 Solid 04/13/99 13:10	91502 003 BG-1B 1-1.5 Solid 04/13/99 13:15	91502 004 BG-2A 0-0.5 Solid 04/13/99 13:26	91502 005 BG-2B 1.5-2 Solid 04/13/99 13:31	91502 006 BG-3A 0-0.5 Solid 04/13/99 13:38
Moisture Content ASTM 2216-71	Analyzed: / Units:		05/24/99 % R.L.	04/26/99 % R.L.	04/30/99 % R.L.	04/26/99 % R.L.	04/30/99 % R.L.	04/26/99 % R.L.
Moisture Content			14.4 (0.1)	5.6 (0.1)	10.7 (0.1)	4.2 (0.1)	6.7 (0.1)	1.5 (0.1)
Total Lead by ICP-MS EPA 6020-Pb	Analyzed: / Units:			04/15/99 mg/kg R.L.	04/30/99 mg/kg R.L.	04/15/99 mg/kg R.L.	04/30/99 mg/kg R.L.	04/15/99 mg/kg R.L.
Lead				201 (1.1)	154 (1.1)	4.8 (1.1)	77.6 (1.1)	24.0 (1.0)
Total RCRA Metals by ICP-MS EPA 6020	Analyzed: / Units:		05/17/99 mg/kg R.L.					
Chromium			13.8 (2.9)					
SPLP Metals EPA1312/6010	Analyzed: / Units:		05/14/99 mg/L R.L.					
Chromium			J 0.018 (0.004)					

J-The contaminant was positively identified and the associated value is an estimated concentration.

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Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY -91502

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: MP/COH Heights Service Center
Date Received in Lab : Apr 13, 1999 18:40
Project Manager: Wendall Honeycutt
Date Report Faxed: May 24, 1999
Project Location: 3602 Center, Houston,TX
XENCO contact : Karen Olson/Brent Barron

Analysis Requested	*Lab ID:*	91502 007		91502 008		91502 009		91502 010		91502 011		91502 012	
	Field ID:	BG-3B		BG-4A		BG-4B		BG-5A		BG-5B		BG-6A	
	Depth:	1-1.5		0-0.5		1-1.5		0-0.5		1-1.5		0-0.5	
	Matrix:	Solid		Solid		Solid		Solid		Solid		Solid	
	Sampled:	04/13/99 13:44		04/13/99 13:48		04/13/99 13:51		04/13/99 13:54		04/13/99 13:56		04/13/99 14:02	
Moisture Content **ASTM 2216-71**	*Analyzed:*	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.
	Units:	%		%		%		%		%		%	
Moisture Content		13.5	(0.1)	4.2	(0.1)	13.5	(0.1)	8.2	(0.1)	2.9	(0.1)	3.5	(0.1)
Total Lead by ICP-MS **EPA 6020-Pb**	*Analyzed:*	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.
	Units:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Lead		7.6	(1.2)	12.7	(1.1)	12.0	(1.2)	28.8	(1.1)	17.6	(1.1)	31.0	(1.1)

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Eddie L. Clemons, II
QA/QC Manager

CERTIFICATE OF ANALYSIS SUMMARY -91502

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Name: MP/COH Heights Service Center
Date Received in Lab : Apr 13, 1999 18:40
Project Manager: Wendall Honeycutt
Date Report Faxed: May 24, 1999
Project Location: 3602 Center, Houston,TX
XENCO contact : Karen Olson/Brent Barron

Analysis Requested	*Lab ID:*	91502 013		91502 014		91502 015		91502 016		91502 017		91502 018	
	Field ID:	BG-6B		BG-7A		BG-7B		BG-8A		BG-8B		BG-9A	
	Depth:	1-1.5		0-0.5		1-1.5		0-0.5		1-1.5		0-0.5	
	Matrix:	Solid		Solid		Solid		Solid		Solid		Solid	
	Sampled:	04/13/99 14:04		04/13/99 14:10		04/13/99 14:12		04/13/99 14:16		04/13/99 14:18		04/13/99 14:22	
Moisture Content	*Analyzed:*	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.
ASTM 2216-71	*Units:*	%		%		%		%		%		%	
Moisture Content		9.7	(0.1)	4.8	(0.1)	6.3	(0.1)	4.3	(0.1)	11.6	(0.1)	4.1	(0.1)
Total Lead by ICP-MS	*Analyzed:*	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.
EPA 6020-Pb	*Units:*	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Lead		32.7	(1.1)	4.4	(1.1)	75.9	(1.1)	9.2	(1.1)	16.6	(1.2)	9.2	(1.1)

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Eddie L. Clemons, II.
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF AN' 'SIS SUMMARY -91502

Corrigan Consulting, Inc.

Project ID: 98S-128 ***Project Name: MP/COH Heights Service Center*** **Date Received in Lab :** Apr 13, 1999 18:40

Project Manager: Wendall Honeycutt **Date Report Faxed:** May 24, 1999

Project Location: 3602 Center, Houston,TX **XENCO contact :** Karen Olson/Brent Barron

Analysis Requested	*Lab ID:*	91502 019		91502 020		91502 021		91502 022		91502 023		91502 024	
	Field ID:	BG-9B		BG-10A		BG-10B		BG-11A		BG-11B		BG-12A	
	Depth:	1-1.5		0-0.5		1-1.5		0-0.5		1-1.5		0-0.5	
	Matrix:	Solid		Solid		Solid		Solid		Solid		Solid	
	Sampled:	04/13/99 14:24		04/13/99 14:30		04/13/99 14:32		04/13/99 14:35		04/13/99 14:37		04/13/99 14:41	
Moisture Content	*Analyzed:*	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.	04/30/99	R.L.	04/26/99	R.L.
ASTM 2216-71	*Units:*	%		%		%		%		%		%	
Moisture Content		15.4	(0.1)	2.5	(0.1)	12.7	(0.1)	7.8	(0.1)	12.7	(0.1)	9.0	(0.1)
Total Lead by ICP-MS	*Analyzed:*	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.	04/30/99	R.L.	04/15/99	R.L.
EPA 6020-Pb	*Units:*	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Lead		6.1	(1.2)	44.4	(1.1)	15.9	(1.2)	11.1	(1.1)	58.1	(1.2)	6.4	(1.1)

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Eddie L. Clemons, II
QA/QC Manager

Laboratories

CERTIFICATE OF ANALYSIS SUMMARY -91502

Corrigan Consulting, Inc.

Project ID: 98S-128 | ***Project Name: MP/COH Heights Service Center*** | **Date Received in Lab :** Apr 13, 1999 18:40

Project Manager: Wendall Honeycutt | **Date Report Faxed:** May 25, 1999

Project Location: 3602 Center, Houston,TX | **XENCO contact :** Karen Olson/Brent Barron

Analysis Requested	*Lab ID:*	91502 025		91502 026		91502 027		91502 028			
	Field ID:	BG-12B		B4-A		B4-B		WS-1			
	Depth:	1-1.5		0-2		6-8					
	Matrix:	Solid		Solid		Solid		Solid			
	Sampled:	04/13/99 14:43		04/13/99 14:56		04/13/99 15:07		04/13/99 15:40			
Moisture Content	*Analyzed:*	04/30/99		04/26/99		04/26/99		04/26/99			
ASTM 2216-71	*Units:*	%	R.L.	%	R.L.	%	R.L.	%	R.L.		
Moisture Content		15.1	(0.1)	12.6	(0.1)	17.4	(0.1)	9.2	(0.1)		
Total Lead by ICP-MS	*Analyzed:*	04/30/99						04/15/99			
EPA 6020	*Units:*	mg/kg	R.L.					mg/kg	R.L.		
Lead		5.9	(1.2)					23.4	(1.1)		
BTEX	*Analyzed:*							04/27/99			
EPA 8021B	*Units:*							ppm	R.L.		
Benzene								U	< 0.005 (0.005)		
Toluene								U	< 0.005 (0.005)		
Ethylbenzene								U	< 0.005 (0.005)		
m,p-Xylene								U	< 0.010 (0.010)		
o-Xylene								U	< 0.005 (0.005)		
Total BTEX									N.D.		
Total Petroleum Hydrocarbons	*Analyzed:*			04/15/99		04/15/99		04/15/99			
EPA 418.1	*Units:*			mg/kg	R.L.	mg/kg	R.L.	mg/kg	R.L.		
Total Petroleum Hydrocarbons				25.3	(11.4)	U	< 6.1 (6.1)	220	(11.0)		

U-The contaminant was analyzed for, but was not detected above the level of the associated value. The associated value is the MQL.

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Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF QUALITY CONTROL Batch # 19A36C33

INSTRUMENTATION:	GC	**METHOD:** SW-846 8021B		**DATE:**	4/26/99
ANALYST:	O.R.	**MATRIX:** Soil			

SURROGATE RECOVERY STANDARDS ANALYSIS

Sample ID - Blank	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
Bromofluorobenzene	30.00	28.22	94.1%	74-121
Sample ID - Blank Spike	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
Bromofluorobenzene	30.00	29.33	97.8%	74-121
Sample ID - 91502-028	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
Bromofluorobenzene	30.00	26.00	86.7%	74-121

Eddie Clemons
QA/QC Director

XENCO Laboratories

CERTIFICATE OF QUALITY CONTROL — Batch # 19A36C33

INSTRUMENTATION:	GC	**METHOD:** SW-846 8021B		**DATE:**	4/26/99
ANALYST:	O.R.	**MATRIX:** Soil			

INTERNAL STANDARD AREA ANALYSIS

Parameter	Retention time	Area response	Recovery %	QC LIMITS
a,a,a-Trifluorotoluene			Internal Recovery	Recovery Limits %
CCV1	10.35	2039786	N/A	
CCV2	10.35	2031214	N/A	
Blank	10.34	2051118	101%	50-200
Blankspike	10.35	2057110	101%	50-200
91502-028	10.35	2055015	101%	50-200

Eddie Clemons
QA/QC Director

XENCO Laboratories

SOIL

CORRIGAN CONSULTING		
ANALYTES	**MDL**	**MQL**
Benzene	0.86 (ppb)	5 (ppb)
Chromium	0.4(ppm)	2.5 (ppm)
Ethylbenzene	0.76 (ppb)	5 (ppb)
Lead	0.28 (ppb)	10 (ppb)
Toluene	0.59 (ppb)	5 (ppb)
m,p-Xylene	2.1 (ppb)	10 (ppb)
o-Xylene	0.96 (ppb)	5 (ppb)
TPH 418.1	**1 (ppb)	**1 (ppb)

WATER

CORRIGAN CONSULTING		
ANALYTES	**MDL**	**MQL**
Chromium	0.8(ppb)	10 (ppb)

*MDL are statistical values generated according to 40CFR part 136. These are subject to change annually; based on instrument and calibration conditions at the time of MDL generations.

**Lowest non-zero standard-MDL not applicable to TPH 418.1 methodology.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C41

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: May 19, 1999 12:17
Date Analyzed: May 17, 1999 16:49

Analyst: MAB
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 2.50	98.45	100	2.50	98.5	70-125	
Barium	< 2.5	48.1	50.0	2.5	96.2	70-125	
Cadmium	< 0.50	18.90	20.00	0.50	94.5	70-125	
Chromium	< 2.50	50.55	50.00	2.50	101.1	70-125	
Lead	< 1.00	95.45	100	1.00	95.5	70-125	
Selenium	< 4.00	96.90	100	4.00	96.9	70-125	
Silver	< 2.50	38.15	50.00	2.50	76.3	70-125	

ık Spike Recovery [E] = 100*(B-A)/(C)
. = Not calculated, data below detection limit
. = Below detection limit
esults are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C41

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: May 19, 1999 12:17
Date Analyzed: May 17, 1999 17:06

Analyst: MAB
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 91932- 001	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Arsenic	3.00	4.05	2.50	29.8	30.0	106	100	103.0	70-125	
Barium	53.6	70.0	2.5	26.5	25.0	89.1	50	71.0	70-125	A
Cadmium	2.45	3.35	0.50	31.0	25.0	20.40	20.0	89.8	70-125	A
Chromium	11.90	29.85	2.50	86.0	25.0	59.10	50.0	94.4	70-125	A
Lead	54.40	138	1.00	86.9	25.0	137	100	82.6	70-125	A
Selenium	< 4.00	< 4.00	4.00	N.C	25.0	96.50	100	96.5	70-125	
Silver	< 2.50	< 2.50	2.50	N.C	25.0	6.25	50.0	12.5	70-125	B

(A) Variability in duplicate measurement attributed to sample non-homogeneity.
(B) LCS within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A19B24

ASTM 2216- 71 Moisture Content

Date Validated: *May 24, 1999 14:55*
Date Analyzed: *May 24, 1999 13:05*

Analyst: *EZ*
Matrix: *Solid*

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 91502- 001	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F]
Parameter			Detection Limit	Relative Difference	Relative Difference	Qualifier
	%	%	%	%	%	
Moisture Content	*14.40*	*14.60*	*0.1*	*1.4*	*20.0*	

Relative Difference [D] = 200(B-A)/(B+A)*
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C38

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: May 17, 1999 09:46
Date Analyzed: May 14, 1999 15:00

Analyst: MAB
Matrix: Liquid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Detection Limit mg/L	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 0.0444	2.3061	2.2000	0.0444	104.8	75-125	
Barium	0.033	1.168	1.100	0.028	103.2	75-125	
Cadmium	< 0.0044	0.4494	0.4440	0.0044	101.2	75-125	
Chromium	< 0.0278	1.2006	1.1000	0.0278	109.1	75-125	
Lead	< 0.0111	2.2194	2.2200	0.0111	100.0	75-125	
Selenium	< 0.0444	2.2550	2.2000	0.0444	102.5	75-125	
Silver	< 0.0044	0.8689	1.1000	0.0044	79.0	75-125	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C t calculated, data below detection limit
N.D ow detection limit
All resuits are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

Laboratories

Certificate Of Quality Control for Batch : 19A48C38

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: May 17, 1999 09:46
Date Analyzed: May 14, 1999 15:12

Analyst: MAB
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 91904- 001	[A] Sample Result	[B] Duplicate Result	[C] Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC Matrix Spike Recovery	[I] LIMITS Recovery Range	[G] Qualifier
Parameter	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Arsenic	< 0.0444	< 0.0444	0.0444	N.C	20.0	2.5667	2.200	116.7	75-125	
Barium	0.159	0.176	0.028	10.1	20.0	1.498	1.10	121.7	75-125	
Cadmium	< 0.0044	< 0.0044	0.0044	N.C	20.0	0.4883	0.444	110.0	75-125	
Chromium	< 0.0278	< 0.0278	0.0278	N.C	20.0	1.3306	1.100	121.0	75-125	
Lead	< 0.0111	< 0.0111	0.0111	N.C	20.0	2.5611	2.220	115.4	75-125	
Selenium	< 0.0444	< 0.0444	0.0444	N.C	20.0	2.4433	2.200	111.1	75-125	
Silver	< 0.0044	0.0044	0.0044	N.C	20.0	0.2639	1.100	24.0	75-125	A

(A) Post-digestion spike/LCS within acceptance limits.
Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48B99

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: Apr 27, 1999 17:22
Date Analyzed: Apr 27, 1999 11:23

Analyst: MAB
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 2.50	92.70	100	2.50	92.7	70-125	
Barium	< 2.5	46.4	50.0	2.5	92.8	70-125	
Cadmium	< 0.50	18.25	20.00	0.50	91.3	70-125	
Chromium	< 2.50	48.45	50.00	2.50	96.9	70-125	
Lead	< 1.00	90.90	100	1.00	90.9	70-125	
Selenium	< 4.00	88.40	100	4.00	88.4	70-125	
Silver	< 2.50	46.00	50.00	2.50	92.0	70-125	

Blar ke Recovery [E] = 100*(B-A)/(C)
N.C t calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48B99

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: Apr 16, 1999 13:51
Date Analyzed: Apr 15, 1999 11:24

Analyst: MAB
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 91489- 001	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Arsenic	< 2.50	< 2.50	2.50	N.C	30.0	116	100	116.0	70-125	
Barium	41.2	45.0	2.5	8.8	25.0	103	50	123.6	70-125	
Cadmium	< 0.50	< 0.50	0.50	N.C	25.0	22.35	20.0	111.8	70-125	
Chromium	2.85	3.05	2.50	6.8	25.0	57.25	50.0	108.8	70-125	
Lead	3.30	3.60	1.00	8.7	25.0	124	100	120.7	70-125	
Selenium	< 4.00	< 4.00	4.00	N.C	25.0	104	100	104.0	70-125	
Silver	< 2.50	< 2.50	2.50	N.C	25.0	35.60	50.0	71.2	70-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C26

EPA SW846/6020 Total Lead by ICP- MS

Date Validated: Apr 30, 1999 16:52
Date Analyzed: Apr 30, 1999 12:40

Analyst: MAB
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Lead	< 1.00	113	100	1.00	113.0	70-125	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N.C. Not calculated, data below detection limit
N.D. Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C26

EPA SW846/6020 Total Lead by ICP- MS

Date Validated: Apr 30, 1999 16:52
Date Analyzed: Apr 30, 1999 12:46

Analyst: MAB
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 91502- 003	[A] Sample Result	[B] Duplicate Result	[C] Detection Limit	[D] QC Relative Difference	[E] LIMITS Relative Difference	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC Matrix Spike Recovery	[I] LIMITS Recovery Range	[G] Qualifier
Parameter	mg/kg	mg/kg	mg/kg	%	%	mg/kg	mg/kg	%	%	
Lead	154	147	1.00	4.7	25.0	258	111	93.9	70-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A07A70

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1999 16:11
Date Analyzed: Apr 15, 1999 12:05

Analyst: EZ
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/kg	[B] Blank Spike Result mg/kg	[C] Blank Spike Amount mg/kg	[D] Detection Limit mg/kg	[E] QC LIMITS Blank Spike Recovery %	[F] Recovery Range %	[G] Qualifier
Total Petroleum Hydrocarbons	< 10.00	210	206	10.00	101.7	65-135	

Blank Spike Recovery [E] = 100*(B-A)/(C)
N ot calculated, data below detection limit
N.D. Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A07A70

EPA 418.1 Total Petroleum Hydrocarbons

Date Validated: Apr 15, 1999 16:11
Date Analyzed: Apr 15, 1999 12:35

Analyst: EZ
Matrix: Solid

MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY

Q.C. Sample ID 91502- 027	[A]	[B]	[C]	[D]	[E]	Matrix	[F]	[G]	[H]	[I]	[J]
						Limit	QC	QC	QC	Matrix Spike	
Parameter	Sample Result	Matrix Spike Result	Matrix Spike Duplicate Result	Matrix Spike Amount	Detection Limit	Relative Difference	Spike Relative Difference	Matrix Spike Recovery	M.S.D. Recovery	Recovery Range	Qualifier
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	%	%	%	%	
Total Petroleum Hydrocarbons	< 10.00	192	185	208	10.00	30.0	3.7	93.0	89.6	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A19A93

ASTM 2216- 71 Moisture Content

Date Validated: Apr 26, 1999 12:56
Date Analyzed: Apr 26, 1999 11:05

Analyst: EZ
Matrix: Solid

	MATRIX DUPLICATE ANALYSIS					
Q.C. Sample ID 91502- 002	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC LIMITS	[E]	[F]
Parameter			Detection Limit	Relative Difference	Relative Difference	Qualifier
	%	%	%	%	%	
Moisture Content	5.60	5.30	0.1	5.5	20.0	

Relative Difference (D) = 200*(B-A)/(B+A)
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A36C33

SW- 846 5030/8021B BTEX

Date Validated: Apr 27, 1999 11:00
Date Analyzed: Apr 26, 1999 16:49

Analyst: OS
Matrix: Solid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result ppm	[B] Blank Spike Result ppm	[C] Blank Spike Amount ppm	[D] Detection Limit ppm	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Benzene	< 0.0010	0.0877	0.1000	0.0010	87.7	65-135	
Toluene	< 0.0010	0.0890	0.1000	0.0010	89.0	65-135	
Ethylbenzene	< 0.0010	0.0905	0.1000	0.0010	90.5	65-135	
m,p-Xylene	< 0.0020	0.1993	0.2000	0.0020	99.7	65-135	
o-Xylene	< 0.0010	0.0900	0.1000	0.0010	90.0	65-135	

ank Spike Recovery [E] = 100*(B-A)/(C)
C. = Not calculated, data below detection limit
D. = Below detection limit
results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XEN Laboratories

Certificate Of Quality Control for Batch : 19A36C33

SW- 846 5030/8021B BTEX

Date Validated: Apr 27, 1999 11:00
Date Analyzed: Apr 27, 1999 03:23

Analyst: OS
Matrix: Solid

	MATRIX SPIKE / MATRIX SPIKE DUPLICATE AND RECOVERY										
Q.C. Sample ID 91656- 001 / Parameter	[A] Sample Result	[B] Matrix Spike Result	[C] Matrix Spike Duplicate Result	[D] Matrix Spike Amount	[E] Detection Limit	Matrix Limit Relative Difference	[F] QC Spike Relative Difference	[G] QC Matrix Spike Recovery	[H] QC M.S.D. Recovery	[I] Matrix Spike Recovery Range	[J] Qualifier
	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	
Benzene	< 0.050	2.080	2.240	2.000	0.050	25.0	7.4	104.0	112.0	65-135	
Toluene	< 0.050	2.045	2.205	2.000	0.050	25.0	7.5	102.3	110.3	65-135	
Ethylbenzene	< 0.050	2.285	2.495	2.000	0.050	25.0	8.8	114.3	124.8	65-135	
m,p-Xylene	< 0.100	4.670	5.070	4.000	0.100	25.0	8.2	116.8	126.8	65-135	
o-Xylene	< 0.050	2.070	2.245	2.000	0.050	25.0	8.1	103.5	112.3	65-135	

Spike Relative Difference [F] = 200*(B-C)/(B+C)
Matrix Spike Recovery [G] = 100*(B-A)/[D]
M.S.D. = Matrix Spike Duplicate
M.S.D. Recovery [H] = 100*(C-A)/[D]
N.D. = Below detection limit or not detected
All results are based on MDL and validated for QC purposes

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

LABORATORY

QC DATA

FOR

Corrigan Consulting

TNRCC

11381 Meadowglen, Suite L
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210-509-3335 fax

XENCO Laboratories

SUMMARY

FOR

6020 INITAL CALIBRATION

11381 Meadowglen, Suite L
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281-589-0692 phone
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Dallas, Texas, 75229
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972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

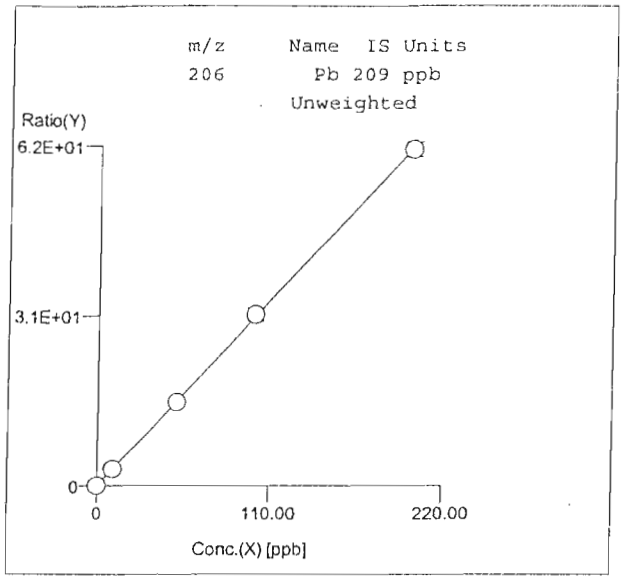
Calibration Report

Calibration : C:\HPCHEM\1\CALIB\EPAPB.C
Last Calib: Jun 09, 1999 11:26
Cal Type : External Calibration Method
Cal Title : ONE OR MORE METALS

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99d1510a.b\001calb.d\	001calb.d#	Apr 15 1999 10:43 am
2	...hem\1\data\99d1510a.b\002cals.d\	002cals.d#	Apr 15 1999 10:47 am
3	...hem\1\data\99d1510a.b\003cals.d\	003cals.d#	Apr 15 1999 10:51 am
4	...hem\1\data\99d1510a.b\004cals.d\	004cals.d#	Apr 15 1999 10:54 am
5	...hem\1\data\99d1510a.b\005cals.d\	005cals.d#	Apr 15 1999 10:58 am
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

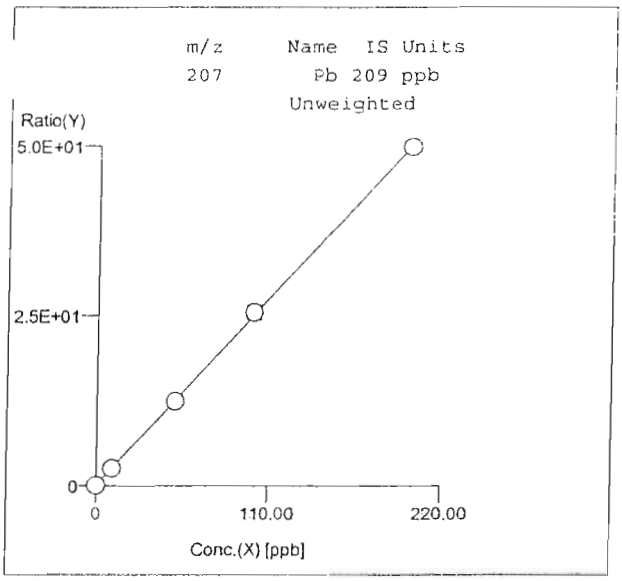
Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio	RSD %
1	0.00	4.33E-2 P	12.50
2	10.00	3.08E+0 P	2.04
3	50.00	1.53E+1 P	2.01
4	100.00	3.12E+1 P	3.71
5	200.00	6.13E+1 P	2.20
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 3.070E-1*X +7.061E-2
X = 3.257E+0*Y -2.300E-1

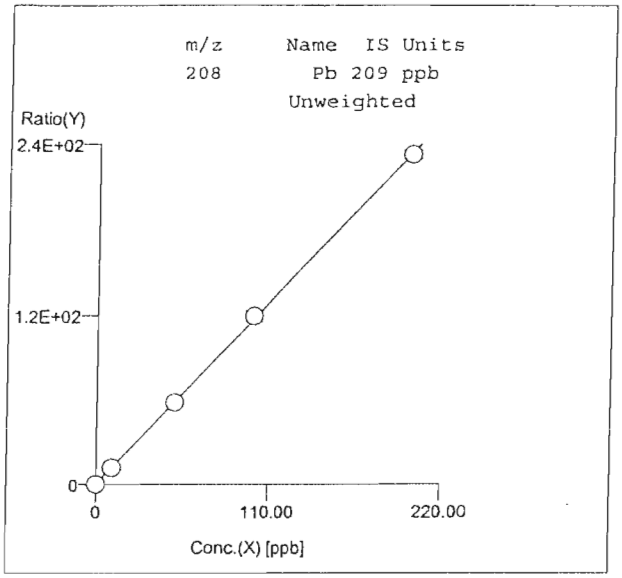
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	3.30E-2 P	15.90
2	10.00	2.54E+0 P	2.11
3	50.00	1.25E+1 P	3.20
4	100.00	2.55E+1 P	4.10
5	200.00	4.99E+1 P	1.31
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 0.9999
Y = 2.497E-1*X +9.109E-2
X = 4.005E+0*Y -3.648E-1

MinConc: 0.00



Lv.	Conc.	Ratio		RSD %
1	0.00	1.64E-1	P	10.50
2	10.00	1.18E+1	P	1.04
3	50.00	5.83E+1	P	2.67
4	100.00	1.19E+2	P	3.36
5	200.00	2.33E+2	P	1.30
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 0.9999
Y = 1.164E+0*X +5.365E-1
X = 8.588E-1*Y -4.607E-1

MinConc: 0.00

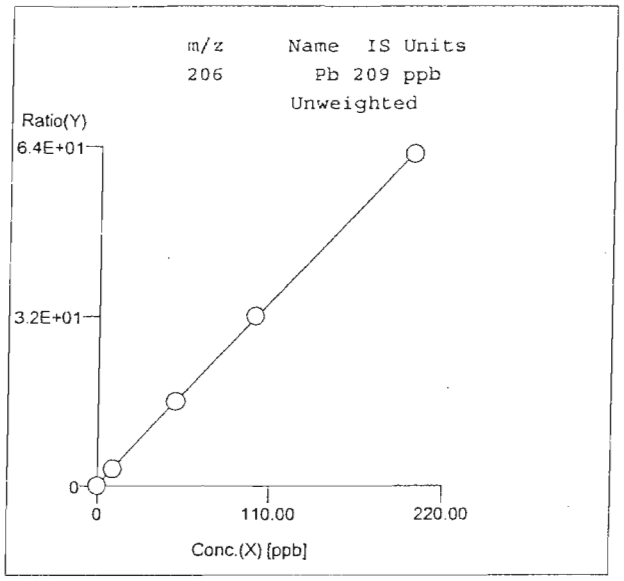
Calibration Report

Calibration : C:\HPCHEM\1\CALIB\EPAPB.C
Last Calib: Jun 09, 1999 11:35
Cal Type : External Calibration Method
Cal Title : ONE OR MORE METALS

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99d3011a.b\001calb.d\	001calb.d#	Apr 30 1999 11:59 am
2	...hem\1\data\99d3011a.b\002cals.d\	002cals.d#	Apr 30 1999 00:02 pm
3	...hem\1\data\99d3011a.b\003cals.d\	003cals.d#	Apr 30 1999 00:05 pm
4	...hem\1\data\99d3011a.b\004cals.d\	004cals.d#	Apr 30 1999 00:07 pm
5	...hem\1\data\99d3011a.b\005cals.d\	005cals.d#	Apr 30 1999 00:10 pm
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

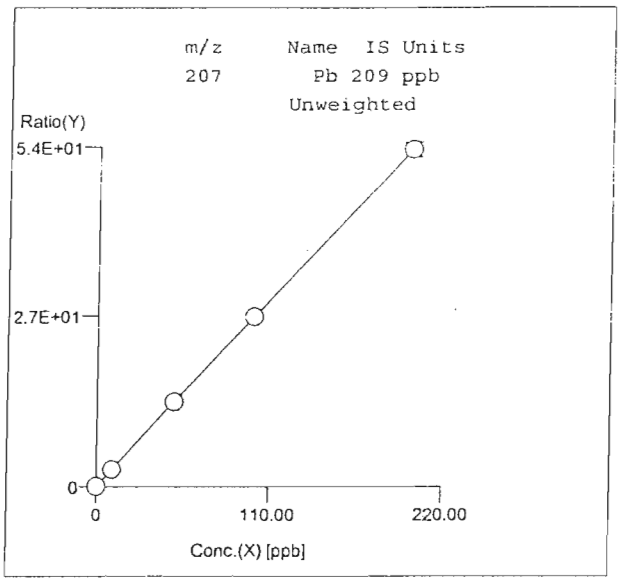
Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio	RSD %
1	0.00	7.68E-2 P	1.79
2	10.00	3.23E+0 P	2.60
3	50.00	1.58E+1 P	1.04
4	100.00	3.19E+1 P	5.17E-1
5	200.00	6.26E+1 P	1.17
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 3.129E-1*X +1.714E-1
X = 3.196E+0*Y -5.479E-1

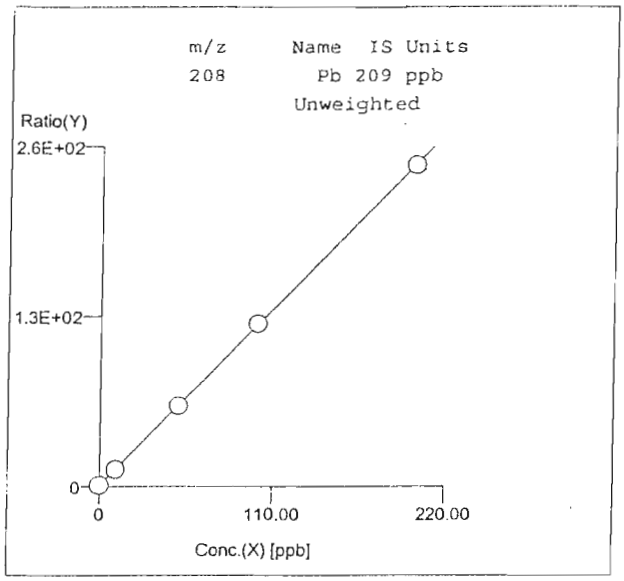
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	5.86E-2 P	17.20
2	10.00	2.71E+0 P	3.54
3	50.00	1.33E+1 P	1.01
4	100.00	2.68E+1 P	4.98E-1
5	200.00	5.36E+1 P	2.12
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 2.678E-1*X +2.337E-2
X = 3.735E+0*Y -8.729E-2

MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	9.63E-1 P	1.09
2	10.00	1.31E+1 P	2.25
3	50.00	6.20E+1 P	1.47
4	100.00	1.24E+2 P	7.14E-1
5	200.00	2.46E+2 P	1.53
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 1.227E+0*X +9.716E-1
X = 8.152E-1*Y -7.921E-1

MinConc: 0.00

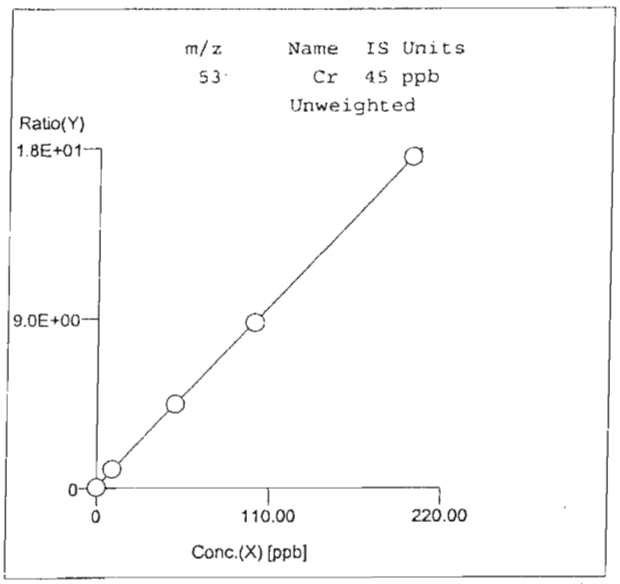
Calibration Report

Calibration : C:\HPCHEM\1\CALIB\EPAPB.C
Last Calib: Jun 09, 1999 11:30
Cal Type : External Calibration Method
Cal Title : ONE OR MORE METALS

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99e1414b.b\001calb.d\	001calb.d#	May 14 1999 02:29 pm
2	...hem\1\data\99e1414b.b\002cals.d\	002cals.d#	May 14 1999 02:33 pm
3	...hem\1\data\99e1414b.b\003cals.d\	003cals.d#	May 14 1999 02:36 pm
4	...hem\1\data\99e1414b.b\004cals.d\	004cals.d#	May 14 1999 02:39 pm
5	...hem\1\data\99e1414b.b\005cals.d\	005cals.d#	May 14 1999 02:43 pm
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio		RSD %
1	0.00	4.16E-2	P	13.60
2	10.00	1.00E+0	P	1.38
3	50.00	4.43E+0	P	3.37
4	100.00	8.76E+0	P	2.24
5	200.00	1.76E+1	P	1.64
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 1.0000
Y = 8.734E-2*X +6.930E-2
X = 1.145E+1*Y -7.935E-1

MinConc: 0.00

Calibration Report

Calibration : C:\HPCHEM\1\CALIB\EPAPB.C
Last Calib: Jun 09, 1999 11:32
Cal Type : External Calibration Method
Cal Title : ONE OR MORE METALS

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99e1715a.b\001calb.d\	001calb.d#	May 17 1999 03:51 pm
2	...hem\1\data\99e1715a.b\002cals.d\	002cals.d#	May 17 1999 03:56 pm
3	...hem\1\data\99e1715a.b\003cals.d\	003cals.d#	May 17 1999 04:02 pm
4	...hem\1\data\99e1715a.b\004cals.d\	004cals.d#	May 17 1999 04:08 pm
5	...hem\1\data\99e1715a.b\005cals.d\	005cals.d#	May 17 1999 04:14 pm
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
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12	---		
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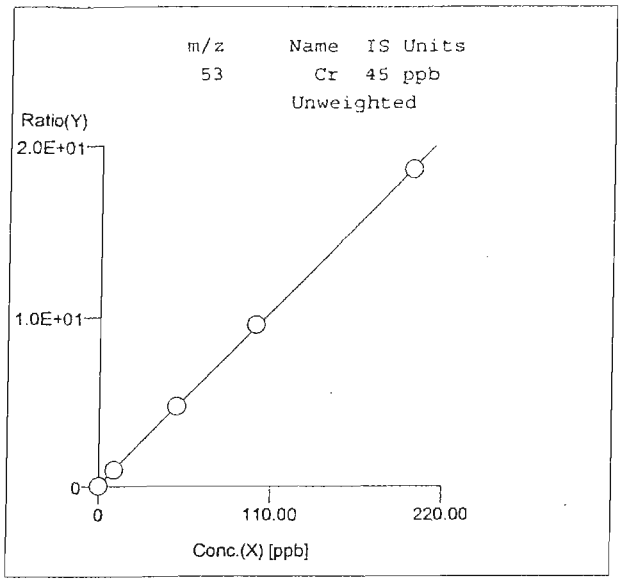
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio	RSD %
1	0.00	3.48E-2 P	4.96
2	10.00	9.68E-1 P	9.16E-1
3	50.00	4.71E+0 P	1.41
4	100.00	9.53E+0 P	9.28E-1
5	200.00	1.86E+1 P	7.35E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 0.9999
Y = 9.317E-2*X +6.697E-2
X = 1.073E+1*Y -7.188E-1

MinConc: 0.00

XENCO Laboratories

RAW DATA

FOR

6020 BLANKS

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

Sample QC Report

Data File:	C:\HPCHEM\1\DATA\99D2710a.B\020SMPL.D\020SMPL.D#
Date Acquired:	Apr 27 1999 11:23 am
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	RERUN
Vial Number:	2301
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	Apr 27 1999 10:32 am
Sample Type:	Sample
Dilution Factor:	10.00

Original data 04/19A48017

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
53 Cr	-1.69 ppb	2.53	1000.00	
75 As	-0.21 ppb	129.83	1000.00	
82 Se	-0.03 ppb	2667.60	1000.00	
107 Ag	0.59 ppb	1.45	500.00	
109 Ag	0.32 ppb	4.48	500.00	
111 Cd	0.10 ppb	15.26	1000.00	
114 Cd	0.00 ppb	638.14	1000.00	
137 Ba	-0.17 ppb	3.01	1000.00	
206 Pb	-0.03 ppb	21.53	1000.00	
207 Pb	0.08 ppb	3.40	1000.00	
208 Pb	0.01 ppb	103.88	1000.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	656676.88	3.67	600550.63	109.3	30 - 120	
72 Ge	161730.94	1.43	162071.36	99.8	30 - 120	
115 In	725842.75	2.34	741690.81	97.9	30 - 120	
209 Bi	480661.13	1.14	501478.53	95.8	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99D2710a.B\001CALB.D\001CALB.D#

0 :Element Failures 0 :Max. Number of Failures Allowed
0 :ISTD Failures 0 :Max. Number of ISTD Failures Allowed

Data Results:

Analytes:	Pass
ISTD:	Pass

PB QC Report

Data File:	C:\HPCHEM\1\DATA\99D3011a.B\015__PB.D\015__PB.D#
Date Acquired:	Apr 30 1999 00:40 pm
Acq. Method:	EPAMO.M
Operator:	
Sample Name:	BLK
Misc Info:	S *1*50*04/30/99*10:45*MAB*JOS*
Vial Number:	2106
Current Method:	C:\HPCHEM\1\METHODS\EPAMO.M
Calibration File:	C:\HPCHEM\1\CALIB\EPAMO.C
Last Cal. Update:	Apr 30 1999 00:11 pm
Sample Type:	PB
Dilution Factor:	10.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
54 Fe	0.00 ppm	862.05	---	
57 Fe	-0.08 ppm	4.05	---	
206 Pb	-0.05 ppb	96.00	10.00	
207 Pb	0.35 ppb	10.79	10.00	
208 Pb	0.21 ppb	9.30	10.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	348774.66	3.74	373412.25	93.4	30 - 120	
72 Ge	10240.39	2.25	11017.42	92.9	30 - 120	
209 Bi	284263.38	2.64	275019.34	103.4	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99D3011a.B\001CALB.D\001CALB.D#

0 :Element Failures 0 :Max. Number of Failures Allowed
0 :ISTD Failures 0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes: Pass
ISTD: Pass

LRB QC Report

Data File:	C:\HPCHEM\1\DATA\99E1414b.B\010_LRB.D\010_LRB.D#
Date Acquired:	May 14 1999 03:00 pm
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	W *45*50*05/14/99*10:00*MAB*JOS*
Vial Number:	2101
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	May 14 1999 02:46 pm
Sample Type:	LRB
Dilution Factor:	5.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
43 Ca	-1.94 ppm	0.51	---	
44 Ca	-1.96 ppm	0.54	---	
53 Cr	-0.08 ppb	34.18	1.00	
75 As	0.94 ppb	42.89	1.00	
82 Se	1.97 ppb	56.97	1.00	Fail
107 Ag	0.51 ppb	1.16	1.00	
109 Ag	0.56 ppb	0.27	1.00	
111 Cd	0.66 ppb	1.20	1.00	
114 Cd	0.42 ppb	3.71	1.00	
135 Ba	5.98 ppb	1.66	1.00	Fail
137 Ba	5.92 ppb	2.51	1.00	Fail
206 Pb	0.89 ppb	2.53	1.00	
207 Pb	0.77 ppb	2.19	1.00	
208 Pb	0.86 ppb	1.55	1.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	905472.13	2.49	1006648.70	89.9	30 - 120	
72 Ge	185924.16	2.44	183157.89	101.5	30 - 120	
209 Bi	861861.81	1.41	847823.69	101.7	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99E1414b.B\001CALB.D\001CALB.D#

3 :Element Failures	0 :Max. Number of Failures Allowed
0 :ISTD Failures	0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes:	Fail
ISTD:	Pass

XENCO Laboratories

INSTRUMENT

RUN LOG

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	PB	2101		EPA8MET	BLK1	S *1*50*04/14/99*16:001	10			
2	LCS	2102		EPA8MET	BKS1	S *1*50*04/14/99*16:001	10			
3	AllRef	2103		EPA8MET	91489-001	S *1*50*04/14/99*16:001	10			
4	Dup1	2104		EPA8MET	91489-001D	S *1*50*04/14/99*16:001	10			
	Spike1	2105		EPA8MET	91489-001S	S *1*50*04/14/99*16:001	10			
	Sample	2106		EPA8MET	91489-004	S *1*50*04/14/99*16:001	10			
	Sample	2107		EPA8MET	91489-005	S *1*50*04/14/99*16:001	10			
8	Sample	2108		EPA8MET	91489-006	S *1*50*04/14/99*16:001	10			
9	Sample	2109		EPA8MET	91474-006	S *1*50*04/14/99*16:001	10			
10	Sample	2110		EPA8MET	91474-007	S *1*50*04/14/99*16:001	10			
11	Sample	2111		EPA8MET	91474-008	S *1*50*04/14/99*16:001	10			
12	Sample	2112		EPA8MET	91473-001	S *1*50*04/14/99*16:001	10			
13	Sample	2201		EPA8MET	91473-002	S *1*50*04/14/99*16:001	10			
14	Sample	2202		EPA8MET	91473-003	S *1*50*04/14/99*16:001	10			
15	Sample	2203		EPA8MET	91473-004	S *1*50*04/14/99*16:001	10			
16	Sample	2204		EPA8MET	91473-005	S *1*50*04/14/99*16:001	10			
17	Sample	2205		EPA8MET	91473-006	S *1*50*04/14/99*16:001	10			
18	Sample	2206		EPA8MET	91473-007	S *1*50*04/14/99*16:001	10			
19	Sample	2207		EPA8MET	91473-008	S *1*50*04/14/99*16:001	10			
20	PB	3101		EPA8MET	BLK	W *45*50*04/15/99*12:0	5			
21	LFB	3102		EPA8MET	BKS	W *45*50*04/15/99*12:0	5			
22	Sample	3103		EPA8MET	91349-006	W *45*50*04/15/99*12:0	5			
23	Sample	2208		EPA8MET	91496-001	S *1*50*04/14/99*16:001	10			
24	Sample	2209		EPA8MET	91502-002	S *1*50*04/14/99*16:001	10			
25	Sample	2210		EPA8MET	91502-004	S *1*50*04/14/99*16:001	10			
26	Sample	2211		EPA8MET	91502-006	S *1*50*04/14/99*16:001	10			
27	Sample	2212		EPA8MET	91502-008	S *1*50*04/14/99*16:001	10			
28	PB	2301		EPA8MET	BLK2	S *1*50*04/14/99*16:001	10			
29	LCS	2302		EPA8MET	BKS2	S *1*50*04/14/99*16:001	10			
30	AllRef	2303		EPA8MET	91502-010	S *1*50*04/14/99*16:001	10			
31	Dup1	2304		EPA8MET	91502-010D	S *1*50*04/14/99*16:001	10			
32	Spike1	2305		EPA8MET	91502-010S	S *1*50*04/14/99*16:001	10			
33	Sample	2306		EPA8MET	91502-012	S *1*50*04/14/99*16:001	10			
34	Sample	2307		EPA8MET	91502-014	S *1*50*04/14/99*16:001	10			
35	Sample	2308		EPA8MET	91502-016	S *1*50*04/14/99*16:001	10			
36	Sample	2309		EPA8MET	91502-018	S *1*50*04/14/99*16:001	10			
37	Sample	2310		EPA8MET	91502-020	S *1*50*04/14/99*16:001	10			
38	Sample	2311		EPA8MET	91502-022	S *1*50*04/14/99*16:001	10			
	Sample	2312		EPA8MET	91502-024	S *1*50*04/14/99*16:001	10			
	Sample	2401		EPA8MET	91502-028	S *1*50*04/14/99*16:001	10			
	AllRef	3104		EPA8MET	91475-001	W *45*50*04/15/99*12:0	5			
42	Dup1	3105		EPA8MET	91475-001D	W *45*50*04/15/99*12:0	5			
43	Spike2	3106		EPA8MET	91475-001S	W *45*50*04/15/99*12:0	5			
44	Sample	3107		EPA8MET	91475-002	W *45*50*04/15/99*12:0	5			
45	Sample	3108		EPA8MET	91474-009	W *45*50*04/15/99*12:0	5			
46	Sample	3109		EPA8MET	91474-010	W *45*50*04/15/99*12:0	5			
47	Sample	3110	SMP101	EPA8MET	91165-006	W *45*50*04/15/99*12:0	5			
48	Sample	3111	SMP102	EPA8MET	91165-009	T *45*50*04/15/99*12:00	5			
49	Sample	3112	SMP103	EPA8MET	91165-011	T *45*50*04/15/99*12:00	5			
50	Sample	3201	SMP104	EPA8MET	91165-014	T *45*50*04/15/99*12:00	5			
51	Sample	3202	SMP105	EPA8MET	91165-015	T *45*50*04/15/99*12:00	5			
52	PB	3203	SMP106	EPA8MET	BLK	O *1*50*04/15/99*12:30	10			
53	LCS	3204	SMP107	EPA8MET	BKS	O *1*50*04/15/99*12:30	10			
54	AllRef	3205	SMP108	EPA8MET	BSD	O *1*50*04/15/99*12:30	10			
55	Dup1	3206	SMP109	EPA8MET	91475-001	O *1*50*04/15/99*12:30	10			
56	Spike1	3207	SMP110	EPA8MET	91475-001D	O *1*50*04/15/99*12:30	10			
57	Sample	3208	SMP111	EPA8MET	91475-002	O *1*50*04/15/99*12:30	10			
58	Sample	3209	SMP112	EPA8MET	91489-001DILUTION	DILUTED TO 1/3	30			

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	LRB	2101		EPAMO	BLK	W *45*50*04/23/99*15:0	5			
2	LFB	2102		EPAMO	BKS	W *45*50*04/23/99*15:0	5			
3	AllRef	2103		EPAMO	91657-001	W *45*50*04/23/99*15:0	5			
4	Dup1	2104		EPAMO	91657-001D	W *45*50*04/23/99*15:0	5			
5	Spike2	2105		EPAMO	91657-001S	W *45*50*04/23/99*15:0	5			
6	PB	2106		EPAMO	BLK	S *1*50*04/30/99*10:45	10			
7	LCS	2107		EPAMO	BKS	S *1*50*04/30/99*10:45	10			
8	AllRef	2108		EPAMO	91502-003	S *1*50*04/30/99*10:45	10			
9	Dup1	2109		EPAMO	91502-003D	S *1*50*04/30/99*10:45	10			
10	Spike1	2110		EPAMO	91502-003S	S *1*50*04/30/99*10:45	10			
11	Sample	2111		EPAMO	91502-005	S *1*50*04/30/99*10:45	10			
12	Sample	2112		EPAMO	91502-007	S *1*50*04/30/99*10:45	10			
13	PB	2201		EPAMO	91502-009	S *1*50*04/30/99*10:45	10			
14	Sample	2202		EPAMO	91502-011	S *1*50*04/30/99*10:45	10			
15	Sample	2203		EPAMO	91502-013	S *1*50*04/30/99*10:45	10			
16	Sample	2204		EPAMO	91502-015	S *1*50*04/30/99*10:45	10			
17	Sample	2205		EPAMO	91502-017	S *1*50*04/30/99*10:45	10			
18	Sample	2206		EPAMO	91502-019	S *1*50*04/30/99*10:45	10			
19	Sample	2207		EPAMO	91502-021	S *1*50*04/30/99*10:45	10			
20	Sample	2208		EPAMO	91502-023	S *1*50*04/30/99*10:45	10			
21	Sample	2209		EPAMO	91502-025	S *1*50*04/30/99*10:45	10			
22	LRB	2101		EPAMO	BLK	W *45*50*04/23/99*15:0	5			
23	LFB	2102		EPAMO	BKS	W *45*50*04/23/99*15:0	5			
24	AllRef	2103		EPAMO	91657-001	W *45*50*04/23/99*15:0	5			
25	Dup1	2104		EPAMO	91657-001D	W *45*50*04/23/99*15:0	5			
26	Spike2	2105		EPAMO	91657-001S	W *45*50*04/23/99*15:0	5			
27	Sample	1107		EPAMO	CCV	CCV	1			

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	LRB	2101		EPA8MET	BLK	W *45*50*05/14/99*10:0	5			
2	LFB	2102		EPA8MET	BKS	W *45*50*05/14/99*10:0	5			
3	AllRef	2103		EPA8MET	91904-001	W *45*50*05/14/99*10:0	5			
	Dup1	2104	SMP101	EPA8MET	91904-001D	W *45*50*05/14/99*10:0	5			
	Spike2	2105	SMP102	EPA8MET	91904-001S	W *45*50*05/14/99*10:0	5			
	Sample	2106	SMP103	EPA8MET	91904-002	W *45*50*05/14/99*10:0	5			
7	Sample	2107	SMP104	EPA8MET	91904-003	W *45*50*05/14/99*10:0	5			
8	Sample	2108	SMP105	EPA8MET	91909-019	W *45*50*05/14/99*10:0	5			
9	Sample	2109	SMP106	EPA8MET	91899-001	W *45*50*05/14/99*10:0	5			
10	Sample	2110	SMP107	EPA8MET	91899-002	W *45*50*05/14/99*10:0	5			
11	Sample	2111	SMP108	EPA8MET	91899-003	W *45*50*05/14/99*10:0	5			
12	Sample	2112	SMP109	EPA8MET	91899-004	W *45*50*05/14/99*10:0	5			
13	Sample	2201	SMP110	EPA8MET	91899-005	W *45*50*05/14/99*10:0	5			
14	Sample	2202	SMP111	EPA8MET	91899-006	W *45*50*05/14/99*10:0	5			
15	Sample	2203	SMP112	EPA8MET	91899-010	W *45*50*05/14/99*10:0	5			
16	Sample	2204	SMP113	EPA8MET	91872-003	W *45*50*05/14/99*10:0	5			
17	Sample	2205	SMP114	EPA8MET	91502-001	W *45*50*05/14/99*10:0	5			
18	Sample	2304	SMP115	EPA8MET	91904-001PDS	50% OF 200PPB	5			
19	LRB	2206	SMP116	EPA8MET	BLK	W *45*50*05/14/99*13:0	5			
20	LFB	2207	SMP117	EPA8MET	BKS	W *45*50*05/14/99*13:0	5			
21	AllRef	2208	SMP118	EPA8MET	91928-001	W *45*50*05/14/99*13:0	5			
22	Dup1	2209	SMP119	EPA8MET	91928-001D	W *45*50*05/14/99*13:0	5			
23	Spike2	2210	SMP120	EPA8MET	91928-001S	W *45*50*05/14/99*13:0	5			
24	Sample	2211	SMP121	EPA8MET	91928-002	W *45*50*05/14/99*13:0	5			
25	Sample	2212	SMP122	EPA8MET	91928-003	W *45*50*05/14/99*13:0	5			
26	Sample	2301	SMP123	EPA8MET	91928-004	W *45*50*05/14/99*13:0	5			
27	Sample	2302	SMP124	EPA8MET	91928-005	W *45*50*05/14/99*13:0	5			
28	Sample	2303	SMP125	EPA8MET	91928-006	W *45*50*05/14/99*13:0	5			
29	LFB	2207	SMP126	EPA8MET	BKS	W *45*50*05/14/99*13:0	5			
30	Sample	2207	SMP127	EPA8MET	BKS	W *45*50*05/14/99*13:0	5			
31	Sample	2305	SMP128	EPA8MET	91928-006	W *45*50*05/14/99*13:0	50			

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	PB	2301		TABLEIII	BLK	S *1*50*05/17/99*12:30	10	-		
2	LCS	2302		TABLEIII	BKS	S *1*50*05/17/99*12:30	10			
3	AllRef	2303		TABLEIII	91932-001	S *1*50*05/17/99*12:30	10			
4	Dup1	2304		TABLEIII	91932-001D	S *1*50*05/17/99*12:30	10			
5	Spike1	2305		TABLEIII	91932-001S	S *1*50*05/17/99*12:30	10			
6	Sample	2306		TABLEIII	91954-002	S *1*50*05/17/99*12:30	10			
7	Sample	2307		TABLEIII	91943-007	S *1*50*05/17/99*12:30	10			
8	Sample	2308		TABLEIII	91502-001	S *1*50*05/17/99*12:30	10			
9	LRB	2501		TABLEIII	BLK	W *45*50*05/17/99*15:0	5			
10	LFB	2502		TABLEIII	BKS	W *45*50*05/17/99*15:0	5			
11	AllRef	2503		TABLEIII	91914-001	W *45*50*05/17/99*15:0	5			
12	Dup1	2504		TABLEIII	91914-001D	W *45*50*05/17/99*15:0	5			
13	Spike2	2505		TABLEIII	91914-001S	W *45*50*05/17/99*15:0	5			
14	Sample	2506		TABLEIII	91914-003	W *45*50*05/17/99*15:0	5			
15	Sample	2507		TABLEIII	91947-001 CLEAR	W *45*50*05/17/99*15:0	5			
16	Sample	2508		TABLEIII	91947-001 GREEN	W *45*50*05/17/99*15:0	50			

XENCO Laboratories

SUMMARY

FOR

8021B INITIAL CALIBRATION

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Response Factor Report A36

Method : C:\HPCHEM\1\METHODS\BTEX0302.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Tue May 25 21:41:13 1999

Calibration Files
1 =GC2001.D 2 =GC2002.D 3 =GC2003.D
4 =GC2004.D 5 =GC2005.D

		Compound	1	2	3	4	5	Avg		%RSD
1)	I	a,a,a-Trifluorotoluen	----------ISTD----------							
2)		MTBE	4.909	5.605	6.111	5.552	4.724	5.380	E4	10.46
3)		Benzene	2.414	2.148	2.817	2.969	2.477	2.565	E5	12.80
4)		Toluene	1.955	1.572	2.021	2.282	2.011	1.968	E5	12.96
5)		Ethylbenzene	1.665	1.287	1.576	1.790	1.558	1.575	E5	11.75
6)		m,p-Xylenes	1.905	1.500	1.880	1.867	1.625	1.755	E5	10.38
7)		o-Xylene	1.629	1.216	1.463	1.730	1.607	1.529	E5	13.04
8)	SMC	Bromofluorobenzene	1.172	1.219	1.258	1.279	1.385	1.263	E5	6.30

= Out of Range

XENCO Laboratories

RAW DATA

FOR

8021B BLANKS

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Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\0426S99\GC2003.D Vial: 3
Acq On : 26 Apr 1999 4:49 pm Operator: OSR
Sample : BLK1 *1* Inst : A36
Misc : 5ML - *04/26/99 15:25 *OSR* Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Apr 27 9:30 1999 Quant Results File: BTEX0302.RES

Quant Method : C:\HPCHEM\1\METHODS\BTEX0302.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Tue Apr 27 01:07:24 1999
Response via : Initial Calibration
DataAcq Meth : BTEX0126.M

Volume Inj. :
Signal Phase :
Signal Info :

Compound	R.T.	Response	Conc Units
Internal Standards			
1) I a,a,a-Trifluorotoluene	10.34	2051118	30.000 ug/L
System Monitoring Compounds			
3) SMC Bromofluorobenzene	15.16	2883904	28.220 ug/L
Spiked Amount 30.000		Recovery =	94.07%
Target Compounds			
2) MTBE	0.00	0	N.D. ug/L
4) Benzene	0.00	0	N.D. ug/L
5) Toluene	0.00	0	N.D. ug/L
6) Ethylbenzene	0.00	0	N.D. ug/L
7) m,p-Xylenes	0.00	0	N.D. ug/L
8) o-Xylene	0.00	0	N.D. ug/L

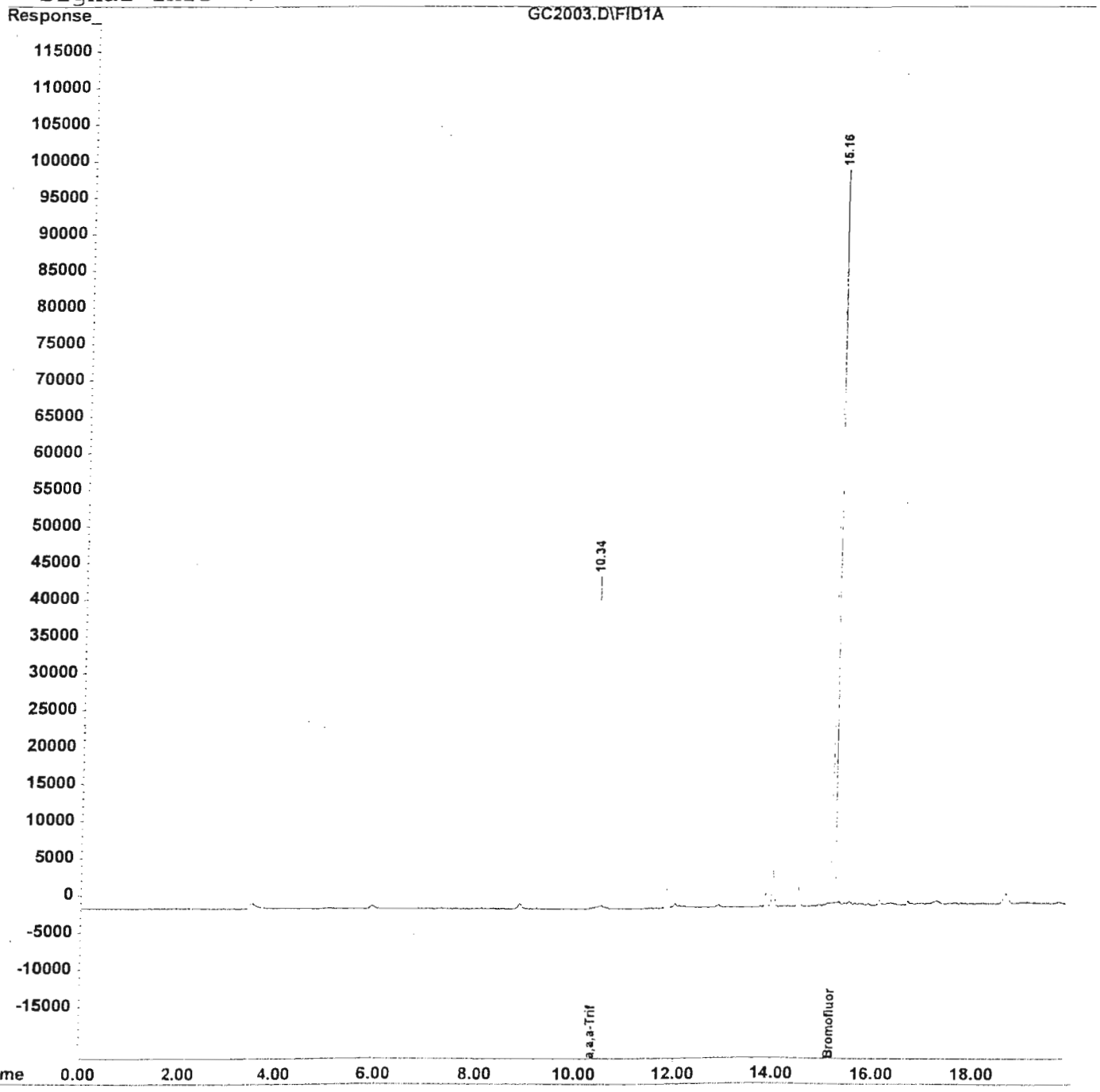
(#)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report

Data File : C:\HPCHEM\1\DATA\0426S99\GC2003.D Vial: 3
Acq On : 26 Apr 1999 4:49 pm Operator: OSR
Sample : BLK1 *1* Inst : A36
Misc : 5ML - *04/26/99 15:25 *OSR* Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Apr 27 9:30 1999 Quant Results File: BTEX0302.RES

Quant Method : C:\HPCHEM\1\METHODS\BTEX0302.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Tue Apr 27 01:07:24 1999
Response via : Multiple Level Calibration
DataAcq Meth : BTEX0126.M

Volume Inj. :
Signal Phase :
Signal Info :



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INSTRUMENT

RUN LOG

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Injection Log

Directory: c:\hpchem\1\data\0426s99

ine	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
	1	gc2001.d	1.	CCV1*1*	5ML - *04/26/99 15:20 *OSR*	26 Apr 99 15:48
	2	gc2002.d	1.	BKS1*1*	5ML - *04/26/99 15:25 *OSR*	26 Apr 99 16:23
	3	gc2003.d	1.	BLK1 *1*	5ML - *04/26/99 15:25 *OSR*	26 Apr 99 16:49
	4	gc2004.d	1.	91703-001 *50* ✓	5G/5ML.1/5ML - *04/26/99 15:30 *OSR*	26 Apr 99 17:15
	5	gc2005.d	1.	91703-002 *50* ✓	5G/5ML.1/5ML - *04/26/99 15:35 *OSR*	26 Apr 99 17:42
	6	gc2006.d	1.	91502-028 *50* ✓	5G/5ML.1/5ML - *04/26/99 15:40 *OSR*	26 Apr 99 18:23
	7	gc2007.d	1.	91566-001 *50* ✓	5G/5ML.1/5ML - *04/26/99 15:45 *OSR*	26 Apr 99 18:49
	8	gc2008.d	1.	91566-006 *50* ✓ reporting but need to rerun for I.S.	5G/5ML.1/5ML - *04/26/99 15:50 *OSR*	26 Apr 99 19:15
	9	gc2009.d	1.	91576-002 *50* ✓ reporting but need to rerun for I.S	5G/5ML.1/5ML - *04/26/99 15:55 *OSR*	26 Apr 99 19:41
)	10	gc2010.d	1.	91576-011 *50* ✓	5G/5ML.1/5ML - *04/26/99 16:00 *OSR*	26 Apr 99 20:08
1	11	gc2011.d	1.	91576-012 *50* ✓	5G/5ML.1/5ML - *04/26/99 16:05 *OSR*	26 Apr 99 20:34
2	12	gc2012.d	1.	91576-013 *50* ✓	5G/5ML.1/5ML - *04/26/99 16:10 *OSR*	26 Apr 99 21:00
3	13	gc2013.d	1.	91576-014 *50* ✓	5G/5ML.1/5ML - *04/26/99 16:15 *OSR*	26 Apr 99 21:27
4	14	gc2014.d	1.	CCV2 *1*	5ML - *04/26/99 22:00 *OSR*	27 Apr 99 02:44
5	15	gc2015.d	1.	91656-001 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:05 *OSR*	27 Apr 99 03:23
6	16	gc2016.d	1.	91656-001S *50* ✓	5G/5ML.1/5ML - *04/26/99 22:10 *OSR*	27 Apr 99 03:50
7	17	gc2017.d	1.	91656-001SD *50* ✓	5G/5ML.1/5ML - *04/26/99 22:15 *OSR*	27 Apr 99 04:16
8	18	gc2018.d	1.	91656-003 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:20 *OSR*	27 Apr 99 04:42
		gc2019.d	1.	91656-005 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:25 *OSR*	27 Apr 99 05:08
	20	gc2020.d	1.	91656-006 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:30 *OSR*	27 Apr 99 05:34
	21	gc2021.d	1.	91656-007 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:35 *OSR*	27 Apr 99 06:00
	22	gc2022.d	1.	91656-008 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:40 *OSR*	27 Apr 99 06:26
	23	gc2023.d	1.	91656-010 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:45 *OSR*	27 Apr 99 06:52
	24	gc2024.d	1.	91586-002 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:50 *OSR*	27 Apr 99 07:18
	25	gc2025.d	1.	91586-004 *50* ✓	5G/5ML.1/5ML - *04/26/99 22:55 *OSR*	27 Apr 99 07:44
	26	gc2026.d	1.	91502-028 *50* ✓	5G/5ML.1/5ML - *04/26/99 23:00 *OSR*	27 Apr 99 08:10
	27	gc2027.d	1.	CCV3*1*	5ML - *04/26/99 23:05 *OSR*	27 Apr 99 08:36
	28	gc2028.d	1.	BLK1*1*	5ML - *04/26/99 23:10 *OSR*	27 Apr 99 09:02
	29	gc2029.d	1.	BKS1*1*	5ML - *04/26/99 23:15 *OSR*	27 Apr 99 09:28
	30	gc2030.d	1.	91566-001 *50*	5G/5ML.1/5ML - *04/26/99 23:20 *OSR*	27 Apr 99 09:55

19736 C33

XENCO Laboratories

RAW DATA

FOR

TPH 418.1 ANAYLSIS

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19A07A70

XENCO Laboratories

1381 Meadowglen, Ste. L Houston, TX 77082

TPH

EPA 418.1

Ext. by EZ Date: 4/15/99 Quant. Factor: 738.59

Anal.by ↓ Date: ↓ CCV Std #: 3-1-99

TPH Calibration: 1 | 25 | 99 Matrix: (Soil) Water

A\QC	Lab ID	Sample Amount	Volume of Ext. (ml)	Dilution Factor	Abs. 2930 cm-1	Quant.	TPH (ppm)	Time Ext.	Time Anal.	True Value ppm
reon	4/8/99		N/A	N/A	.106	N/A	N/A		12:00	
ank	BLK	5gr	25ml	N/A	0	0	0	10:00	12:05	
heck Std 1	CCV (1)		N/A	N/A	.074	54.65	54.65		12:10	51.61
heck Std 2	↓ (2)		N/A	N/A	.071	52.43	52.43		13:00	
nk Spike	BLK-S	5gr	25ml		.057	42.09	210.4	10:05	12:15	206.44
nk Spike D										
mple spk	91502-27	5gr	25ml		.052	38.40	192.03	10:15	12:20	206.44
mple spk D	↓ 27	↓	↓		.050	36.92	184.6	10:20	12:25	↓

TPH = E*C*B/A

	A	B	C	D	E				
Lab ID	Sample Amount	Volume of Extract	Dilution Factor	Abs. 2930 cm-1	Quant.	TPH (ppm)	Time Ext.	Time Anal.	Remarks
91502-26	5gr	25ml		.006	4.43	22.15	10:25	12:30	
↓ 27	↓	↓		0	0	0	10:30	12:35	
↓ 28				.054	39.88	199.41	10:35	12:40	
91524-6	↓	↓		.005	3.692	18.46	10:40	12:45	

Lot #: 4/8/99 Silica Gel Lot#: 814302 NaSO4. Lot#: 825002 HCl Lot#: 38265

Lev1 By/Date&Time: EZ 4/15/99 Val. Lev3 By/Date&Time:

Lev2 By/Date&Time: Val. Lev4 By/Date&Time:

Approval: SA; 04/15/99 @ 16:11

XENCO Laboratories

RAW DATA

FOR

%MOISTURE ANALYSIS

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Percent Moisture Determination Work Sheet

19A19A93

Client Name: _____ COC #: 91502

Analyst: EZ Matrix: Soil

Method Name: _____ Method #: Gravimetric Determination

Units: Percent by weight

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	Initial Vial & Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	~~Final Vial & Sample Dry Weight 2~~ Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
BLK	0.98	4-26 8:02		~~11:00~~	11:00	
91802-2	0.99	5.89 8:04		5-56 ~~11:05~~	6-55 (-0.01) 11:05	5.6%
2D	1.00	5.97 8:06		5.69 ~~11:10~~	6.65 11:10	5.3%
4	0.98	6.12 8:08		6.15 ~~11:15~~	7.13 11:15	4.2%
6	0.98	6.28 8:10		6.18 ~~11:20~~	7.16 11:20	1.5%
8	0.99	6.09 8:12		5.83 ~~11:25~~	6.82 11:25	4.2%
10	0.99	6.11 8:14		5.61 ~~11:30~~	6.60 11:30	0.18%
12	0.99	5.39 8:16		5.2 ~~11:35~~	6.19 11:35	3.5%
14	0.99	5.52 8:18		5.25	6.24 11:40	4.8%
16	1.00	6.19 8:20		5.92	6.92 11:45	4.3%
18	0.99	6.55 8:22		6.28	7.27 11:50	4.12%
20	0.99	5.85 8:24		5.7	6.69 11:55	2.5%

Empty Vial Initial Dry Weight = A

Vial and Sample Wet Weight = B

Vial and Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

KO 4/26/99 12:56

MOISTTEM.XLS

Page Number 1

XENCO Laboratories

Percent Moisture Determination Work Sheet

Client Name: _____
Analyst: EB
Method Name: _____
Units: Percent by weight

COC #: 91502
Matrix: Soil
Method #: Gravimetric Determination

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	Initial Vial & Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	Final Vial & Sample Dry Weight 2 Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
91502-22	0.99	6.40 8:26		5.9	6.89 12:00	7.8 %
220	0.98	5.78 8:28		5.37	6.35 12:05	7.0 %
24	0.98	6.20 8:30		5.64	6.62 12:10	9.0 %
26	0.98	5.67 8:32		4.95	5.93 12:15	12.6 %
27	0.99	6.75 8:34		5.57	6.56 12:20	17.4 %
28	0.99	6.60 8:36		5.99	6.98 12:25	9.2 %

Empty Vial Initial Dry Weight = A
Vial and Sample Wet Weight = B
Vial and Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

KO 4/26/99 12:56

MOISTTEM.XLS

Page Number 2

XENCO Laboratories

Percent Moisture Determination Work Sheet

19A19B04

Client Name: _____ COC #: 91502

Analyst: EZ Matrix: Soil

Method Name: _____ Method #: Gravimetric Determination

Units: Percent by weight

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	~~Initial Vial &~~ Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	~~Final Vial & Sample Dry Weight 2~~ Sample Dry Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
BLK	1.27	11:00	4-30-99		1.27 15:00	
91502-03	1.00	6.17 11:05		5.51	6.51 15:05	10.7 %
03D	0.99	5.10 11:10		4.49	5.48 15:10	11.9 %
05	0.98	5.75 11:15		5.36	6.34 15:15	6.7 %
07	1.26	7.54 11:20		6.52	7.78 15:20	13.5 %
09	1.27	6.50 11:25		5.62	6.89 15:25	13.5 %
11	0.98	6.80 11:30		5.82	6.63 15:30	2.4 %
13	0.99	6.45 11:35		5.52	6.81 15:35	9.7 %
15	1.27	6.16 11:40		5.77	7.04 15:40	6.3 %
17	1.26	7.89 11:45		6.97	8.23 15:45	11.6 %
19	1.28	7.57 11:50		6.4	7.68 15:50	15.4 %
21	1.23	6.49 11:55		5.66	6.89 15:55	12.7 %

pty Vial Initial Dry Weight = A
l and Sample Wet Weight = B
l and Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

MB 05/03/99 9:55

MOISTTEM.XLS

Page Number 1

XENCO Laboratories

Percent Moisture Determination Work Sheet

Client Name: _____
Analyst: EZ
Method Name: _____
Units: Percent by weight

COC #: 91502
Matrix: Soil
Method #: Gravimetric Determination

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	~~Initial~~ Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	~~Final~~ Sample Dry ~~Weight 2~~ Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
91502-23	1.26	5.47 12:00	4/30/99	5-21	6.47 16:00	12.7 %
25	1.22	6.02 12:05		5.11	6.33 16:05	15.1 %
250	1.27	7.84 12:10		6.57	6.98 16:10	15.0 %

Vial Initial Dry Weight = A
d Sample Wet Weight = B
d Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

MB 05/03/99

STTEM.XLS

Page Number 2

9:55

XENCO Laboratories

Percent Moisture Determination Work Sheet

Client Name: _____ COC #: 91502 -1

Analyst: EB Matrix: Soil

Method Name: _____ Method #: Gravimetric Determination

Units: Percent by weight

Sample Dry

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	Initial Vial & Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	Final Vial & Sample Dry Weight 2 Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
Blk	1-27	10:30	5.24.99		13:00	
					1-27	
91502-01	1-23	10:32			13:05	
		6.30		5.39	6.62	14.4%
V 010	1-25	10:34			13:10	
		6.07		5.18	6.43	14.6%

Empty Vial Initial Dry Weight = A

Vial and Sample Wet Weight = B

Vial and Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

KD 5/24/99 1455

XENCO Laboratories

Pre-Login

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210-509-3335 fax

Laboratories

Dallas, San Antonio

Page 1 of 1

Validated by: Date:

COC #: 91502-14 Custodian: SW Log Date & 4/13 19:10 Number Containers In This Cooler: 32 No. of Coolers: 1

Cooler ID: 2 Custody Seal Id: Broken Intact None Cooler Temp.: 3.4 deg C. Thermometer Id.: T.1 ICE: Blue, Dry, Water

Container Ids	Number of Containers	Matrix	Sample Type	Collection Method	Custody Seal	Container Size	Container Type	Liner	Preservative	Sample Condition	Label Condition	Head Space	Sample Amount %	pH	Analyses Requested	Hold	Refrig. #	Remarks & Analysis #s
For All 01	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54	X		Total Cr SPLP Cr.
02,04,06, 08,10,12, 14,16,18,20 22,24.	2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
03,05,07, 09,11,13,15, 17,19,21,23 25.	2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
26	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
27	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
28	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	P B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			

1 BTEX S8021B	7 pH W1501	13 VOA 8260	19 VOA VTCLPV	25 Met 7Tot S6010R	31 Met GF Pb W2392E	37 KMF Diox VKMG01	43 PAHs 8270P1	49	S6020 Pb
2 TPH W4181A	8 pH S9045	14 SV S6270E1	20 SV VTCLPSV	26 Met Hg S7470R	32 SV Scans S8270	38 Anions W300	44 PAHs on Highest TPH 8270	50	SPLP 8270.1
3 BTEX-M S8021BL	9 pH S9040	15 Pest S8080A	21 Pest VTCLPP	27 Met Hg S7471R	33 SPLP TPH W4181P	39 TSS W1602	45 Soil Charac. Parameters	51	
4 TPH S8015D	10 Flash S1010	16 Pest S8081	22 Herb VTCLPH	28 Met 22 S6010A	34 SPLP Met 7 S6010S	40 O&G W4131	46 TPH TX1005	52	
5 TPH S8015G	11 R Cyan. S9010R	17 PCB S8082	23 Met 7T S6010T	29 Met Pb S6010Pb	35 SPLP Hg S7470S	41 Moisture AD2216A	47 Met 7Tot S6020R	53	
6 TDS W1601	12 R Sulf.S9030R	18 VOA 8260D	24 Met Hg S7470T	30 Met Pb GF S7421A	36 SPLP Pb W2392S	42 PAHs 8310	48 Met W2008	54	

TAT: A: ASAP - All B: (48 hrs) - All P: (24hrs) - All T: 3 Days - All 10 DAYS

DO NOT MIX COOLERS IN THE SAME PAGE

ANALYTICAL REPORT -91553

for

RECEIVED
JUN 14 1999
BY:

Corrigan Consulting, Inc.

Project Manager: Wendell Honeycutt

Project Name: MP/COH Heights Service Center

Project Id: 98S-128

June 14, 1999

XENCO Laboratories

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Houston · Dallas · San Antonio · Latin America

April 23, 1999

Project Manager: Wendell Honeycutt
Corrigan Consulting, Inc.
1909 Capri Lane
Seabrook, TX 77586

Reference: **XENCO Report No.: -91553**
Project Name: MP/COH Heights Service Center
Project ID: 98S-128
Project Address: 3602 Center
Houston, TX

Dear Wendell Honeycutt:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with XENCO Chain of Custody Number -91553.H All results being reported to you apply only to the samples analyzed, properly identified with a Laboratory ID number. This letter documents the official transmission of the contents of the report and validates the information contained within.

All the results for the quality control samples passed thorough examination. Also, all parameters for data reduction and validation checked satisfactorily. 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.

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 3 years in our archives and after that time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in COC No. -91553H will be filed for 60 days, and after that time they will be properly disposed of 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).

XENCO operates under the A2LA guidelines. Our Quality System meets ISO/IEC Guide 25 requirements which is strictly implemented and enforced through our standard QA/QC procedures.

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.

Sincerely,

Eddie L. Clemons, II
QA/QC Manager

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!

XENCO Laboratories

☒ 11381 Meadowglen, Suite L, Houston TX 77082 281-589-0692
☐ 5309 Wurzbach Road, Suite 104, San Antonio, TX 78238 210-509-3334
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ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

On-LINE Help & Technical Services at XENCO.com

`994

Company COC No: Work Order No: Page 1 of 1

Company Corrigan Consulting Inc	**Phone** 281 474-7455	**Lab Only:** 91553-H	
Project Name MP/CoH Heights Service Center ☐ Previously done at XENCO	**Project ID** 785-128	**TAT:** 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d Standard TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days	
Location 3602 Center, Houston TX			
Project Manager (PM) Wendell Honeycutt	**Project Director (PD)** Roxie Voran		
Fax Results to ☒ PM and / or	**Fax** 281 474-4501		
Invoice to ☐ Accounting ☐ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:			
Quote No.	**P.O No** ☐ Call for a P.O.		
Special DLs (RR I RR II DW QAPP See Lab PM Call Proj. PM)			
Specifications			

Sampler Name Tod C. Heverly Signature

	Sample ID	Sampling Date	Time	Depth ft/in/m	Matrix A P S W	Composite	Grab	# Containers	Container Size	Type	Preservatives
1	TW-1	4/15/99	11:33		W		X		.5	P	Z
2		END	—	OF	—		RECORD				
3											
4											
5											
6											
7											
8											
9											
10											

	BTEX by 8020 8021 8260 602 624 Other	BTEX-MTBE by 8020 8021 8260 602 624 Other	TPH by TX1005 418.1 8015GRO 8015DRO 8015JetF	PAHs by 8270 8100 8310	METALS by 6010 8RCRA (Tot Pb) TCLP8 13PP 23TAL See List	VOAs by 8260 624 BTEX MTBE PPs TCL See List Call PM	SVOAs by 8270 625 PAHs BN&A TCL PPs See List Call PM	TAT 5h 12h 20h 24h 48h 3d 5d 7d (10d) 14d 21d	Addn: PAH above mg/L W. mg/Kg S Highest Hit	Hold Analysis	Remarks
1					X			X			
2											

Lab Only Additions: From: Rcv by: Date | From: Rcv by: Date | From: Rcv by: Date

Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1	Wendell Honeycutt	4/15/99 16:27
2		4/16/99 8:36
3	Lab: Sheri L. Stokes	4/16/99 0936

Total Containers per COC: 1

Rush TATs Fax Due: Final Fax Due:

Final Report Data Package Due Date:

Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

Preservatives - Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO4 pH<2 (N), NaOH+Asbc Acid (NAA), ZnAc+NaOH (ZA), (Cool,<4C) (C4), None (N), See Label (SL), Other (O) _____

SIZE: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (.5), Tedlar Bag (B), Wipe (W), Other _____ **TYPE** Glass Amb (GA), Glass Clear (GC), Plastic (P), Other (O) _____

Laboratories

CHRONOLOGY OF SAMPLES

Corrigan Consulting, Inc.

Project ID: 98S-128
Project Manager: Wendell Honeycutt
Project Location: 3602 Center
Houston, TX

Project Name: MP/COH Heights Service Center

XENCO COC#: -91553
Date Received in Lab: Apr 16, 1999 09:36 by AS
XENCO contact : Karen Olson/Brent Barron

							Date and Time			
	Field ID	**Lab. ID**	**Method Name**	**Method ID**	**Units**	**Turn Around**	**Sample Collected**	**Addition Requested**	**Extraction**	**Analysis**
1	TW-1	91553-001	Pb ICP-MS	EPA	mg/L	10 days	Apr 15, 1999 15:33		Apr 19, 1999 by JOS	Apr 19, 1999 19:31 by MAB

XENCO Laboratories

WATER

CORRIGAN CONSULTING		
ANALYTES	**MDL**	**MQL**
Lead	0.28(ppb)	10 (ppb)

*MDL are statistical values generated according to 40CFR part 136.
These are subject to change annually; based on instrument and calibration conditions at the time of MDL generations.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

CERTIFICATE OF ANALYSIS SUMMARY -91553

Corrigan Consulting, Inc.

Project Name: MP/COH Heights Service Center

Project ID: 98S-128
Project Manager: Wendell Honeycutt
Project Location: 3602 Center
Houston, TX

Date Received in Lab : Apr 16, 1999 09:36
Date Report Faxed: Apr 23, 1999
XENCO contact : Karen Olson/Brent Barron

Analysis Requested	*Lab ID:*	91553 001			
	Field ID:	TW-1			
	Depth:				
	Matrix:	Liquid			
	Sampled:	04/15/99 15:33			
Total Lead by ICP-MS	*Analyzed:*	04/19/99			
EPA 6020-Pb	*Units:*	mg/L	R.L.		
Lead		U	< 0.010 (0.010)		

U-The contaminant was analyzed for, but was not detected above the level of the associated value. The associated value is the sample quantitation limit.

This report summary, and the entire report it represents, has been made for the exclusive and confidential use of Corrigan Consulting, Inc..
The interpretations and results expressed through this analytical report represent the best judgment of XENCO Laboratories. Xenco Laboratories, however, assumes no responsibility and makes no warranty to the end use of the data hereby presented.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

Certificate Of Quality Control for Batch : 19A48C06

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: Apr 22, 1999 15:47
Date Analyzed: Apr 19, 1999 18:50

Analyst: MAB
Matrix: Liquid

	BLANK SPIKE ANALYSIS						
Parameter	[A] Blank Result mg/L	[B] Blank Spike Result mg/L	[C] Blank Spike Amount mg/L	[D] Detection Limit mg/L	[E] QC Blank Spike Recovery %	[F] LIMITS Recovery Range %	[G] Qualifier
Arsenic	< 0.0444	2.0461	2.2200	0.0444	92.2	75-125	
Barium	< 0.028	1.069	1.110	0.028	96.3	75-125	
Cadmium	< 0.0044	0.4067	0.4440	0.0044	91.6	75-125	
Chromium	< 0.0278	1.1600	1.1100	0.0278	104.5	75-125	
Lead	< 0.0111	2.0778	2.2200	0.0111	93.6	75-125	
Selenium	< 0.0444	1.9394	2.2200	0.0444	87.4	75-125	
Silver	< 0.0278	1.1056	1.1100	0.0278	99.6	75-125	

Bla· ike Recovery [E] = 100*(B-A)/(C)
N.(t calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

Xenco Laboratories

Certificate Of Quality Control for Batch : 19A48C06

EPA SW846/6020 Total RCRA Metals by ICP- MS

Date Validated: Apr 22, 1999 15:47
Date Analyzed: Apr 19, 1999 19:01

Analyst: MAB
Matrix: Liquid

	MATRIX DUPLICATE ANALYSIS					MATRIX SPIKE ANALYSIS				
Q.C. Sample ID 91547- 003	[A] Sample Result	[B] Duplicate Result	[C]	[D] QC	[E] LIMITS	[F] Matrix Spike Result	[G] Matrix Spike Amount	[H] QC	[I] LIMITS	[G]
Parameter			Detection Limit	Relative Difference	Relative Difference			Matrix Spike Recovery	Recovery Range	Qualifier
	mg/L	mg/L	mg/L	%	%	mg/L	mg/L	%	%	
Arsenic	< 0.0444	< 0.0444	0.0444	N.C	20.0	2.3111	2.200	105.1	75-125	
Barium	0.583	0.611	0.028	4.7	20.0	1.774	1.10	108.3	75-125	
Cadmium	< 0.0044	< 0.0044	0.0044	N.C	20.0	0.4450	0.444	100.2	75-125	
Chromium	< 0.0278	< 0.0278	0.0278	N.C	20.0	1.2828	1.100	116.6	75-125	
Lead	< 0.0111	< 0.0111	0.0111	N.C	20.0	2.3339	2.220	105.1	75-125	
Selenium	< 0.0444	< 0.0444	0.0444	N.C	20.0	2.1322	2.200	96.9	75-125	
Silver	< 0.0278	< 0.0278	0.0278	N.C	20.0	1.1361	1.100	103.3	75-125	

Relative Difference [D] = 200*(B-A)/(B+A)
Matrix Spike Recovery [H] = 100*(F-A)/[G]
N.C. = Not calculated, data below detection limit
N.D. = Below detection limit
All results are based on MDL and validated for QC purposes only

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories
Case Narrative
TNRCC/MP/COH Heights Service Center
Project No. 98S-128

June 14, 1999
XENCO ID 91553
For Corrigan Consulting

Sample Receipt:

One sample was received at XENCO Laboratories on April 16, 1999 at 09:36 hours. The sample was intact and matched the chain of custody. The chain of custody was assigned XENCO ID number 91553. The water sample was received in the proper container for the analysis requested, on ice and the sample custody seals were intact. The sample was analyzed for target analytes in accordance with XENCO Laboratories SOP for Metals.

Sample Receipt Non-conformances:

NA

Sample additions and corrections:

NA

Sample Preparation:

The water sample for metals analysis was digested in accordance with XENCO Laboratories SOP MDGA-DGL-90066.

Sample Analysis and Results:

SOP MDGA-DGL-90060 (Method 6020): Precision, accuracy, and recovery data were within laboratory acceptance limits for the water QC samples.

Eddie Clemons
QA/QC Director

Karen Olson
Project Manager

XENCO Laboratories

LABORATORY

QC DATA

FOR

Corrigan Consulting

TNRCC

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XENCO Laboratories

SUMMARY

FOR

6020 INITAL CALIBRATION

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San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

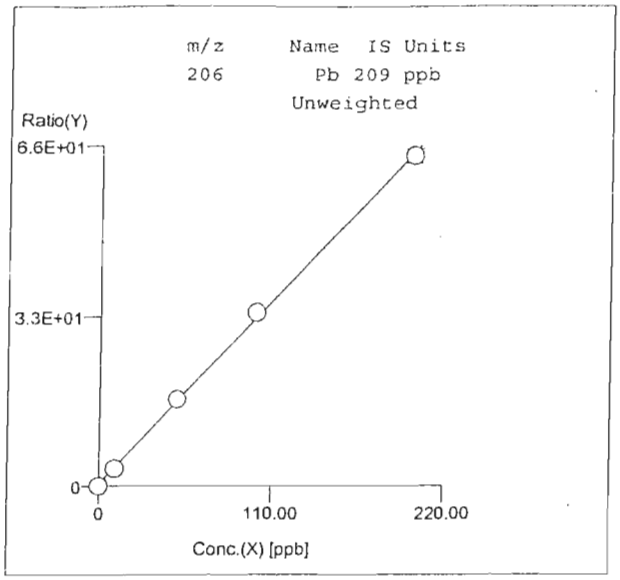
Calibration Report

Calibration : C:\HPCHEM\1\CALIB\EPAPB.C
Last Calib: Jun 09, 1999 11:28
Cal Type : External Calibration Method
Cal Title : ONE OR MORE METALS

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99d1918a.b\001calb.d\	001calb.d#	Apr 19 1999 06:14 pm
2	...hem\1\data\99d1918a.b\002cals.d\	002cals.d#	Apr 19 1999 06:17 pm
3	...hem\1\data\99d1918a.b\003cals.d\	003cals.d#	Apr 19 1999 06:21 pm
4	...hem\1\data\99d1918a.b\004cals.d\	004cals.d#	Apr 19 1999 06:24 pm
5	...hem\1\data\99d1918a.b\005cals.d\	005cals.d#	Apr 19 1999 06:28 pm
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

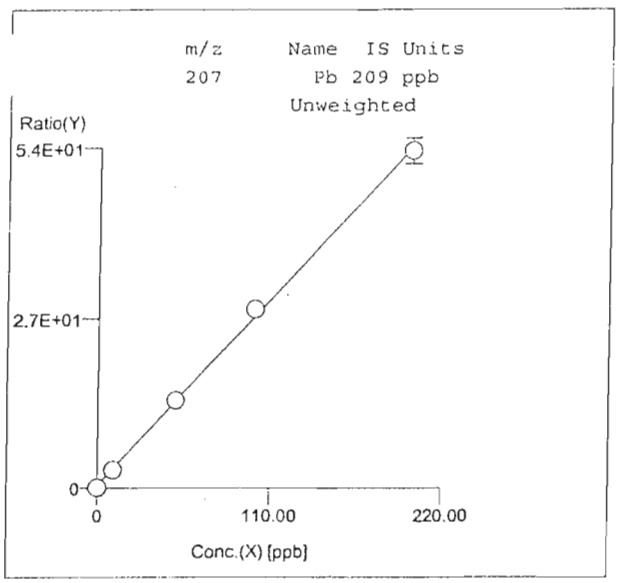
Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio		RSD %
1	0.00	1.93E-2	P	2.32
2	10.00	3.42E+0	P	2.12
3	50.00	1.68E+1	P	6.64E-1
4	100.00	3.36E+1	P	2.29
5	200.00	6.40E+1	P	2.17
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 0.9997
Y = 3.205E-1*X +5.056E-1
X = 3.120E+0*Y -1.578E+0

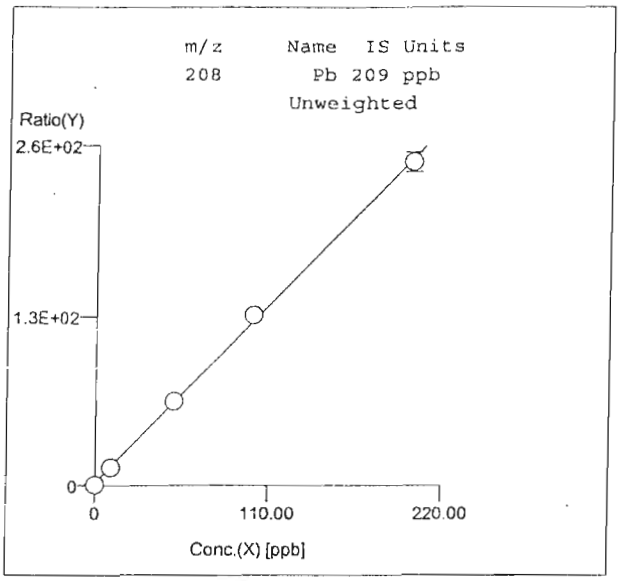
MinConc: 0.00



Lv.	Conc.	Ratio		RSD %
1	0.00	1.47E-2	P	11.90
2	10.00	2.87E+0	P	1.48
3	50.00	1.39E+1	P	1.21
4	100.00	2.84E+1	P	1.55
5	200.00	5.35E+1	P	3.83
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 0.9995
Y = 2.684E-1*X +4.224E-1
X = 3.726E+0*Y -1.574E+0

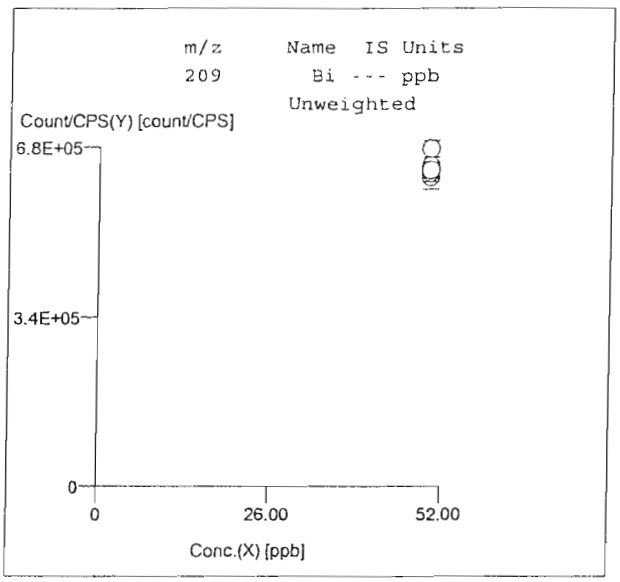
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	4.13E-1 P	4.70
2	10.00	1.37E+1 P	1.75
3	50.00	6.47E+1 P	9.22E-1
4	100.00	1.31E+2 P	1.04
5	200.00	2.48E+2 P	3.08
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 0.9996
Y = 1.241E+0*X +2.208E+0
X = 8.061E-1*Y -1.780E+0

MinConc: 0.00



Lv.	Conc.	Count/CPS	RSD %
1	50.00	6.42E+5 P	6.72E-1
2	50.00	6.20E+5 P	3.86
3	50.00	6.28E+5 P	2.87
4	50.00	6.33E+5 P	2.51
5	50.00	6.76E+5 P	2.47
*6	50.00	---	---
*7	50.00	---	---
*8	50.00	---	---
*9	50.00	---	---
*10	50.00	---	---
*11	50.00	---	---
*12	50.00	---	---
*13	50.00	---	---
*14	50.00	---	---
*15	50.00	---	---
*16	50.00	---	---
*17	50.00	---	---
*18	50.00	---	---
*19	50.00	---	---
*20	50.00	---	---

CurveFit : Excluded

MinConc: 0.00

XENCO Laboratories

INSTRUMENT

RUN LOG

11381 Meadowglen, Suite L
Houston, Texas, 77082
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San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	PB	2101		EPA8MET	BLK	W *45*50*04/19/99*11:0	5	-		
2	LFB	2102		EPA8MET	BKS	W *45*50*04/19/99*11:0	5			
3	AllRef	2103		EPA8MET	91547-003	W *45*50*04/19/99*11:0	5			
4	Dup1	2104		EPA8MET	91547-003D	W *45*50*04/19/99*11:0	5			
5	Spike1	2105		EPA8MET	91547-003S	W *45*50*04/19/99*11:0	5			
6	Sample	1106		EPA8MET	ICB/CCB	ICB/CCB	1			
7	Sample	2106		EPA8MET	91552-003	W *45*50*04/19/99*11:0	5			
8	Sample	2107		EPA8MET	91552-006	W *45*50*04/19/99*11:0	5			
9	Sample	2108		EPA8MET	91553-001	W *45*50*04/19/99*11:0	5			
10	Sample	2109		EPA8MET	91520-001	T *45*50*04/19/99*11:00	5			
11	Sample	2110		EPA8MET	91520-002	T *45*50*04/19/99*11:00	5			
12	Sample	2111		EPA8MET	91520-003	T *45*50*04/19/99*11:00	5			
13	Sample	2112		EPA8MET	91520-004	T *45*50*04/19/99*11:00	5			
14	Sample	2201		EPA8MET	91547-003PDS	50% OF 200PPB	5			
15	PB	2202		EPA8MET	BLK	W *50*50*04/15/99*15:0	5			
16	LFB	2203		EPA8MET	BKS	W *50*50*04/15/99*15:0	5			
17	Sample	2204		EPA8MET	BSD	W *50*50*04/15/99*15:0	5			
18	AllRef	2205		EPA8MET	91552-002	W *50*50*04/15/99*15:0	5			
19	Dup1	2206		EPA8MET	91552-019	W *50*50*04/15/99*15:0	5			
20	Spike1	2207		EPA8MET	91552-019D	W *50*50*04/15/99*15:0	5			

XENCO Laboratories

RAW DATA

FOR

6020 BLANK

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PB QC Report

Data File:	C:\HPCHEM\1\DATA\99D1918a.B\011__PB.D\011__PB.D#
Date Acquired:	Apr 19 1999 06:50 pm
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	W *45*50*04/19/99*11:00*MAB*JOS*
Vial Number:	2101
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	Apr 19 1999 06:29 pm
Sample Type:	PB
Dilution Factor:	5.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
53 Cr	-4.15 ppb	1.12	10.00	
75 As	-0.76 ppb	6.15	10.00	
82 Se	-1.28 ppb	10.95	10.00	
107 Ag	-0.36 ppb	1.45	10.00	
109 Ag	-0.88 ppb	0.34	10.00	
111 Cd	-0.90 ppb	0.64	10.00	
114 Cd	-1.08 ppb	2.56	10.00	
135 Ba	0.67 ppb	2.70	10.00	
137 Ba	0.60 ppb	15.81	10.00	
206 Pb	-1.39 ppb	1.77	10.00	
207 Pb	-1.40 ppb	0.88	10.00	
208 Pb	-1.28 ppb	0.86	10.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	885160.25	2.54	969576.94	91.3	30 - 120	
72 Ge	707757.31	2.40	742422.50	95.3	30 - 120	
115 In	948248.63	0.80	1022870.20	92.7	30 - 120	
209 Bi	570416.25	1.26	642065.69	88.8	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99D1918a.B\001CALB.D\001CALB.D#

0 :Element Failures 0 :Max. Number of Failures Allowed
0 :ISTD Failures 0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes: Pass
ISTD: Pass

Pre-Login

11381 Meadowglen, Suite L
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972-481-9999 phone
972-481-9998 fax

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San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

Validated By: _____ Date: _____

COC #: 41555-H Custodian: SW Log Date & Time: 7/16/99 10:15 Number Containers In This Cooler: 1 No. of Coolers: 1

er ID: 0 Custody Seal Id: 0 Broken (Intact) None Cooler Temp.: 3.2 deg C. Thermometer Id.: T1 ICE: Blue, Dry, (Water)

Container Ids	Number of Containers	Matrix	Sample Type	Collection Method	Custody Seal	Container Size	Container Type	Liner	Preservative	Sample Condition	Label Condition	Head Space	Sample Amount %	pH	Analyses Requested	Hold	Refrig. #	Remarks & Analysis #s
For All 01	(1) 2 3 Tot: (1)	A S (L)	S (W) P	MC LC C (G) U	B I (N)	4 8 16 32 1 (500) VOA BAG	GA GC (PH) VA T	T (P) N	H S (N) <4C Z SB None	(P) B L M	I (M) PL None	(N) Y	(P) 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 (49) 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A S L	S W P	MC LC C G U	B I N	4 8 16 32 1 500 VOA BAG	GA GC PH VA T	T P N	H S N <4C Z SB None	I B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			

TEX S8021B	7 pH W1501	13 VOA 8260	19 VOA VTCLPV	25 Met 7Tot S6010R	31 Met GF Pb W2392E	37 KMF Diox VKMG01	43 PAHs 8270P1	49 S6020Pb
PH W4181A	8 pH S9045	14 SV S8270E1	20 SV VTCLPSV	26 Met Hg S7470R	32 SV Scans S8270	38 Anions W300	44 PAHs on Highest TPH 8270	50
TEX-M S8021BL	9 pH S9040	15 Pest S8080A	21 Pest VTCLPP	27 Met Hg S7471R	33 SPLP TPH W4181P	39 TSS W1602	45 Soil Charac. Parameters	51
PH S8015D	10 Flash S1010	16 Pest S8081	22 Herb VTCLPH	28 Met 22 S6010A	34 SPLP Met 7 S6010S	40 O&G W4131	46 TPH TX1005	52
PH S8015G	11 R Cyan. S9010R	17 PCB S8082	23 Met 7T S6010T	29 Met Pb S6010Pb	35 SPLP Hg S7470S	41 Moisture AD2216A	47 Met 7Tot S6020R	53
08 W1601	12 R Sulf.S9030R	18 VOA 8260D	24 Met Hg S7470T	30 Met Pb GF S7421A	36 SPLP Pb W2392S	42 PAHs 8310	48 Met W2008	54

TAT: A: ASAP - All B: (48 hrs) - All
P: (24hrs) - All T: 3 Days - All

DO NOT MIX COOLERS IN THE SAME PAGE

Analytical Report 93099

for

Corrigan Consulting, Inc.

Project Manager: Wendall Honeycutt

Project Name : Heights Service Center

August 13, 1999

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

Houston - Dallas - San Antonio - Austin - Latin America

XENCO Laboratories

August 13, 1999

Project Manager: Wendall Honeycutt
Corrigan Consulting, Inc.
1909 Capri Lane Seabrook, TX 77586
Seabrook , TX

Reference: XENCO Report No: 93099
Project Name : Heights Service Center
Project Address: 3602 Center St., Houston, TX

Dear Wendall Honeycutt :

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 93099 . All results being reported under this Chain of Custody apply to the samples analyzed and properly identified with a Laboratory ID number.

All the results for the quality control samples were reviewed. Also, all parameters for data reduction and validation were reviewed. 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.

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 3 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. 93099 will be filed for 60 days, and after that time they will be properly disposed without futher 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.

Sincerely,

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories
Case Narrative
Heights Service Center
Project No. 98S-128

August 13, 1999
XENCO ID 93099
For Corrigan Consulting

Sample Receipt:

Six samples were received at XENCO Laboratories on July 30 1999 at 11:50 hours. These samples were intact and matched the chain of custody with the exception of the non-conformance listed below. The chain of custody was assigned XENCO ID number 93099. These soil samples were received in the proper containers for the analyses requested, on ice and the sample custody seals were intact. The BG-xx samples were analyzed for total Lead by method 6020. The WS-073099 was initially analyzed for TPH by method TX1005 and RCI, however, see the sample additions and corrections section for changes made to this sample.

Sample Receipt Non-conformances:

The Depths on the COC for samples BG-14 and BG-15 did not match the container Labels. XENCO Laboratories was instructed to use the Identification off of the COC for these samples.

Sample additions and corrections:

After sample receipt, the RCI analysis for sample WS-073099 was cancelled. The pH for this sample had already been processed, and is therefore reported. On August 2, 1999, an addition of BTEX and TCLP metals was placed on sample WS-073099.

Sample Preparation:

Soil samples for Metals analyses were digested in accordance with XENCO Laboratories SOP MDGA-DGL-90066 (Method 3051).
Soil TCLP samples for metals analyses were extracted in accordance with XENCO Laboratories SOP GENC-TCLP-90045 (Method 1311). Soil TCLP samples for metals analyses were digested in accordance with XENCO Laboratories SOP MDGA-DGL-90063 Method 3015). Soil samples were purged for volatiles analysis using XENCO Laboratories SOP VOLA-VGV-90050 (Method 5030).

Sample Analysis and Results:

SOP MDGA-MIN-90059 (Method 6020): Precision, accuracy, and recovery data were within laboratory acceptance limits for all water QC samples.

SOP VGV-90050 (Method 8021B): Precision, accuracy, and recovery data were within laboratory acceptance limits for all water QC samples.

XENCO Laboratories
Case Narrative
Heights Service Center
Project No. 98S-128

August 13, 1999
XENCO ID 93099
For Corrigan Consulting

SOP TPH1005-007-03 (Method TX1005): Precision, accuracy, and recovery data were within laboratory acceptance limits for all water QC samples, with the exception of the Blank Spike recovery. The Matrix Spike and Matrix Spike Duplicate were within QC limits, and therefore the data are reported as analyzed.

Eddie Clemons
QA/QC Director

Karen Olson
Project Manager

XENCO Laboratories

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☐ 5309 Wurzbach Road, Suite 104, San Antonio, TX 78238 210-509-333
☐ 11078 Morrison Road, Suite D, Dallas, TX 75229 972-481-9999

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

On-LINE Help & Technical Services at XENCO.com

793

Company COC No: Work Order No: Page 1 of 1

Company: Corrigan Consulting, Inc. Phone: (281) 474-7455

Lab Only: 93099-H

Project Name: Heights Service Center ☐ Previously done at XENCO Project ID: 985-128

TAT: 5h 12h 20h 24h 48h 3d 5d 7d 14d 21d Standard TAT is 10 Working Days unless otherwise agreed in writing. But often reported in 5-7 Working Days 10 day TAT

Location: 3602 Center St. Houston Texas

Project Manager (PM): Wendall Honeycutt Project Director (PD): Roxie Voran

Fax Results to ☒ PM and / or Fax

Invoice to ☐ Accounting ☒ Include Invoice with Final Report Attn PM ☐ Invoice must have a P.O Bill to:

Quote No. P.O No ☐ Call for a P.O.

Special DLs (RR I RR II DW QAPP See Lab PM Call Proj. PM)

Specifications

Sampler Name: Melinda Goelz Signature: Melinda Goelz

Lab Only Additions: Rcv by: From: Date; Rcv by: From: Date; Rcv by: From: Date

	Sample ID	Sampling Date	Time	Depth ft' in" m	Matrix A R S W	Composite	Grab	# Containers	Container Size	Type	Preservatives	BTEX by 8020 8021 8260 602 624 Other	BTEX-MTBE by 8020 8021 8260 602 624 Other	TPH by TX1005 418.1 8015GRO 8015DRO 8015JetF	PAHs by 8270 8100 8310	METALS by 6010 8RCRA Tot Pb TCLP8 13PP 23TAL See List	VOAs by 8260 624 BTEX MTBE PPs TCL See List Call PM	SVOAs by 8270 625 PAHs BN&A TCL PPs See List Call PM	RCI	TAT 5h 12h 20h 24h 48h 3d 5d 7d 10d 14d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Analysis	Remarks
1	BG-1A	7/30/99	0850	0-0.5	S		X	1	~~GC~~ 4	GC	C4					X				X			
2	BG-1B	7/30/99	0900	1-1.5	S		X	1	~~GC~~ 4	GC	C4					X				X			
3	BG-13	7/30/99	0930	1-1.5	S		X	1	~~GC~~ 4	GC	C4					X				X			
4	BG-14	7/30/99	0915	2-2.5	S		X	1	~~GC~~ 4	GC	C4					X				X			
5	BG-15	7/30/99	0940	1-1.5	S		X	1	~~GC~~ 4	GC	C4					X				X			
6	WS-073099	7/30/99	1045	—	S		X	2	~~GC~~ 4	GC	C4			X					X	X			
7	END OR RECORD																						
8																							
9																							
10																							

	Relinquished by (Initials and Signature)	Relinquished to (Initials and Signature)	Date & Time
1	Melinda Goelz		7/30/99 11:50
2			
3		Lab: [signature]	7/30/99 11:50

Total Containers per COC: 7

Rush TATs Fax Due: Final Fax Due: 8/9/99

Final Report Dato Package Due Date:

Rush Charges are Pre-Approved upon Requesting them. All Terms Apply

Preservatives - Various (V), HCl pH<2 (H), H2SO4 pH<2 (S), HNO4 pH<2 (N), NaOH+Asbe Acid (NAA), ZnAc+NaOH (ZA), (Cool,<4C) (C4), None (N), See Label (SL), Other (O) _____

SIZE: 4oz (4), 8oz (8), 32oz (32), 40ml VOA (V), 1L (1), 500ml (.5), Tedlar Bag (B), Wipe (W), Other _____ **TYPE** Glass Amb (GA), Glass Clear (GC), Plastic (P), Other (O) _____

XENCO Laboratories

SAMPLE PROTOCOL NONCONFORMANCE WORKSHEET

Prepared by : Alicia Sanchez	Date / Time : 7/30/99
Client : Corrigan	COC # : 93099
Submitted to : ICA Xeno	Samples Logged In ? ☒ YES ☐ NO

Matrix: ☒ SOIL ☐ WATER ☐ AIR ☐ OTHER _____

Samples Affected: ☐ ALL ☒ PARTIAL (see description)

Description of non-conformance :

BG-14 Depth on COC 2-2.5, on label 1-1.5'
BG-15 Depth on COC 1-1.5', on label 2-2.5'

Condition	Information	Container
☐ Temp > 4°C	☐ No collected date	☐ Damaged containers
☐ Expired Hold Time	☐ No COC	☐ Improper containers
☐ Headspace	☐ Samples not labeled	☐ Insufficient containers
☐ Unpreserved	☐ Sample v. COC ID disagreement	☐ Sample not on COC
☐ Inproperly preserved	☒ Container v. COC disagreement	☐ Sample not received
☐ Insufficient Sample	☐ Method not specified or not listed	
☐ Other _____	☐ Other _____	☐ Other _____

Client Name Contacted: Wendall	Date / Time: 8/3/99 1455
Phone: 281-474-7400	Action: ☑ Complete Login ☐ HOLD

Client Instructions:

Go with what's on COC - look @ Boring logs to confirm.

Comments:

KOwen
Project Manager Signature

8/3/99 1500
Date / Time

COPIES TO: ☐ File ☐ Project Manager ☐ Area Supervisor ☐ QA

ENCO
laboratories

REQUEST FOR ADDITIONS / CORRECTIONS FORM

COC 93099 (A) B C D E (Circle One)

☒ 11381 Meadowglen, Suite L Houston, TX 77082 (713) 589-0692
☐ 11078 Morrison Ln, Suite D Dallas, TX 75229 (972) 481-9999 Fax (972) 481-9998
☐ 5309 Wurzbach Rd., Suite 104 San Antonio, TX 78238 (210) 509-3334 Fax (210) 509-3335

Page 1 of 1

Information should be taken from the original COC.

Requested by: Wendall D/T: 8/2/99 1615

Contractor: Corrigan Phone ( )

Project Name: Heights Service Center

Project Manager: Wendall Honeycutt

Project Location:

Project No.:

☒ ADDITION
☐ CORRECTION
☒ CANCELLED
☐ NO ADDITION
☐ ON HOLD

TURN-AROUND TIME: ASAP / 24 hrs / 48 hrs / 3 Days / 5 Days / (7 Days) / Remarks

Lab ID	Field ID	Date/Time	Depth	Matrix	Sample Description	RCI - Cancel	H.T.E.	BTEX	H.T.E.	TCLP-RCRA8 metals	H.T.E.		H.T.E.		H.T.E.	Remarks
006.	WS-073099	7/30	–	S		X		X		X						

TNRCC Consist.

COMMENTS: pH already completed.

Per our telephone conversation on 8/2, please confirm, (within 2 hours), the following additions to the project identified above. We will proceed with analysis according to this addition form, unless otherwise instructed.

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

Add received by tech: [signature]

Date/Time:

Add Taken By: KO Date/Time: 8/2/99 1645 E.Clemons

HOLD TIME EXPIRATION (H.T.E.)

XENCO Laboratories

CERTIFICATE OF QUALITY CONTROL Batch # 93352

INSTRUMENTATION:	GC	**METHOD:** SW-846 8021B		**DATE:**	August-99
ANALYST:	O.R.	**MATRIX:** Soil			

SURROGATE RECOVERY STANDARDS ANALYSIS

Sample ID - Blank 1	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
4-Bromofluorobenzene	30.00	31.56	105%	74-121
Sample ID - Blank Spike 1	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
4-Bromofluorobenzene	30.00	33.19	111%	74-121
Sample ID - 93099-006	**Conc. ppb**	**Result ppb**	**Recovery %**	**QC LIMITS**
Parameter			Surrogate Recovery	Recovery Limits %
4-Bromofluorobenzene	30.00	29.75	99%	74-121

Eddie Clemons
QA/QC Director

XENCO Laboratories

CERTIFICATE OF QUALITY CONTROL — Batch # 92875

INSTRUMENTATION:	GC	**METHOD:** SW-846 8021B		**DATE:**	8/03/99
ANALYST:	O.R.	**MATRIX:** Soil			

INTERNAL STANDARD AREA ANALYSIS

Parameter	Retention time	Area response	Recovery %	QC LIMITS
a,a,a-Trifluorotoluene			Internal Recovery	Recovery Limits %
CCV1	10.37	1890596	N/A	
Blank	10.37	1847537	98%	50-200
Blankspike	10.36	1893955	100%	50-200
93099-006	10.36	1918706	101%	50-200

Eddie Clemons
QA/QC Director

XENCO Laboratories

Soil

CORRIGAN CONSULTING		
ANALYTES	MDL	MQL
Benzene	1 (ppb)	5 (ppb)
Ethylbenzene	1 (ppb)	5 (ppb)
Lead	1 (ppb)	10 (ppb)
Toluene	1 (ppb)	5 (ppb)
m,p-Xylene	1 (ppb)	10 (ppb)
o-Xylene	1 (ppb)	5 (ppb)
TPH1005	31 (ppm)	100 (ppm)

*MDL are statistical values generated according to 40CFR part 136.
These are subject to change annually; based on instrument and calibration conditions at the time of MDL generations.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories

WATER

CORRIGAN CONSULTING		
ANALYTES	MDL	MQL
Chromium	0.8(ppb)	10 (ppb)
Cadmium	0.2(ppb)	10 (ppb)
Arsenic	1 (ppb)	10 (ppb)
Barium	0.5(ppb)	10 (ppb)
Selenium	1.1(ppb)	10 (ppb)
Silver	0.23(ppb)	10 (ppb)
Mercury	0.25(ppb)	10 (ppb)
Lead	0.28 (ppb)	10 (ppb)

*MDL are statistical values generated according to 40CFR part 136.
These are subject to change annually; based on instrument and calibration conditions at the time of MDL generations.

Eddie L. Clemons, II
QA/QC Manager

XENCO Laboratories
CHRONOLOGY OF HOLDING TIMES

Analytical Method: __SW-846 6020_____ Client: Corrigan Consulting, Inc.

Lab Name: _XENCO Laboratories Project Name: Heights Service Center

LAB ID: 93099

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	
BG-1A	07/30/99	07/30/99	08/03/99	180 Days	4 Days	08/04/99	180 Days	5 Days	
BG-1B	07/30/99	07/30/99	08/03/99	180 Days	4 Days	08/04/99	180 Days	5 Days	
BG-13	07/30/99	07/30/99	08/03/99	180 Days	4 Days	08/04/99	180 Days	5 Days	
BG-14	07/30/99	07/30/99	08/03/99	180 Days	4 Days	08/04/99	180 Days	5 Days	
BG-15	07/30/99	07/30/99	08/03/99	180 Days	4 Days	08/04/99	180 Days	5 Days	
WS-073099	07/30/99	07/30/99	08/05/99	180 Days	6 Days	08/05/99	180 Days	6 Days	

Analytical Method: __SW-846 7471_____ Client: Corrigan Consulting, Inc.

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	
WS-073099	07/30/99	07/30/99	08/05/99	28 Days	6 Days	08/05/99	28 Days	6 Days	

Analytical Method: __SW-846 8021B_____ Client: Corrigan Consulting, Inc.

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	
WS-073099	07/30/99	07/30/99	08/04/99	14 Days	5 Days	08/04/99	14 Days	5 Days	

Analytical Method: __TX1005_____ Client: Corrigan Consulting, Inc.

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	
WS-073099	07/30/99	07/30/99	08/03/99	14 Days	4 Days	08/04/99	14 Days	5 Days	

Comments:

XENCO Laboratories

Certificate of Analysis Summary 93099

Corrigan Consulting, Inc., Seabrook, TX

Project Name: Heights Service Center

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: 3602 Center St., Houston, TX

Date Received in Lab: Fri Jul-30-99 11:50 AM
Date Report Faxed: fri Aug-13-99
XENCO Contact: Karen Olson

Analysis Requested	*Lab ID :* / *Field ID :* / *Depth :* / *Matrix :* / *Sampled :*	93099-001 BG-1A 0-0.5 ft Soil Jul-30-1999	93099-002 BG-1B 1-1.5 ft Soil Jul-30-1999	93099-003 BG-13 1-1.5 ft Soil Jul-30-1999	93099-004 BG-14 2-2.5 ft Soil Jul-30-1999	93099-005 BG-15 1-1.5 ft Soil Jul-30-1999	93099-006 WS-073099 Soil Jul-30-1999
TCLP Metals by EPA 6020	*Analyzed :* / *Units :*						Aug-05-1999 mg/L RL
Arsenic							J 0.044 0.033
Barium							1.99 0.056
Cadmium							J 0.017 0.011
Chromium							J 0.039 0.033
Lead							0.107 0.056
Selenium							J 0.050 0.033
Silver							0.061 0.056
TPH by Texas1005	*Analyzed :* / *Units :*						Aug-04-1999 mg/kg RL
C6-C10 Gasoline Range Hydrocarbons							BRL 61.2
C10-C28 Diesel Range Hydrocarbons							BRL 61.2
Total TPH 1005							BRL
Total Pb by EPA 6020	*Analyzed :* / *Units :*	Aug-04-1999 mg/kg RL	Aug-04-1999 mg/kg RL	Aug-04-1999 mg/kg RL	Aug-04-1999 mg/kg RL	Aug-04-1999 mg/kg RL	
Lead		42.1 1.07	43.0 1.20	9.05 1.19	15.4 1.20	9.05 1.22	

"J" - The contaminant was positively identified and the associated value is an estimated concentration.

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.

Eddie L. Clemons, II
QA/QC Director

BRL Below Reporting Limits.

Certificat f Analysis Summary 93099

Corrigan Consulting, Inc., Seabrook , TX

Project Name: Heights Service Center

Project ID: 98S-128
Project Manager: Wendall Honeycutt
Project Location: 3602 Center St., Houston, TX

Date Received in Lab: Fri Jul-30-99 11:50 AM
Date Report Faxed: fri Aug-13-99
XENCO Contact: Karen Olson

Analysis Requested	*Lab ID :* / *Field ID :* / *Depth :* / *Matrix :* / *Sampled :*	93099-001 BG-1A 0-0.5 ft Soil Jul-30-1999	93099-002 BG-1B 1-1.5 ft Soil Jul-30-1999	93099-003 BG-13 1-1.5 ft Soil Jul-30-1999	93099-004 BG-14 2-2.5 ft Soil Jul-30-1999	93099-005 BG-15 1-1.5 ft Soil Jul-30-1999	93099-006 WS-073099 Soil Jul-30-1999
BTEX by EPA 8021	*Analyzed :* / *Units :*						Aug-04-1999 mg/kg RL
Benzene							BRL 0.061
Toluene							BRL 0.061
Ethylbenzene							BRL 0.061
m,p-Xylenes							BRL 0.122
o-Xylene							BRL 0.061
Total Xylenes							BRL
Total BTEX							BRL
Percent Moisture	*Analyzed :* / *Units :*	Aug-04-1999 %	Aug-04-1999 %	Aug-04-1999 %	Aug-04-1999 %	Aug-04-1999 %	Aug-04-1999 %
Percent Moisture		6.64	16.4	16.1	16.5	17.8	18.3
Soil pH by EPA 9045C	*Analyzed :* / *Units :*						Aug-02-1999 SU
pH							10.4
TCLP Mercury by EPA 7471	*Analyzed :* / *Units :*						Aug-05-1999 mg/L RL
Mercury							BRL 0.010

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XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented.

Eddie L. Clemons, II
QA/QC Director

BRL Below Reporting Limits.

XENCO Laboratories

Certificate of Quality Control

Analytical Report: 93099

Project Name: Heights Service Center
Project ID: 98S-128

Lab Batch #: 93352
Reporting Units: mg/kg **Matrix:** Solid

BTEX by EPA 8021 Analytes	Blank Result [A]	BLANK/BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Benzene	<0.050	0.1	0.124	124.0	70-130	
Toluene	<0.050	0.1	0.117	117.0	70-130	
Ethylbenzene	<0.050	0.1	0.098	98.0	71-129	
m,p-Xylenes	<0.100	0.2	0.238	119.0	70-135	
o-Xylene	<0.050	0.1	0.111	111.0	71-133	

Lab Batch #: 93529
Reporting Units: mg/L **Matrix:** Water

TCLP Metals by EPA 6020 Analytes	Blank Result [A]	BLANK/BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Arsenic	<0.056	1.11	1.23	110.8	75-125	
Barium	<0.056	1.11	1.25	112.6	75-125	
Cadmium	<0.022	0.444	0.492	110.8	75-125	
Chromium	<0.056	1.11	1.35	121.6	75-125	
Lead	<0.056	2.22	2.41	108.6	75-125	
Selenium	<0.056	1.11	1.21	109.0	75-125	
Silver	<0.056	2.22	2.57	115.8	75-125	

Lab Batch #: 93428
Reporting Units: mg/kg **Matrix:** Solid

TPH by Texas1005 Analytes	Blank Result [A]	BLANK/BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
C6-C10 Gasoline Range Hydrocarbons	<50.0	500.0	493	98.6	70-135	
C10-C28 Diesel Range Hydrocarbons	<50.0	200.0	146	73.0	70-135	

Lab Batch #: 93424
Reporting Units: mg/kg **Matrix:** Solid

Total Pb by EPA 6020 Analytes	Blank Result [A]	BLANK/BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Lead	<1.00	100.0	106	106.0	75-125	

ık Spike Recovery [D] = 100*(C-A)/[B]
esults are based on MDL and validated for QC purposes.

Eddie L. Clemons, II
QA/QC Director

XENCO Laboratories

Certificate of Quality Control

Analytical Repor 93099

Project Name Heights Service Center
Project ID 98S-128

Lab Batch #: 93531
Reporting Units: mg/L **Matrix:** Water

TCLP Mercury by SW 7470A Analytes	BLANK /BLANK SPIKE RECOVERY STUDY					
	Blank Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Mercury	<0.010	0.005	0.006	120.0	77-120	

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

Eddie L. Clemons, II
QA/QC Director

XENCO Laboratories

Certificate of Quality Control

Analytical Report: 93099

Project Name: Heights Service Center
Project ID: 98S-128

Lab Batch #: 93424
QC- Sample ID: 93099-005
Reporting Units: mg/kg **Matrix:** Solid

Total Pb by EPA 6020 Analyte	MATRIX / MATRIX SPIKE RECOVERY STUDY					
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Lead	9.05	122	128	97.50	75-125	

Lab Batch #: 93531
QC- Sample ID: 93165-001-001
Reporting Units: mg/L **Matrix:** Water

TCLP Mercury by SW 7470A Analyte	MATRIX / MATRIX SPIKE RECOVERY STUDY					
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Mercury	<0.010	.003	0.003	100.00	77-120	

ık Spike Recovery [D] = 100*(C-A)/[B]
results are based on MDL and validated for QC purposes.

Eddie L. Clemons, II
QA/QC Director

XENCO Laboratories

Certificate of Quality Control

Analytical Report : 93099
Lab Batch #: 93529
QC- Sample ID: 93165-001
Reporting Units: mg/L Matrix: Water

Project Name: Heights Service Center
Project ID: 98S-128

TCLP Metals by EPA 6020 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Arsenic	0.259	0.252	2.7	25	
Barium	0.076	0.068	11.1	25	
Cadmium	0.007	0.006	15.4	25	
Chromium	<0.056	<0.056	NC	25	
Lead	1.40	1.43	2.1	25	
Selenium	<0.056	<0.056	NC	25	
Silver	<0.056	<0.056	NC	25	

Lab Batch #: 93424
QC- Sample ID: 93099-005
Reporting Units: mg/kg Matrix: Solid

Total Pb by EPA 6020 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Lead	9.05	11.3	22.1	25	

Lab Batch #: 93360
QC- Sample ID: 93099-006-006
Reporting Units: % Matrix: Solid

Percent Moisture Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Percent Moisture	18.3	18.1	1.1		

Lab Batch #: 93305
QC- Sample ID: 93099-006-006
Reporting Units: SU Matrix: Solid

Soil pH by EPA 9045C Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
pH	10.4	10.4	0	20	

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

Eddie L. Clemons, II
QA/QC Director

XENCO Laboratories

Certificate of Quality Control

alytical Report 93099

Project Name: Heights Service Center
Project ID: 98S-128

Lab Batch #: 93531
QC- Sample ID: 93165-001-001
Reporting Units: mg/L **Matrix:** Water

TCLP Mercury by SW 7470A	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Mercury	<0.010	<0.010	NC		

ix Spike Percent Recovery [D] = 100*(C-A)/B
tive Percent Difference [E] = 200*(C-A)/(C+B)
Results are based on MDL and Validated for QC Purposes

Eddie L. Clemons, II
QA/QC Director

Certific. of Quality Control

Analytical Report: 93099

Project Name: Heights Service Center

Project ID: 98S-128

Lab Batch ID: 93352
QC- Sample ID: 93099-006
Reporting Units: mg/kg **Matrix:** Solid

BTEX by EPA 8021 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY									
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Duplicate Spiked Sample Result [E]	Spiked Dup. %R [F]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.061	2	1.74	87.00	1.78	89.00	2.27	70-130	35	
Toluene	<0.061	2	1.91	95.50	1.92	96.00	0.52	70-130	35	
Ethylbenzene	<0.061	2	1.56	78.00	1.56	78.00	0.00	71-129	35	
m,p-Xylenes	<0.122	4	3.84	96.00	3.85	96.25	0.26	70-135	35	
o-Xylene	<0.061	2	1.77	88.50	1.79	89.50	1.12	71-133	35	

Lab Batch ID: 93428
QC- Sample ID: 93127-001
Reporting Units: mg/kg **Matrix:** Solid

TPH by Texas1005 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY									
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Duplicate Spiked Sample Result [E]	Spiked Dup. %R [F]	RPD %	Control Limits %R	Control Limits %RPD	Flag
C6-C10 Gasoline Range Hydrocarbons	<50.0	1000	1000	100.00	1020	102.00	1.98	70-135	35	
C10-C28 Diesel Range Hydrocarbons	<50.0	1000	1110	111.00	1130	113.00	1.79	70-135	35	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Matrix Spike Duplicate Percent Recovery [F] = 100*(E-A)/B
Relative Percent Difference RPD = 200*(C-E)/(C+E)
All Results are based on MDL and validated for QC purposes

Eddie L. Clemons, II
QA/QC Director

XENCO Laboratories

LABORATORY

QC DATA

FOR

Corrigan Consulting

TNRCC

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

SUMMARY

FOR

6020 INITAL CALIBRATION

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

Calibration Report

Calibration : C:\HPCHEM\1\CALIB\TABLEIII.C
Last Calib: Aug 16, 1999 12:23
Cal Type : External Calibration Method
Cal Title : TABLEIII

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99h0411a.b\001calb.d\	001calb.d#	Aug 4 1999 11:13 am
2	...hem\1\data\99h0411a.b\002cals.d\	002cals.d#	Aug 4 1999 11:17 am
3	...hem\1\data\99h0411a.b\003cals.d\	003cals.d#	Aug 4 1999 11:20 am
4	...hem\1\data\99h0411a.b\004cals.d\	004cals.d#	Aug 4 1999 11:24 am
5	...hem\1\data\99h0411a.b\005cals.d\	005cals.d#	Aug 4 1999 11:28 am
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
8	---		
9	---		
10	---		
11	---		
12	---		
13	---		
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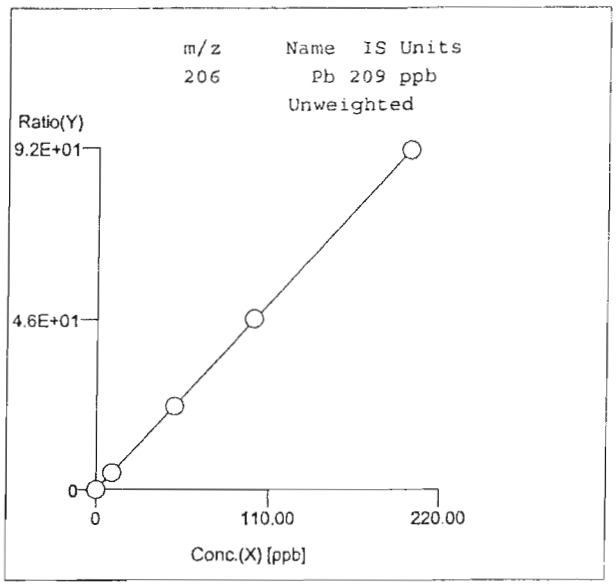
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio	RSD %
1	0.00	1.27E-2 P	14.90
2	10.00	4.56E+0 P	6.46E-1
3	50.00	2.27E+1 P	1.27
4	100.00	4.60E+1 P	7.03E-1
5	200.00	9.12E+1 P	1.80E-2
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 4.564E-1*X +2.270E-2
X = 2.191E+0*Y -4.973E-2

MinConc: 0.00

Calibration Report

Calibration : C:\HPCHEM\1\CALIB\TABLEIII.C
Last Calib: Aug 16, 1999 12:26
Cal Type : External Calibration Method
Cal Title : TABLEIII

Standard Data Files

Level	DataPath	DataFile	Date Acquired
1	...hem\1\data\99h0511a.b\001calb.d\	001calb.d#	Aug 5 1999 00:00 pm
2	...hem\1\data\99h0511a.b\002cals.d\	002cals.d#	Aug 5 1999 00:04 pm
3	...hem\1\data\99h0511a.b\003cals.d\	003cals.d#	Aug 5 1999 00:08 pm
4	...hem\1\data\99h0511a.b\004cals.d\	004cals.d#	Aug 5 1999 00:12 pm
5	...hem\1\data\99h0511a.b\005cals.d\	005cals.d#	Aug 5 1999 00:16 pm
6	---		
7	---		
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14	---		
15	---		
16	---		
17	---		
18	---		
19	---		
20	---		

Level	BkgPath	BkgFile	Interference Correction
1	---	---	ON
2	---	---	ON
3	---	---	ON
4	---	---	ON
5	---	---	ON
6	---		
7	---		
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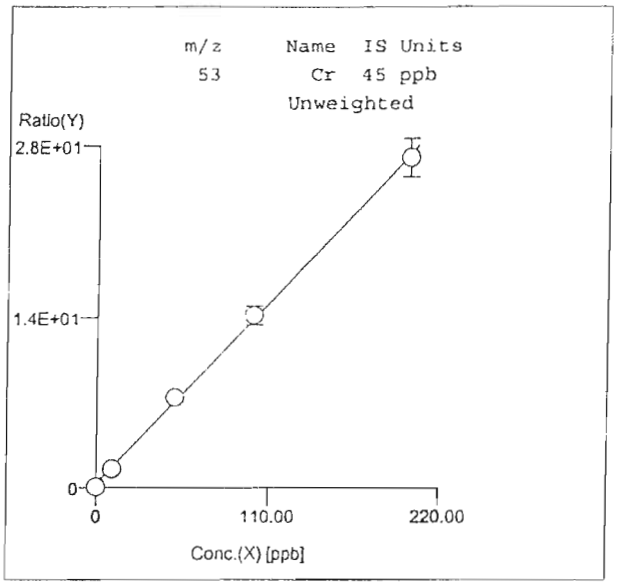
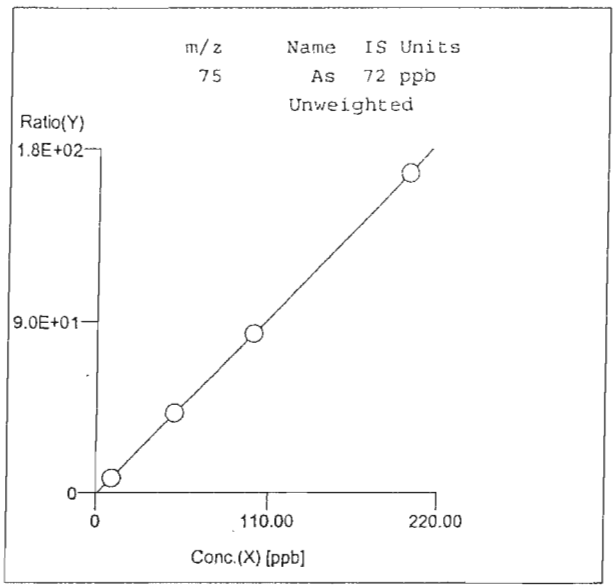
18	---		
19	---		
20	---		



Lv.	Conc.	Ratio		RSD %
1	0.00	6.42E-2	P	8.43
2	10.00	1.54E+0	P	6.27
3	50.00	7.44E+0	P	4.79
4	100.00	1.42E+1	P	5.42
5	200.00	2.71E+1	P	5.75
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 0.9996
Y = 1.349E-1*X +3.488E-1
X = 7.414E+0*Y -2.586E+0

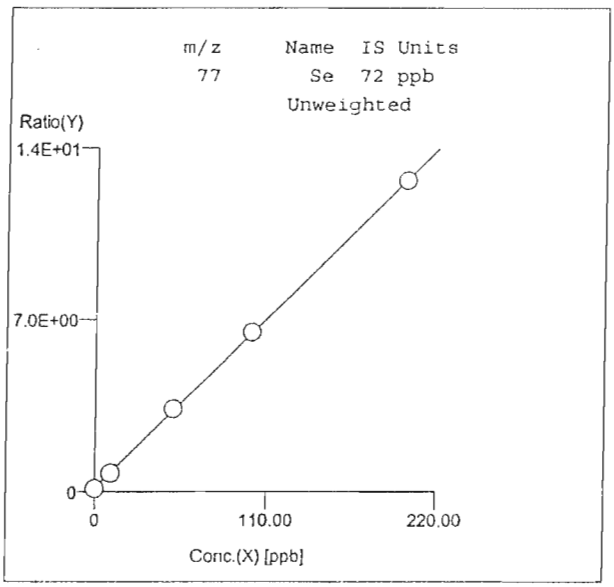
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	-9.19E-1 P	---
2	10.00	7.41E+0 P	3.51
3	50.00	4.14E+1 P	1.61
4	100.00	8.35E+1 P	4.89E-2
5	200.00	1.67E+2 P	9.28E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 8.420E-1*X -8.610E-1
X = 1.188E+0*Y +1.023E+0

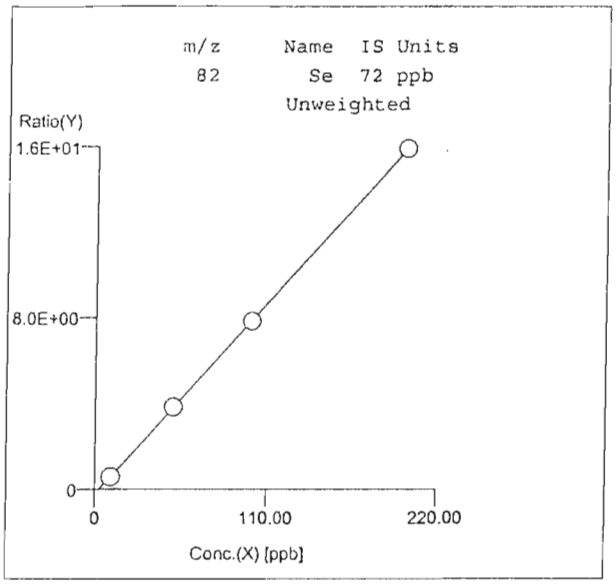
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	1.24E-1 P	2.19
2	10.00	7.48E-1 P	4.45
3	50.00	3.36E+0 P	2.05
4	100.00	6.47E+0 P	1.82
5	200.00	1.27E+1 P	7.48E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 6.270E-2*X +1.575E-1
X = 1.595E+1*Y -2.512E+0

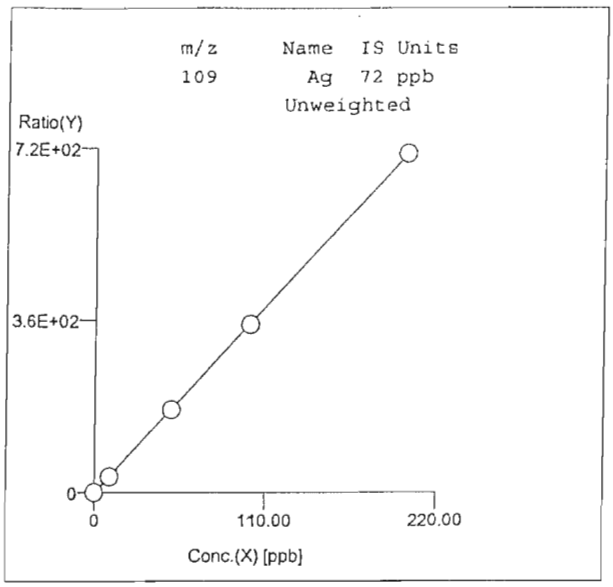
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	-2.04E-1 P	---
2	10.00	5.80E-1 P	9.85
3	50.00	3.84E+0 P	2.40
4	100.00	7.81E+0 P	1.07
5	200.00	1.59E+1 P	8.98E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 8.054E-2*X -2.146E-1
X = 1.242E+1*Y +2.665E+0

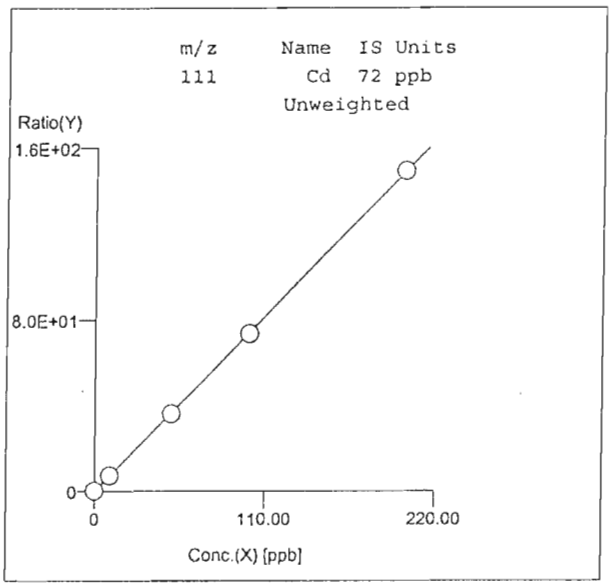
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	8.11E-2 P	26.10
2	10.00	3.27E+1 P	9.79E-1
3	50.00	1.74E+2 P	4.78E-1
4	100.00	3.50E+2 P	5.51E-1
5	200.00	7.09E+2 P	7.42E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 3.548E+0*X -2.354E+0
X = 2.818E-1*Y +6.636E-1

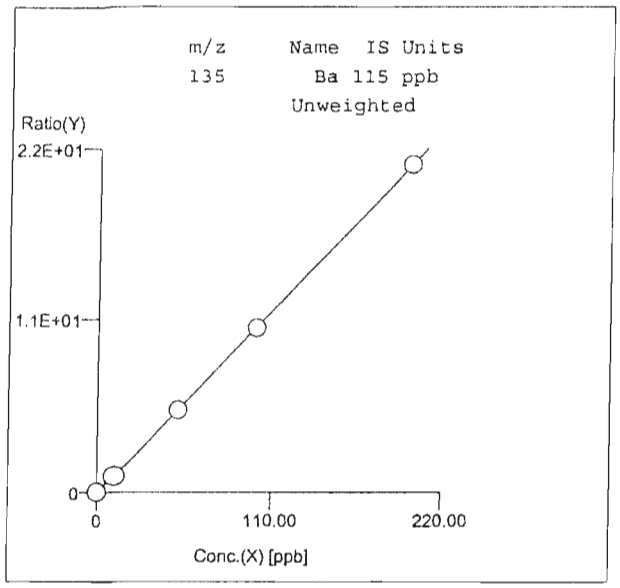
MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	6.91E-2 P	8.76
2	10.00	7.29E+0 P	1.01
3	50.00	3.65E+1 P	6.31E-1
4	100.00	7.36E+1 P	9.30E-1
5	200.00	1.49E+2 P	6.44E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 1.0000
Y = 7.454E-1*X -3.534E-1
X = 1.342E+0*Y +4.741E-1

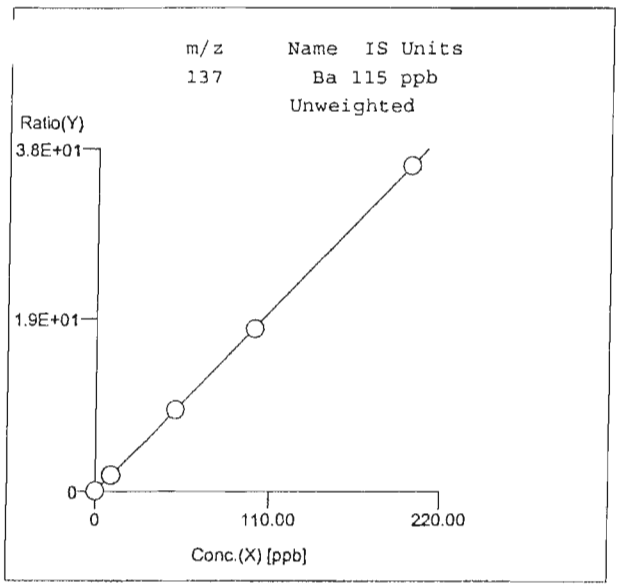
MinConc: 0.00



Lv.	Conc.	Ratio		RSD %
1	0.00	2.11E-2	P	6.30
2	10.00	1.03E+0	P	3.90
3	50.00	5.24E+0	P	1.25
4	100.00	1.04E+1	P	9.98E-1
5	200.00	2.10E+1	P	1.32
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 1.0000
Y = 1.048E-1*X -9.587E-3
X = 9.541E+0*Y +9.148E-2

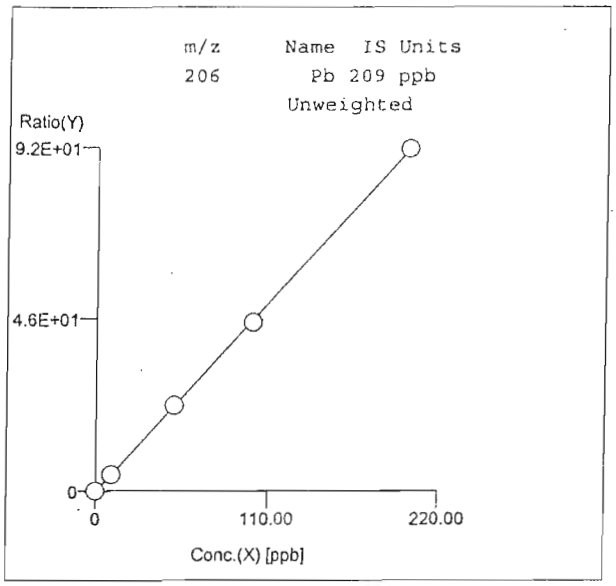
MinConc: 0.00



Lv.	Conc.	Ratio		RSD %
1	0.00	3.66E-2	P	17.80
2	10.00	1.77E+0	P	9.68E-1
3	50.00	9.01E+0	P	4.92E-1
4	100.00	1.79E+1	P	5.83E-1
5	200.00	3.61E+1	P	1.34
*6	---	---		---
*7	---	---		---
*8	---	---		---
*9	---	---		---
*10	---	---		---
*11	---	---		---
*12	---	---		---
*13	---	---		---
*14	---	---		---
*15	---	---		---
*16	---	---		---
*17	---	---		---
*18	---	---		---
*19	---	---		---
*20	---	---		---

CurveFit : Y=aX+b
r = 1.0000
Y = 1.805E-1*X -2.806E-2
X = 5.541E+0*Y +1.555E-1

MinConc: 0.00



Lv.	Conc.	Ratio	RSD %
1	0.00	1.44E-2 P	25.30
2	10.00	4.45E+0 P	1.59
3	50.00	2.29E+1 P	1.02
4	100.00	4.49E+1 P	1.52
5	200.00	9.16E+1 P	4.20E-1
*6	---	---	---
*7	---	---	---
*8	---	---	---
*9	---	---	---
*10	---	---	---
*11	---	---	---
*12	---	---	---
*13	---	---	---
*14	---	---	---
*15	---	---	---
*16	---	---	---
*17	---	---	---
*18	---	---	---
*19	---	---	---
*20	---	---	---

CurveFit : Y=aX+b
r = 0.9999
Y = 4.574E-1*X -1.638E-1
X = 2.186E+0*Y +3.581E-1

MinConc: 0.00

XENCO Laboratories

RAW DATA

FOR

6020 BLANK

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

PB QC Report

Data File:	C:\HPCHEM\1\DATA\99H0411a.B\SMP101.D\SMP101.D#
Date Acquired:	Aug 4 1999 00:37 pm
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	S *1*50*08/03/99*16:45*ALO*JOS*
Vial Number:	2101
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	Aug 04 1999 11:45 am
Sample Type:	PB
Dilution Factor:	10.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
53 Cr	-2.34 ppb	1.28	10.00	
75 As	-1.61 ppb	25.17	10.00	
82 Se	-0.78 ppb	205.27	10.00	
107 Ag	0.94 ppb	9.48	10.00	
109 Ag	1.00 ppb	8.87	10.00	
111 Cd	-0.02 ppb	139.91	10.00	
114 Cd	0.31 ppb	2.67	10.00	
135 Ba	0.13 ppb	11.42	10.00	
137 Ba	0.23 ppb	7.29	10.00	
206 Pb	0.00 ppb	2982.00	10.00	
207 Pb	-0.04 ppb	22.32	10.00	
208 Pb	-0.10 ppb	4.88	10.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	337678.69	3.39	361431.34	93.4	30 - 120	
72 Ge	81830.08	0.19	85881.02	95.3	30 - 120	
115 In	538418.31	0.37	548938.81	98.1	30 - 120	
209 Bi	371303.59	0.48	377073.94	98.5	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99H0411a.B\009CALB.D\009CALB.D#

1 :Element Failures	0 :Max. Number of Failures Allowed
0 :ISTD Failures	0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes:	Fail
ISTD:	Pass

PB QC Report

Data File:	C:\HPCHEM\1\DATA\99H0411a.B\SMP114.D\SMP114.D#
Date Acquired:	Aug 4 1999 01:38 pm
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	S *1*50*08/03/99*16:45*ALO*JOS*
Vial Number:	2202
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	Aug 04 1999 11:45 am
Sample Type:	PB
Dilution Factor:	10.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
53 Cr	-2.48 ppb	2.96	10.00	
75 As	-1.49 ppb	5.63	10.00	
82 Se	-0.29 ppb	118.69	10.00	
107 Ag	0.58 ppb	0.86	10.00	
109 Ag	0.63 ppb	0.54	10.00	
111 Cd	-0.04 ppb	3.13	10.00	
114 Cd	0.28 ppb	1.32	10.00	
135 Ba	0.13 ppb	26.64	10.00	
137 Ba	0.25 ppb	6.74	10.00	
206 Pb	-0.02 ppb	31.18	10.00	
207 Pb	-0.07 ppb	8.63	10.00	
208 Pb	-0.12 ppb	3.50	10.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	358715.97	2.55	361431.34	99.2	30 - 120	
72 Ge	80523.13	0.91	85881.02	93.8	30 - 120	
115 In	513386.19	0.44	548938.81	93.5	30 - 120	
209 Bi	353510.00	0.54	377073.94	93.8	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99H0411a.B\009CALB.D\009CALB.D#

0 :Element Failures 0 :Max. Number of Failures Allowed
0 :ISTD Failures 0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes: Pass
ISTD: Pass

LRB QC Report

Data File:	C:\HPCHEM\1\DATA\99H0511a.B\SMP101.D\SMP101.D#
Date Acquired:	Aug 5 1999 04:36 pm
Acq. Method:	EPA8MET.M
Operator:	
Sample Name:	BLK
Misc Info:	W *50*50*08/04/99*16:30*ALO*JOS*
Vial Number:	2304
Current Method:	C:\HPCHEM\1\METHODS\EPA8MET.M
Calibration File:	C:\HPCHEM\1\CALIB\EPA8MET.C
Last Cal. Update:	Aug 05 1999 00:17 pm
Sample Type:	LRB
Dilution Factor:	5.00

QC Elements

Element	Conc.	RSD(%)	High Limit	Flag
27 Al	-6.63 ppb	5.64	1.00	
53 Cr	-2.19 ppb	4.11	1.00	
75 As	-0.25 ppb	143.16	1.00	
82 Se	-1.02 ppb	136.95	1.00	
107 Ag	1.04 ppb	1.13	1.00	Fail
109 Ag	0.89 ppb	1.63	1.00	
111 Cd	0.70 ppb	0.36	1.00	
114 Cd	0.66 ppb	1.51	1.00	
135 Ba	1.57 ppb	1.47	1.00	Fail
137 Ba	1.59 ppb	2.07	1.00	Fail
206 Pb	0.57 ppb	7.80	1.00	
207 Pb	0.53 ppb	7.54	1.00	
208 Pb	0.56 ppb	7.49	1.00	

ISTD Elements

Element	CPS Mean	RSD(%)	Ref Value	Rec(%)	QC Range(%)	Flag
45 Sc	315165.16	2.82	291044.34	108.3	30 - 120	
72 Ge	77275.73	1.60	72559.98	106.5	30 - 120	
115 In	512932.59	0.70	457961.66	112.0	30 - 120	
209 Bi	345608.56	2.09	312886.94	110.5	30 - 120	

ISTD Ref File : C:\HPCHEM\1\DATA\99H0511a.B\001CALB.D\001CALB.D#

3 :Element Failures	0 :Max. Number of Failures Allowed
0 :ISTD Failures	0 :Max. Nnumber of ISTD Failures Allowed

Data Results:

Analytes:	Fail
ISTD:	Pass

INSTRUMENT

RUN LOG

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	PB	2101	SMP101	EPA8MET	BLK	S *1*50*08/03/99*16:45	10	1660 / 93424		8RCRA
2	LCS	2102	SMP102	EPA8MET	BKS	S *1*50*08/03/99*16:45	10			
3	AllRef	2103	SMP103	EPA8MET	93109-004	S *1*50*08/03/99*16:45	10			
	Dup1	2104	SMP104	EPA8MET	93109-004D	S *1*50*08/03/99*16:45	10			
	Spike1	2105	SMP105	EPA8MET	93109-004S	S *1*50*08/03/99*16:45	10			
6	Sample	2106	SMP106	EPA8MET	93141-001	S *1*50*08/03/99*16:45	10			
7	Sample	2107	SMP107	EPA8MET	93142-001	S *1*50*08/03/99*16:45	10			
8	Sample	2108	SMP108	EPA8MET	93143-001	S *1*50*08/03/99*16:45	10			
9	Sample	2109	SMP109	EPA8MET	93137-001	S *1*50*08/03/99*16:45	10			Pb
10	Sample	2110	SMP110	EPA8MET	93099-001	S *1*50*08/03/99*16:45	10			Pb
11	Sample	2111	SMP111	EPA8MET	93099-002	S *1*50*08/03/99*16:45	10			
12	Sample	2112	SMP112	EPA8MET	93099-003	S *1*50*08/03/99*16:45	10			
13	Sample	2201	SMP113	EPA8MET	93099-004	S *1*50*08/03/99*16:45	10			
14	PB	2202	SMP114	EPA8MET	BLK	S *1*50*08/03/99*16:45	10			
15	LCS	2203	SMP115	EPA8MET	BKS	S *1*50*08/03/99*16:45	10			
16	AllRef	2204	SMP116	EPA8MET	93099-005	S *1*50*08/03/99*16:45	10			
17	Dup1	2205	SMP117	EPA8MET	93099-005D	S *1*50*08/03/99*16:45	10			
18	Spike1	2206	SMP118	EPA8MET	93099-005S	S *1*50*08/03/99*16:45	10			
19	Sample	2207	SMP119	EPA8MET	93127-001	S *1*50*08/03/99*16:45	10			8RCRA
20	Sample	2208	SMP120	EPA8MET	93104-001	S *1*50*08/03/99*16:45	10			Pb
21	Sample	2209	SMP121	EPA8MET	93104-002	S *1*50*08/03/99*16:45	10			
22	Sample	2210	SMP122	EPA8MET	93109-004PDS	50% OF 200PPB	10			
23	Sample	2211	SMP123	EPA8MET	93099-005PDS	50% OF 200PPB	10			
24	PB	2212	SMP124	TABLEIII	BLK	TP *1*50*08/04/99*13:0	5	1683 / 93452		8TCLP
25	LCS	2301	SMP125	TABLEIII	BKS	TP *1*50*08/04/99*13:0	5			
26	Sample	2302	SMP126	TABLEIII	BSD	TP *1*50*08/04/99*13:0	5			
27	AllRef	2303	SMP127	TABLEIII	93022-004	TP *1*50*08/04/99*13:0	5			
28	Dup1	2304	SMP128	TABLEIII	93022-004D	TP *1*50*08/04/99*13:0	5			
29	Sample	2305	SMP129	TABLEIII	93022-005	TP *1*50*08/04/99*13:0	5			
30	Sample	2306	SMP130	TABLEIII	93022-007	TP *1*50*08/04/99*13:0	5			
31	Sample	2307	SMP131	TABLEIII	93022-012	TP *1*50*08/04/99*13:0	5			
32	Sample	2308	SMP132	TABLEIII	93022-014	TP *1*50*08/04/99*13:0	5			
33	Sample	2309	SMP133	TABLEIII	93022-004PDS	50% OF 200PPB	5			

	Type	Vial	Data File	Method	Sample	Comment	Dil/Lvl	Action on Failure	Skip	Result
1	LRB	2101		EPA8MET	BLK	W *45*50*08/05/99*10:3	5	1688/93525		
2	LFB	2102		EPA8MET	BKS	W *45*50*08/05/99*10:3	5			
3	AllRef	2103		EPA8MET	93165-001	W *45*50*08/05/99*10:3	5			
4	Dup1	2104		EPA8MET	93165-001D	W *45*50*08/05/99*10:3	5			
5	Spike2	2105		EPA8MET	93165-001S	W *45*50*08/05/99*10:3	5			
6	Sample	2106		EPA8MET	93165-002	W *45*50*08/05/99*10:3	5			
7	Sample	2107		EPA8MET	92917-002	W *45*50*08/05/99*10:3	5			
8	Sample	2108		EPA8MET	93023-001	W *45*50*08/05/99*10:3	5			
9	Sample	2109		EPA8MET	93023-002	W *45*50*08/05/99*10:3	5			
10	Sample	2110		EPA8MET	93173-005	W *45*50*08/05/99*10:3	5			
11	Sample	2111		EPA8MET	93163-001	W *45*50*08/05/99*10:3	5			
12	Sample	2112		EPA8MET	93163-002	W *45*50*08/05/99*10:3	5			
13	Sample	2201		EPA8MET	93163-003	W *45*50*08/05/99*10:3	5			
14	AllRef	2202		EPA8MET	93178-001	W *45*50*08/05/99*10:3	5			
15	Dup1	2203		EPA8MET	93178-001D	W *45*50*08/05/99*10:3	5			
16	Spike2	2204		EPA8MET	93178-001S	W *45*50*08/05/99*10:3	5			
17	Sample	2205		EPA8MET	93178-002	W *45*50*08/05/99*10:3	5			
18	Sample	2206		EPA8MET	93099-006	W *45*50*08/05/99*10:3	5			
19	PB	2207		EPA8MET	BLK	S *1*50*8/05/99*13:15*A	10	1689/93463		
20	LCS	2208		EPA8MET	BKS	S *1*50*8/05/99*13:15*A	10			
21	Sample	2209		EPA8MET	93167-012	S *1*50*8/05/99*13:15*A	10			
22	AllRef	2210		EPA8MET	93167-012D	S *1*50*8/05/99*13:15*A	10			
23	Dup1	2211		EPA8MET	93167-012S	S *1*50*8/05/99*13:15*A	10			
24	Sample	2212		EPA8MET	93163-001	S *1*50*8/05/99*13:15*A	10			
25	Sample	2301		EPA8MET	93163-002	S *1*50*8/05/99*13:15*A	10			
26	Sample	2302		EPA8MET	93163-003	S *1*50*8/05/99*13:15*A	10			
27	Sample	2303		EPA8MET	93199-002	S *1*50*8/05/99*13:15*A	10			

XENCO Laboratories

RAW DATA

FOR

7471 TCLP MERCURY ANALYSIS

11381 Meadowglen, Suite L
Houston, Texas, 77082
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210-509-3335 fax

XENCO Laboratories

Analysis: Mercury (Hg)

050805 9A

11381 Meadowglen Houston TX77082 **Instrument ID.:** **Method:**

	Sample Lab. ID	Matrix	Tech	Extraction Date & Time	Analysis Date & Time	Results ( )	Check Std Ref. Value	Check Std Result	Remarks
1	Cal. Blank		A.D.		8-5-99 11:00	0.00084			
2	Std. 1				11:05	0.00050			
3	Std. 2				11:07	0.00221			correlation
4	Std. 3				11:08	0.00309			coefficient 0.99655
5	Std. 4				11:10	0.00369			
6	Std. 5				11:12	0.00514			
7	ICV				11:20	0.00281			
8	ICB				11:21	-0.00019			
9	Blank	water		8-3-99 13:00	12:51	-0.00004			93453
10	BKS				12:52	0.00372			
11	93063-01				12:54	-0.00007			
12	93063-01D				12:56	0.0009			
13	93063-01S				13:00	0.00492			
14	93063-02				13:01	0.00014			(cont)
15	93063-03				13:02	-0.00018			

BKS Standard Lot#:_____ Prep:_____ **Validated by :** SA **Date:** 8/5/99 @ 17:24

~~CCV Standard Lot #:~~ CCV Standard Lot# _____ Prep:_____ Batch #:_____

Calibration : 0.99655

x:\excel\forms97\new\welchem

XENCO Laboratories

Analysis:

11381 Meadowglen Houston TX77082

Instrument ID.: **Method:**

	Sample Lab. ID	Matrix	Tech	Extraction Date & Time	Analysis Date & Time	Results ( )	Check Std Ref. Value	Result	Remarks
1	93163-003				8-5-99 17:01	-0.00002			Cont 93543
2									
3	93099-006				17:02	0.00012			
4	CCV				17:03	0.00321			
5	CCB.				17:04	-0.00010			
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

BKS Standard Lot#:_____ Prep:_____ **Validated by :** SA **Date:** 8/5/99 @ 17:24

CCV Standard Lot #:_____ Prep:_____ **Batch #:**_____

x:\excel\forms97\new\wetchem

SUMMARY

FOR

8021B INITIAL CALIBRATION

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Response Factor Report A36

Method : C:\HPCHEM\1\METHODS\BTEX0616.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Wed Jun 16 18:26:27 1999

Calibration Files
1 =GC0011.D 2 =GC0010.D 3 =GC0005.D
4 =GC0006.D 5 =GC0007.D

		Compound	1	2	3	4	5	Avg		%RSD
1)	I	Trifluorotoluene	ISTD							
2)		MTBE	0.651	0.740	0.829	0.665	0.489	0.675	0	18.64
3)		Benzene	2.993	2.848	3.600	3.704	3.019	3.233	0	12.06
4)		Toluene	2.428	1.914	2.403	2.715	2.391	2.370	0	12.15
5)		Ethylbenzene	1.978	1.609	2.235	2.552	2.013	2.077	0	16.72
6)		m,p-Xylenes	2.223	1.782	2.227	2.217	1.952	2.080	0	9.79
7)		o-Xylene	1.830	1.446	1.652	1.996	1.884	1.762	0	12.25
8)	SMC	Bromofluorobenzene	1.306	1.305	1.333	1.366	1.460	1.354	0	4.76

#) = Out of Range

XENCO Laboratories

RAW DATA

FOR

8021B BLANK

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Quantitation Report (QT Reviewed)

1658/953

Data File : C:\HPCHEM\1\DATA\080399\GC0002.D Vial: 2
Acq On : 3 Aug 1999 8:43 pm Operator: OSR
Sample : -1-BLK *1* Inst : A36
Misc : 5ML - *08/03/99 19:05 *OSR* Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Aug 4 9:21 1999 Quant Results File: BTEX0616.RES

Quant Method : C:\HPCHEM\1\METHODS\BTEX0616.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Thu Jul 01 20:49:43 1999
Response via : Initial Calibration
DataAcq Meth : BTEX0616.M

Volume Inj. :
Signal Phase :
Signal Info :

	Compound	R.T.	Response	Conc	Units	
	Internal Standards					
1)	I a,a,a-Trifluorotoluene	10.37	1847537	30.000	ug/L	
	System Monitoring Compounds					
8)	SMC Bromofluorobenzene	15.18	2631873	31.561	ug/L	
Spiked Amount	30.000	Recovery	=	105.20%		
	Target Compounds					
	MTBE	0.00	0	N.D.	ug/L	
	Benzene	0.00	0	N.D.	ug/L	
4)	Toluene	11.83	272993	1.870	ug/L	
5)	Ethylbenzene	13.84	77654	0.607	ug/L	m
6)	m,p-Xylenes	13.98	293503	2.291	ug/L	
7)	o-Xylene	0.00	0	N.D.	ug/L	

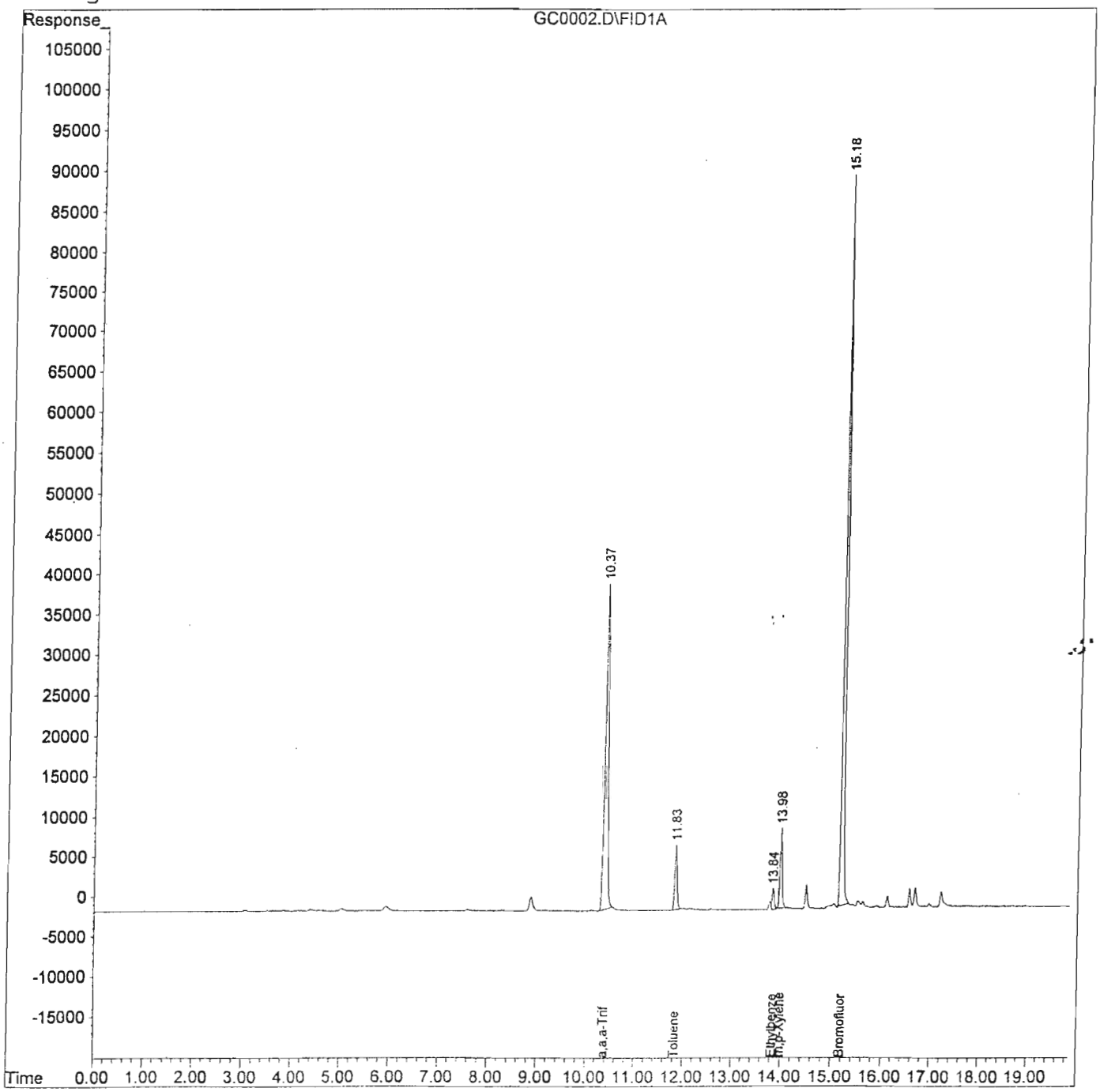
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report

Data File : C:\HPCHEM\1\DATA\080399\GC0002.D Vial: 2
Acq On : 3 Aug 1999 8:43 pm Operator: OSR
Sample : -1-BLK *1* Inst : A36
Misc : 5ML - *08/03/99 19:05 *OSR* Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Aug 4 9:21 1999 Quant Results File: BTEX0616.RES

Quant Method : C:\HPCHEM\1\METHODS\BTEX0616.M (Chemstation Integrator)
Title : BTEX + MTBE
Last Update : Thu Jul 01 20:49:43 1999
Response via : Multiple Level Calibration
DataAcq Meth : BTEX0616.M

Volume Inj. :
Signal Phase :
Signal Info :



INSTRUMENT

RUN LOG

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Injection Log

Directory: c:\hpchem\1\data\080399

ıe	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
	1	gc0001.d	1.	CCV1 *1*	5ML - *08/03/99 19:00 *OSR*	3 Aug 99 19:
	2	gc0002.d	1.	1673-1-BLK *1*	5ML - *08/03/99 19:05 *OSR*	3 Aug 99 20:
	3	gc0003.d	1.	-1-BKS *1*	5ML - *08/03/99 19:10 *OSR*	3 Aug 99 21:1
	4	gc0004.d	1.	93123-007 *50*	5G/5ML.1/5ML - *08/04/99 02:00 *OSR*	4 Aug 99 03:3
	5	gc0005.d	1.	93123-008 *50*	5G/5ML.1/5ML - *08/04/99 02:05 *OSR*	4 Aug 99 03:5
	6	gc0006.d	1.	93123-009 *50*	5G/5ML.1/5ML - *08/04/99 02:10 *OSR*	4 Aug 99 04:2
	7	gc0007.d	1.	93099-006 *50*	5G/5ML.1/5ML - *08/04/99 02:15 *OSR*	4 Aug 99 04:5
	8	gc0008.d	1.	93099-006S *50*	5G/5ML.1/5ML - *08/04/99 02:20 *OSR*	4 Aug 99 05:1
	9	gc0009.d	1.	93099-006SD *50*	5G/5ML.1/5ML - *08/04/99 02:25 *OSR*	4 Aug 99 05:4
	10	gc0010.d	1.	93037-001 *50*	5G/5ML.1/5ML - *08/04/99 02:30 *OSR*	4 Aug 99 06:0
	11	gc0011.d	1.	93170-002 *1*	5ML - *08/04/99 02:35 *OSR*	4 Aug 99 06:3
	12	gc0012.d	1.	93170-005 *1*	5ML - *08/04/99 02:40 *OSR*	4 Aug 99 07:0
	13	gc0013.d	1.	93170-006 *1*	5ML - *08/04/99 02:45 *OSR*	4 Aug 99 07:2
	14	gc0014.d	1.	93171-003 *1*	5ML - *08/04/99 02:50 *OSR*	4 Aug 99 07:5
	15	gc0015.d	1.	1673-1-BLK1 *1*	5ML - *08/04/99 02:55 *OSR*	4 Aug 99 10:1
	16	gc0016.d	1.	93123-007 *50*	.8/40ML - *08/04/99 03:00 *OSR*	4 Aug 99 10:5
	17	gc0017.d	1.	93171-001 *1*	5ML - *08/04/99 03:05 *OSR*	4 Aug 99 12:1
	18	gc0018.d	1.	93171-001S *1*	5ML - *08/04/99 03:10 *OSR*	4 Aug 99 12:4
	19	gc0019.d	1.	93171-001SD *1*	5ML - *08/04/99 03:15 *OSR*	4 Aug 99 13:1
	20	gc0020.d	1.	93137-001 *50*	.8/5ML - *08/04/99 03:20 *OSR*	4 Aug 99 14:0
	21	gc0021.d	1.	93172-002 *1*	5ML - *08/04/99 03:25 *OSR*	4 Aug 99 14:2
	22	gc0022.d	1.	93172-003 *1*	5ML - *08/04/99 03:40 *OSR*	4 Aug 99 15:0
	23	gc0023.d	1.	93172-004 *1*	5ML - *08/04/99 03:45 *OSR*	4 Aug 99 15:3
	24	gc0024.d	1.	93170-003 *5*	1.0/5ML - *08/04/99 03:50 *OSR*	4 Aug 99 16:0
	25	gc0025.d	1.	93170-007 *5*	1.0/5ML - *08/04/99 03:55 *OSR*	4 Aug 99 16:3
	26	gc0026.d	1.	93170-004 *10*	0.5/5ML - *08/04/99 04:00 *OSR*	4 Aug 99 17:0
	27	gc0027.d	1.	CCV3 *1*	5ML - *08/04/99 04:05 *OSR*	4 Aug 99 22:2
	28	gc0028.d	1.	-1-BLK *1*	5ML - *08/04/99 04:10 *OSR*	4 Aug 99 22:5
	29	gc0029.d	1.	-1-BKS *1*	5ML - *08/04/99 04:15 *OSR*	4 Aug 99 23:2
	30	gc0030.d	1.	93177-002 *10*	0.5/5ML - *08/04/99 04:20 *OSR*	4 Aug 99 23:5
	31	gc0031.d	1.	93172-005 *20*	0.25/5ML - *08/05/99 01:20 *OSR*	5 Aug 99 02:1
	32	gc0032.d	1.	93170-001 *200*	0.025/5ML - *08/05/99 01:25 *OSR*	5 Aug 99 02:4
	33	gc0033.d	1.	93128-001 *100*	0.05/5ML - *08/05/99 01:30 *OSR*	5 Aug 99 03:0
	34	gc0034.d	1.	93128-002 *100*	0.05/5ML - *08/05/99 01:35 *OSR*	5 Aug 99 03:3
	35	gc0035.d	1.	93128-005 *100*	0.05/5ML - *08/05/99 01:40 *OSR*	5 Aug 99 03:5
	36	gc0036.d	1.	93157-001 *1*	5ML - *08/05/99 01:45 *OSR*	5 Aug 99 04:2
	37	gc0037.d	1.	93157-001S *1*	5ML - *08/05/99 01:50 *OSR*	5 Aug 99 04:5
	38	gc0038.d	1.	93157-001SD *1*	5ML - *08/05/99 01:55 *OSR*	5 Aug 99 05:1
	39	gc0039.d	1.	93157-002 *1*	5ML - *08/05/99 02:00 *OSR*	5 Aug 99 05:4
	40	gc0040.d	1.	93157-003 *1*	5ML - *08/05/99 02:05 *OSR*	5 Aug 99 06:1
	42	gc0042.d	1.	93157-004 *10*	0.5/5ML - *08/05/99 02:10 *OSR*	5 Aug 99 06:3
	43	gc0043.d	1.	CCV4 *1*	5ML - *08/05/99 02:15 *OSR*	5 Aug 99 07:0
	44	gc0044.d	1.	93128-004 *20*	0.25/5ML - *08/05/99 02:20 *OSR*	5 Aug 99 07:3
	45	gc0045.d	1.	93140-006 *1*	5ML - *08/05/99 02:25 *OSR*	5 Aug 99 07:5

SUMMARY

FOR

TX1005 INITIAL CALIBRATION

11381 Meadowglen, Suite L
Houston, Texas, 77082
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Response Factor Report FID

Method : C:\HPCHEM\1\METHODS\TX0728F.M (Chemstation Integrator)
Title :
Last Update : Tue Aug 03 12:31:06 1999

Calibration Files
100 =F001.D 250 =F002.D 500 =F003.D
2500 =F004.D 5000 =F005.D

		Compound	100	250	500	2500	5000	Avg		%RSD
)	H	C6-C10	1.027	1.025	0.946	1.026	1.070	1.019	E6	4.41
)	H	>C10-C28	1.847	1.951	1.889	2.105	2.221	2.003	E6	7.80
)	S	BAP	1.129	1.205	1.135	1.326	1.523	1.264	E6	13.07

= Out of Range

XENCO Laboratories

RAW DATA

FOR

TX1005 BLANK

11381 Meadowglen, Suite L
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Quantitation Report (Not Reviewed)

Data File : C:\HPCHEM\1\DATA\TEX0804\F002.D Vial: 2
Acq On : 8-4-99 11:33:31 AM Operator: CG
Sample : BLK1 *1* Inst : FID
Misc : *08/03/99 12:36*JLM* Multiplr: 1.00
IntFile : EVENTS.E
Quant Time: Aug 5 11:53 1999 Quant Results File: TX0728F.RES

Quant Method : C:\HPCHEM\1\METHODS\TX0728F.M (Chemstation Integrator)
Title :
Last Update : Tue Aug 03 12:31:06 1999
Response via : Initial Calibration
DataAcq Meth : TX1005.M

Volume Inj. :
Signal Phase :
Signal Info :

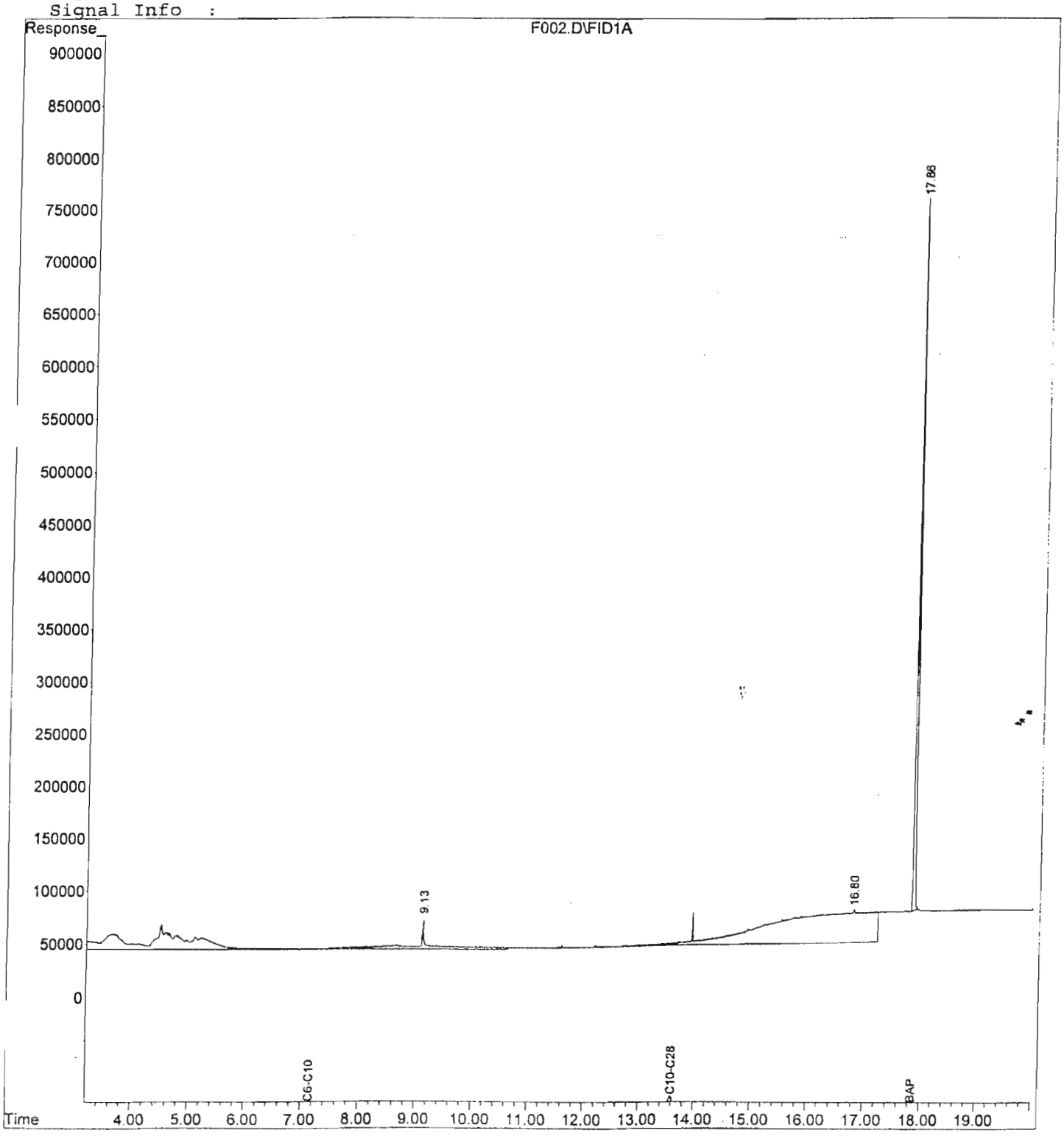
Compound	R.T.	Response	Conc Units
System Monitoring Compounds			
3) S BAP	17.86	12066662	9.550 PPM
piked Amount 10.000	Recovery =	95.50%	
Target Compounds			
1) H C6-C10	7.14	17152313	16.830 PPM
2) H >C10-C28	13.58	37707730	18.830 PPM

Quantitation Report

Data File : C:\HPCHEM\1\DATA\TEX0804\F002.D Vial: 2
Acq On : 8-4-99 11:33:31 AM Operator: CG
Sample : BLK1 *1* Inst : FID
Misc : *08/03/99 12:36*JLM* Multiplr: 1.00
IntFile : EVENTS.E
Quant Time: Aug 5 11:53 1999 Quant Results File: TX0728F.RES

Quant Method : C:\HPCHEM\1\METHODS\TX0728F.M (Chemstation Integrator)
Title :
Last Update : Tue Aug 03 12:31:06 1999
Response via : Multiple Level Calibration
DataAcq Meth : TX1005.M

Volume Inj. :
Signal Phase :
Signal Info :



INSTRUMENT

RUN LOG

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Houston, Texas

TEXAS 1005 SAMPLE LOG

Revised 6/98 by CE

Instrument ID: A40 Sequence ID: 16x0804 Matrix:Solid

Sample ID 1675	Data File Name	Extraction Date & Time year 99		Analysis Date & Time year 99		Sample Amount WT (g) / VOL (ml)	FINAL VOL	MULT X	Status	Analyte List
Blk 1449	F02	8-3	12:36	8-4	1133	10	10	1		
BKS	F03		12:39		1204					
93127-1	F05		12:42		1307					
1ms	F06		12:45		1338					
1msd	F07		12:48		1410					
93099-6	F08		12:51		1442					
93125-1	F09		12:54		1513				10X	
2	F10		12:57		1545					
3	F11		13:00		1617				20X	
4	F12		13:03		1615				5X	
5	F13		13:06		1728					
6	F14		13:09		1754					
93167-12	F04		13:12		1835					

EXTRACTED BY: DM ANALYST: CAC

Extraction Method: 3510-Vortex

Analysis Protocol: TEX1005,

Reviewd by: ___ Date:

Standards Traceability

BAP 10	ul, Lot: TX100	Calibration Date:	
Std-TEX1005	ul, Lot:	Spk-TEX1005 1000	ul, Lot: TX099
OTHER	ul, Lot:	SOLVENT	ml,Lot:
		OTHER	ul, Lot:

XENCO Laboratories

RAW DATA

FOR

%MOISTURE ANALYSIS

11381 Meadowglen, Suite L
Houston, Texas, 77082
281-589-0692 phone
281-589-0695 fax

11078 Morrison Road Ste. D
Dallas, Texas, 75229
972-481-9999 phone
972-481-9998 fax

5309 Wurzbach Road, Suite 104
San Antonio, Texas, 78238
210-509-3334 phone
210-509-3335 fax

XENCO Laboratories

Percent Moisture Determination Work Sheet

Chkd SA 8/4/99 @ 12:08

Client Name:
Analyst: EZ
Method Name:
Units: Percent by weight

COC #: 93099 - 1→6
Matrix: Soil
Method #: Gravimetric Determination

sample weight

COC # Sample No>	Empty Vial Initial Dry Tare Wt.	Initial Vial & Sample Wet Weight Date / Time	Final Vial & Sample Dry Weight 1 Date / Time	Final Vial & Sample Dry Weight 2 Date / Time	Final Vial & Sample Dry Weight 3 Date / Time	Percent Moisture by Weight
Blk	1.27	8:00	8-4-99		11:00	
					1.27	
93099-1	1.27	8:05			11:05	
		6.02		5.62	6.89	6.64 %
2	1.27	8:10			11:10	
		6.71		5.61	6.88	16.39 %
3	1.27	8:15			11:15	
		6.95		5.83	7.10	16.11 %
4	1.27	8:20			11:20	
		5.56		4.64	5.91	16.54 %
5	1.28	8:25			11:25	
		6.19		5.09	6.37	17.77 %
6	1.27	8:30			11:30	
		6.30		5.15	6.42	18.25 %
6D	1.27	8:35			11:35	
		6.18		5.06	6.33	18.12 %

Empty Vial Initial Dry Weight = A
Vial and Sample Wet Weight = B
Vial and Sample Dry Weight = C

$$\% \text{ Moisture} = \frac{(B-A) - (C-A)}{B-A} \times 100$$

$$\% \text{ Solids} = \frac{(C-A)}{(B-A)} \times 100$$

XENCO Laboratories

RAW DATA

FOR

PH ANAYLSIS

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210-509-3335 fax

XENCO Laboratories

pH

11381 Meadowglen Houston TX77082 **Instrument ID.:** **Method:** RCl SW9045C

	Sample Lab. ID		Matrix	Tech	Extraction Date & Time		Analysis Date & Time		Results	Check Std Ref. Value	Check Std Result	Remarks
1	CCV			2F	8-2-99		8-2	16:45		7.00	6.996	
2	93099	01	Soil	↓	↓	16:15	↓	16:50	10.407			
3	↓	1d	↓	↓	↓	16:20	↓	16:55	10.382			
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

Validated by : MB **Date:** 8/2/99 10:20

Standard Lot #: VWR 9808235

CoC1

93305

8/3/99 2F

x:\excel\forms97\new\Flashpoint

Pre-Login

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KENCO Laboratories

Xenco Laboratory Location

☑ 11381 Meadowglen, Suite L, Houston, TX 77082

☐ Dallas, ☐ San Antonio

SAMPLE PRELOG-I

Page 1 of 1

Validated by: _____ Date: _____

COC #: 93099-H Custodian: _____ Log Date & Time: 7/30/99 12:15 Number Containers in This Cooler: 17 No. of Coolers: 1

ler ID: D Custody Seal Id: _____ Broken Intact None Cooler Temp.: 2.7 deg C. Thermometer Id.: T-1 ICE: Blue, Dry, Water

Container Ids	Number of Containers	Matrix	Sample Type	Collection Method	Custody Seal	Container Size	Container Type	Liner	Preservative	Sample Condition	Label Condition	Head Space	Sample Amount %	pH	Analyses Requested	Hold	Refrig. #	Remarks & Analysis #s
For All 31-05	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
06	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	B L M	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			
	1 2 3 Tot:	A L	S W P	MC LC C G U	B N	4 8 16 32 1 500 VOA BAG	GA GC PH VAT	T P N	H S N <4C Z SB None	I L	I M PL None	N Y	F 8 6 4 2 1 0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54			

TEX S8021B	7 pH W1501	13 VOA 8260	19 VOA VTCLPV	25 Met 7Tot S6010R	31 Met GF Pb W2392E	37 KMF Diox VKMG01	43 PAHs 8270P1	49 S6020 Pb
TH W4181A	8 pH S9045	14 SV S8270E1	20 SV VTCLPSV	26 Met Hg S7470R	32 SV Scans S8270	38 Anions W300	44 PAHs on Highest TPH 8270	50
TEX-M S8021BL	9 pH S9040	15 Pest S8080A	21 Pest VTCLPP	27 Met Hg S7471R	33 SPLP TPH W4181P	39 TSS W1602	45 Soil Charac. Parameters	51
TH S8015D	10 Flash S1010	16 Pest S8081	22 Herb VTCLPH	28 Met 22 S6010A	34 SPLP Met 7 S6010S	40 O&G W4131	46 TPH TX1005	52
TH S8015G	11 R Cyan. S9010R	17 PCB S8082	23 Met 7T S6010T	29 Met Pb S6010Pb	35 SPLP Hg S7470S	41 Moisture AD2216A	47 Met 7Tot S6020R	53
S W1601	12 R Sulf.S9030R	18 VOA 8260D	24 Met HgS7470T	30 Met Pb GF S7421A	36 SPLP Pb W2392S	42 PAHs 8310	48 Met W2008	54

TAT: A: ASAP - All B: (48 hrs) - All

P: (24hrs) - All T: 3 Days - All 10 DAYS

DO NOT MIX COOLERS IN THE SAME PAGE

APPENDIX I

Background Statistical Determination

Appendix I
Derivation of UTLs for Background Samples

1.0 Procedures Used in the Determination of Background UTLs

The procedures described below were used to calculate Upper Tolerance Limits for background samples.

1.1 Test for Outliers (Background UTL Determination). Initially, the soil analytical results were assessed to determine whether "outlier" data were present. A soil analytical result that is much different (more than one order of magnitude) from most other values in a data set for the same parameter is termed an "outlier." There are several potential reasons for outlier data points. These include:

- Real contamination caused by an unnatural occurrence such as a local spill,
- Variations in sample collection methodology or laboratory analytical methodology which may produce anomalous results,
- Violations of field or laboratory QA procedures which may result in the introduction of contamination into the sample,
- Errors in data transcription such as number transpositions or decimal point placement, and
- True, but unusually large, variations in natural parameter concentrations, a common occurrence in the analysis of soil samples.

It is important to assess whether data sets contain outlier data points and attempt to determine the cause for the unusual result. If simple data transcription errors are found, these can be corrected to allow for accurate reporting and valid statistical treatment. If laboratory or field errors are found, it may be possible to re-collect and/or re-analyze the sample in question. Otherwise, reporting must qualify the analytical results and the data may not be excluded from the data set for statistical analysis.

A test is performed to examine the sample data for outlier data points. This test involves two steps. First, the data are visually inspected. If the largest analytical result for any constituent is found to be an order of magnitude larger than the other results for that

constituent, the value is considered suspect and potential causes should be investigated. The second step involves computation of the mean, standard deviation, and T_n for the background data population. T_n is computed as the difference between the largest analytical value in the sample population and the mean for that population. That difference is then divided by the standard deviation for the population. The computed value for T_n is then compared to a standard look-up table of critical values for T_n (One Sided) using the upper 5% significance level for the specific sample population size. A T_n value less than the critical value indicates that the maximum reported value for the population is not an outlier. A T_n greater than the critical value indicates that the maximum reported value for the population is an outlier and must be further assessed to attempt to determine whether the outlier value is an error that can be corrected; whether the data point represents real contamination and should be eliminated from inclusion in the background sample population; or, whether the data is real and should be retained in the data population for statistical analysis.

1.2 Test for Data Distribution. Once a data population is determined to be free of inappropriate outlier values, the data set is examined to determine whether the data are normally distributed. Determination whether any of the compliance soil samples contain contamination above background by use of the Tolerance Interval Method assumes that the constituent concentration data acquired from background samples are normally distributed.

Tests for data normality (normal distribution) are conducted using the Coefficient-of-Variation test for each constituent population. The Coefficient-of-Variation test involves computing the mean and standard deviation of the reported analytical results of each constituent, and determining the ratio of the standard deviation divided by the mean. If this ratio exceeds 1.00, there is evidence that the data may not be normally distributed, and statistical procedures requiring normally distributed data (Tolerance Interval Method) should not be applied. However, given the relatively small sample populations used to calculate background UTLs for soil investigations, rigorous tests for normality are often of questionable value. Therefore, based on discussions with the TNRCC, the data can be assumed to be normally distributed, and parametric statistical analyses (Tolerance Interval Method) may be applied to calculate a discrete UTL concentration for the constituent.

In the case of statistical calculation of an Upper Confidence Limit (UCL) to support random stratified sampling analysis, sample populations that fail the COV test for

normality may be log transformed to test for normality. If the log transformed data pass the COV test for normality, parametric statistics are applied.

1.3 Determination of Mean Concentration Value. If the sample population is free of inappropriate outlier data points and is normally distributed, a Mean Concentration Value (MCV) may be calculated. The MCV is the arithmetic mean of the raw or log-transformed data.

1.4 Handling Non-detects. The presence of non-detect analytical results can significantly complicate statistical procedures used to determine allowable background concentrations or UCLs. From the outset, the number of non-detects has been minimized by employing EPA Method 7000 series to analyze for those metals typically present only in very low concentrations. Despite the lower detection limit for the Method 7000 series, some non-detect results may still achieved. In these cases, the analytical laboratory provided estimated concentrations or "J" value data to quantify the presence of constituents at concentrations above the method detection limit (MDL) but below the practical quantitation limit (PQL). Even taking this approach, however, there may be some samples for which the results are non-detect even at the MDL.

The selection of a method for dealing with the remaining non-detect analytical results depends on the percentage of the sample population that has been reported as non-detect and whether the data are being used to determine a UTL.

- More than 90% non-detects: The data set will be considered as not meeting the requisites for statistical testing, and compliance sample analytical results are compared directly against a critical value (CV) defined as the PQL or MDL for that constituent, as appropriate.

- More than 50% but less than 90% non-detects: The data set will be considered as not meeting the requisites for parametric statistical testing, and compliance sample analytical results are compared directly against a UTL determined non-parametrically (EPA, 1992).

- More than 15% but less than 50% non-detects: The simple mean and standard deviation for the data set are corrected using Cohen's Method (EPA, 1989) and the UTL is calculated using the parametric tolerance interval method.

- Less than 15% non-detects: A value equal to one-half the PQL or MDL, as appropriate, is substituted for the non-detect values, and the data are further evaluated for normality prior to computing and the UTL using the parametric tolerance interval method.

1.5 Tolerance Interval Method - UTLs. Provided that statistical applicability requirements are met, the Tolerance Interval Method is used to calculate a UTL as the allowable background concentration for inorganic constituents in surficial soil/fill material and for native in-situ soils. The Tolerance Interval Method is recommended because it is appropriate for use at sites that do not exhibit high degrees of spatial variation between background soil borings and compliance borings. Additionally, investigations at sites that overlie extensive, homogeneous geologic deposits such as Gulf Coast sediments that exhibit very little geochemical variation are good candidates for this statistical method.

A one-sided tolerance interval of the background analytical results for each constituent is constructed independently for the surface soils (or fill material) and for subsurface in-situ clay soils. The UTLs derived for total lead for each soil medium serves as the basis of comparison to assess whether there is statistically significant evidence of contamination in soil samples from compliance borings.

A tolerance interval with 95% coverage and a tolerance coefficient of 95% are used as specified in regulatory guidance documents. Use of these standards implies that at least 95% of the compliance observations should fall below the tolerance limit with 95% probability assuming that compliance observations come from the same distribution as the background data. The one-sided tolerance interval or "Upper Tolerance Limit" is calculated as the MCV plus one standard deviation multiplied by the tolerance factor. The tolerance factor is selected from the statistical table for one-sided normal tolerance intervals with 95% tolerance coverage and a 95% tolerance coefficient (EPA, 1989). In the event a non-parametric UTL must be established, a 95% tolerance coefficient is still employed, but minimum coverage may not meet the required 95% standard due to the relatively small number of samples involved in a soil investigation versus a groundwater investigation. In this case, an expected coverage (Guttman, 1970) is calculated and the desired standard remains at 95%.

Constituent concentrations in surficial soils from the compliance borings are then compared with appropriate UTL values as computed for total lead in local background

surficial soils/fill material. Correspondingly, constituent concentrations from clay matrix subsurface soils (in-situ material) from the compliance borings are then compared with appropriate UTL values as computed for each constituent in local background subsurface soils. Constituent concentrations that exceed their respective UTLs are flagged as showing statistically significant evidence of possible contamination. Background UTL statistical calculations and worksheets are included in this appendix.

2.0 Derivation of UTLs

The derivation of UTLs are presented below.

2.1 Lead in Fill Material/Surficial Soil (Stratum I)

Lead was reported to be present in all of the 12 background fill material/surficial soil samples at concentrations that exceed the PQL of 1.0 mg/kg. Based on this high frequency of reported concentrations, parametric statistics were considered suitable to calculate a UTL. Tables presenting statistical analyses and corresponding worksheets follow the discussion section.

Test for Outliers: Based on simple inspection of the data, one sample, reported to contain total lead at a concentration of 201 mg/kg appears to be an outlier value because the lead concentration is more than one order of magnitude greater than the average for the remaining background samples. Applying the statistical outlier test to the maximum reported value for lead (201 mg/kg), the computed value of T_n was determined to be 3.0905. This value is greater than the critical value for T_n (2.2850) for a sample population containing 12 samples; therefore, the maximum concentration for lead in background fill material/surficial soil samples is determined to be a statistical outlier.

The reported data was checked for possible administrative errors in calculation or recording of the analytical result. Laboratory and field procedures were also reviewed to determine whether the sample may have been contaminated. Based on these assessments, it is determined that the value was real and may simply represent a larger than expected variability in background concentrations. This is not an uncommon occurrence given the heterogeneity of soil samples and the relatively small sample size considered practical for soil background determinations. A replicate sample was collected and was reported to contain total lead at a concentration of 42.1 mg/kg. On this basis, the initial sample was determined to represent simply a 5% statistical outlier and the initial background value was retained in the statistical population for calculation of the UTL for lead. The

analytical result for the replicate sample was not included in the statistical population because it represented a re-sampling of the same material as the original sample. As such, the two results are not independent data as required for inclusion in parametric statistical analysis.

Test for Data Distribution: The computed COV for detected concentrations is 1.16931. This value slightly exceeds 1.0, which could indicate that the data population is not normally distributed. However, based on the comparatively small number of samples within the data set from which normality is evaluated, it is probable that insufficient data is available to accurately determine whether the total sample population is normally or non-normally distributed. Therefore, the data are assumed to be normally distributed and to qualify for parametric statistical analysis..

Upper Tolerance Limit: Because none of the analytical results were reported to be non-detect for lead, no adjustment to correct the mean concentration value and standard deviation was necessary. Using the Tolerance Interval Method, a one-sided tolerance interval was constructed for lead in fill material/surficial soil. The resulting UTL is 181.64 mg/kg.

Lead in Native Clay Soils (Stratum II)

Lead was reported to be present in all of the 14 background subsurface clay soil samples at concentrations exceeding the PQL of 1.0 mg/kg. Based on the high frequency of reported concentrations, parametric statistics were considered suitable to calculate a UTL. Tables presenting statistical analyses and corresponding worksheets follow the discussion section.

Test for Outliers: Based on simple inspection of the data, one sample, reported to contain total lead at a concentration of 154 mg/kg appears to be an outlier value because the lead concentration is more than one order of magnitude greater than the average for the remaining background samples. Applying the statistical outlier test to the maximum reported value for lead (154 mg/kg), the computed value of T_n was determined to be 2.7926. This value is greater than the critical value for T_n (2.3710) for a sample population containing 14 samples; therefore, the maximum concentration for lead in background fill material/surficial soil samples is determined to be a statistical outlier.

The reported data was checked for possible administrative errors in calculation or recording of the analytical result. Laboratory and field procedures were also reviewed to

determine whether the sample may have been contaminated. Based on these assessments, it is determined that the value was real and may simply represent a larger than expected variability in background concentrations. This is not an uncommon occurrence given the heterogeneity of soil samples and the relatively small sample size considered practical for soil background determinations. A replicate sample was collected and was reported to contain total lead at a concentration of 43 mg/kg. On this basis, the initial sample was determined to represent simply a 5% statistical outlier and the initial background value was retained in the statistical population for calculation of the UTL for lead. The analytical result for the confirmation sample was not included in the statistical population because it represented a re-sampling of the same material as the original sample. As such, the two results are not independent data as required for inclusion in parametric statistical analysis.

Test for Data Distribution: The computed COV for detected concentrations is 1.1724. This value slightly exceeds 1.0, which could indicate that the data population is not normally distributed. However, based on the comparatively small number of samples within the data set from which normality is evaluated, it is probable that insufficient data is available to accurately determine whether the total sample population is normally or non-normally distributed. Therefore, the data are assumed to be normally distributed and to qualify for parametric statistical analysis.

Upper Tolerance Limit: Using the Tolerance Interval Method, a one-sided tolerance interval was constructed for total lead in native clay soils (Stratum II). The resulting UTL is 151.61 mg/kg.

Table 1

Statistical Evaluation for Background Concentrations of Total Lead in Surficial Fill Material
Malcolm Pirnie, Inc. / City of Houston - Heights Service Center
Soil Samples Collected on April 13, 1999

Field ID No.	Depth Below Ground Surface (ft.)	Total Lead Analytical Results (mg/kg)
Background Samples Used in Statistical Computation of Upper Tolerance Limit		
BG-1A	0 - 0.5	201
BG-2A	0 - 0.5	4.8
BG-3A	0 - 0.5	24
BG-4A	0 - 0.5	12.7
BG-5A	0 - 0.5	28.8
BG-6A	0 - 0.5	31
BG-7A	0 - 0.5	4.4
BG-8A	0 - 0.5	9.2
BG-9A	0 - 0.5	9.2
BG-10A	0 - 0.5	44.4
BG-11A	0 - 0.5	11.1
BG-12A	0 - 0.5	6.4

Outlier Test

Outlier Test on Max. Concentration=	201	3.0905
Tn for n (detectable concentrations):	12	2.2850
$T_{(201)} < Tn$		Therefore, the value 201 IS an outlier

Statistical Analysis

Background Samples		
Mean Concentration Value (MCV)		32.2500
Standard Deviation		54.6020
Coefficient of Variation		1.6931
Tolerance Factor (K) for n =	12	2.7360
Upper Tolerance Limit (UTL_{95})	UTL_{95} = MCV + K* Stdev	**181.64**

Table 2

Statistical Evaluation for Background Concentrations of Total Lead in Native Surficial Soils
Malcolm Pirnie, Inc. / City of Houston - Heights Service Center
Soil Samples Collected on April 13, 1999

Field ID No.	Depth Below Ground Surface (ft.)	Total Lead Analytical Results (mg/kg)
Background Samples Used in Statistical Computation of Upper Tolerance Limit		
BG-1B	1 - 1.5	154
BG-2B	1.5 - 2	77.6
BG-3B	1 - 1.5	7.6
BG-4B	1 - 1.5	12
BG-5B	1 - 1.5	17.6
BG-6B	1 - 1.5	32.7
BG-7B	1 - 1.5	75.9
BG-8B	1 - 1.5	16.6
BG-9B	1 - 1.5	6.1
BG-10B	1 - 1.5	15.9
BG-11B	1 - 1.5	58.1
BG-12B	1 - 1.5	5.9
BG-13	1 - 1.5	9.05
BG-14	1 - 1.5	15.4

Outlier Test

Outlier Test on Max. Concentration=	154.0	2.7926
Tn for n (detectable concentrations)=	14	2.3710
$T_{(154)} < Tn$		Therefore, the value 154 IS an outlier

Statistical Analysis

Background Samples		
Mean Concentration Value (MCV)		36.0321
Standard Deviation		42.2429
Coefficient of Variation		1.1724
Tolerance Factor (K) for n =	12	2.7360
Upper Tolerance Limit (UTL_{95})	**UTL_{95} = MCV + K* Stdev**	**151.61**

Statistical Calculation Worksheets - Lead in Surficial/Fill Material

1. Arithmetic Mean: A measure of a population's central tendency. The sample mean equals the sum of all measurements in the sample divided by the number of measurements in the sample. The arithmetic mean is used as the mean concentration value (MCV).

The formula for calculating the Arithmetic Mean/Mean Concentration Value is as follows:

$$\overline{X} = \sum_{i=1}^{n} (X_i) / n$$

where X is the ith observation; and
where n is the number of observations.

MCV for total lead in surficial soils/fill material ($\overline{X}s$):

$$\overline{X}s = \sum_{i=1}^{12} X_i \; (201+4.8+24+12.7+28.8+31+4.4+9.2+9.2+44.4+11.1+6.4)/12$$

$$\overline{X}s = 32.2500$$

2. Standard Deviation: The Standard Deviation is the positive square root of the variance. It is an indication of the clustering of measurements around a center of the distribution or mean.

The formula for calculating simple Standard Deviation is as follows:

$$S = \left[\sum_{i=1}^{n} (X_i - \overline{X})^2 / (n-1)\right]^{1/2}$$

Standard Deviation for total lead in surficial soils/fill material (S):

$S = [(201-32.25)^2 / (12-1) + (4.8 - 32.25)^2 / (12-1) + (24 -32.25)^2 / (12-1) + (12.7 -32.25)^2 / (12-1) + (28.8 -32.25)^2 / (12-1) + (31 -32.25)^2 / (12-1) + (4.4 -32.25)^2 / (12-1) + (9.2 -32.25)^2 / (12-1) + (9.2 -32.25)^2 / (12-1) + (44.4 -32.25)^2 / (12-1) + (11.1 -32.25)^2 / (12-1) + (6.4 -32.25)^2 / (12-1)]^{1/2}$

$S = 54.6020$

3. Coefficient of Variation: The coefficient of variation is a means to determine whether the sample population is normally distributed, a

necessary criteria for computing and applying upper tolerance limits as a means to establish whether sample concentrations represent allowable background values or true contamination. The coefficient of variation is computed as the standard deviation of observation divided by the mean. If the value of the coefficient of variation is less than 1.0, the sample population is assumed to normally distributed.

The formula used for calculation of the coefficient of variation is as follows:

$COV = S / \overline{X}$

Coefficient of variation for total lead in surficial soils/fill material (COV)

COV = 54.6020/32.2500

COV = 1.6931

Based on discussions with TNRCC, background soil sample populations are typically not large enough to truly reflect the normality of the total background population. In this case, the apparent lack of normality is related to inclusion of one sample that contains more anthropogenic lead than other background samples. Therefore, despite marginal failure of COV test, consider data to represent a normally distributed population.

4. Tolerance Limit: The Tolerance limit is the background mean plus the background standard deviation multiplied by the tolerance factor. This is the Upper Tolerance Limit below which 95% of the observations of the distribution should fall.

The formulas used for calculation of the Upper Tolerance Limit are as follows:

$UTL = \overline{X} + KS$

where K is the one-sided normal tolerance factor
(Tabulated Tolerance Factors [K] for one-sided normal tolerance intervals with probability level $\gamma = 0.95$ and $\rho = 95\%$)

Upper Tolerance Limit for total lead in surficial soils/fill material (UTL):

UTL = 32.2500 + (2.7360 x 54.6020)

UTL = 181.64

The above summary of the Tolerance Interval calculation methodology is consistent with *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Interim Final Guidance*, U.S EPA, April 1989.

Statistical Calculation Worksheets - Lead in Native Clay Soils

1. Arithmetic Mean: A measure of a population's central tendency. The sample mean equals the sum of all measurements in the sample divided by the number of measurements in the sample. The arithmetic mean is used as the mean concentration value (MCV).

The formula for calculating the Arithmetic Mean/Mean Concentration Value is as follows:

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

where X is the ith observation; and
where n is the number of observations.

MCV for total lead in native clay soils (Xs):

$$\overline{Xs} = \sum_{i=1}^{14} X_i \quad (154+77.6+7.6+12+17.6+32.7+75.9+16.6+6.1+15.9+58.1+5.9+9.05+15.4)/14$$

$$\overline{Xs} = 36.0321$$

2. Standard Deviation: The Standard Deviation is the positive square root of the variance. It is an indication of the clustering of measurements around a center of the distribution or mean.

The formula for calculating simple Standard Deviation is as follows:

$$S = \left[\sum_{i=1}^{n} (X_i - \overline{X})^2 / (n-1)\right]^{1/2}$$

Standard Deviation for total lead in native clay soils (S):

$$S = [(154-36.0321)^2/(14-1) + (77.6-36.0321)^2/(14-1) + (7.6-36.0321)^2/(14-1) + (12-36.0321)^2/(14-1) + (17.6-36.0321)^2/(14-1) + (32.7-36.0321)^2/(14-1) + (75.9-36.0321)^2/(14-1) + (16.6-36.0321)^2/(14-1) + (6.1-36.0321)^2/(14-1) + (15.9-36.0321)^2/(14-1) + (58.1-36.0321)^2/(14-1) + (5.9-36.0321)^2/(14-1) + (9.05-36.0321)^2/(14-1) + (15.4-36.0321)^2/(14-1)]^{1/2}$$

$$S = 42.2429$$

3. Coefficient of Variation: The coefficient of variation is a means to determine whether the sample population is normally distributed, a necessary criteria for computing and applying upper tolerance limits as a means to establish whether sample concentrations represent allowable background values or true contamination. The coefficient of variation is computed as the standard deviation of observation divided by the mean. If the value of the coefficient of variation is less than 1.0, the sample population is assumed to normally distributed.

The formula used for calculation of the coefficient of variation is as follows:

$$COV = S / \overline{X}$$

Coefficient of variation for total lead in native clay soils (COV)

$$COV = 42.2429/36.0321$$

$$COV = 1.1724$$

Based on discussions with TNRCC, background soil sample populations are typically not large enough to truly reflect the normality of the total background population. In this case, the apparent lack of normality is related to inclusion of one sample that contains more anthropogenic lead than other background samples. Therefore, despite marginal failure of COV test, consider data to represent a normally distributed population.

4. Tolerance Limit: The Tolerance limit is the background mean plus the background standard deviation multiplied by the tolerance factor. This is the Upper Tolerance Limit below which 95% of the observations of the distribution should fall.

The formulas used for calculation of the Upper Tolerance Limit are as follows:

$$UTL = \overline{X} + KS$$

where K is the one-sided normal tolerance factor
(Tabulated Tolerance Factors [K] for one-sided normal tolerance intervals with probability level $\gamma = 0.95$ and $\rho = 95\%$)

Upper Tolerance Limit for total lead in native clay soils (UTL):

$$UTL = 36.0321 + (2.7360 \times 42.2429)$$

$$\mathbf{UTL = 151.61}$$

The above summary of the Tolerance Interval calculation methodology is consistent with *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Interim Final Guidance*, U.S EPA, April 1989.

CORRIGAN CONSULTING, INC.

1909 Capri Lane
P.O. Box 99, Seabrook, Texas 77586-0099
(281) 474-7455 • Fax (281) 474-4501

January 18, 2002

Mr. Joe Bell
Texas Natural Resource Conservation Commission
Voluntary Cleanup Section, Remediation Division
P.O. Box 13087
Austin, Texas 77251-1562

Re: City of Houston
Heights Service Center
3602 Center Street, Houston
Voluntary Cleanup Program No. 700

Subject: Certificate of Completion

Dear Mr. Bell:

On behalf of the City of Houston, Corrigan Consulting, Inc. has completed a Phase III Environmental Site Assessment (ESA) at the above-referenced property. Two areas of historical contamination were identified, and the property was entered into the Voluntary Cleanup Program (VCP) of the Texas Natural Resource Conservation Commission (TNRCC). Based on a review of the Phase II ESA report, the TNRCC VCP coordinator for this project requested additional assessment of several areas of concern in a letter dated April 1, 1998.

Potential sources of contamination were identified during the Phase I ESA and were evaluated during the Phase II and III ESAs. Soil samples were collected at locations within the potential source areas that were expected to contain the highest concentrations of contaminants. Based on a comparison of the analytical results for the soil samples to TNRCC standards and background concentrations, contaminants are not present in the soil at concentrations that exceed background concentrations, Risk Reduction Standard (RRS) 2 default standards, and/or media cleanup levels that were calculated according to the requirements for RRS 3 site closures.

Groundwater contamination was not detected in groundwater samples that were collected at the property. An evaluation of the yield of the uppermost water-bearing zone was performed and an estimated yield of 25 gallons per day was calculated. This yield is significantly less than the minimum yield of 150 gallons per day for drinking water aquifers that was established by the TNRCC. As allowed by 30 TAC Section 335.563, the media cleanup levels were increased by a factor of 100 due to the low yield of this water-bearing zone. No active water wells were identified within a 0.5-mile radius of the property.

No further assessment of soil or groundwater at the property is required. Remediation and post-closure care are not required for the property for closure under RRS 3 since the contaminant concentrations do not exceed the applicable media cleanup levels.

In accordance with recent TNRCC policy for maintaining the TNRCC Central Registry database, a Core Data Form has been prepared for this facility. The form is attached for addition to the database.

If there are any questions, please contact Mr. Wendall Honeycutt, P.G., CAPM, Project Manager of Corrigan Consulting, Inc. at (281)474-7455.

Sincerely,

Roxie L. Voran

Roxie L. Voran, P.G., CAPM
Senior Associate

Attachments
Jobs\City of Houston\01-165 Heights Service Center\Report\Cover Letter

cc: Mr. Tanwir Badar, P.E.
Deputy Asst. Director
City of Houston
P.O. Box 1562
611 Walker 18th Floor
Houston, Texas 77251-1562

TNRCC Use Only

TNRCC Core Data Form

SECTION I: General Information

1. Reason for Submission *Example: new wastewater permit; IHW registration; change in customer information; etc.*
Voluntary Cleanup Program project

2. Attachments ☐ Yes ☒ No
Describe Any Attachments: *(ex: Title V Application, Waste Transporter Application, etc.)*
Not Applicable

3. Customer Reference Number-*if issued*
CN *(9 digits)*

4. Regulated Entity Reference Number-*if issued*
RN *(9 digits)*

SECTION II: Customer Information

5. Customer Role *(Proposed or Actual)* -- As It Relates to the Regulated Entity Listed on This Form

Please check one of the following: ☐ Owner ☐ Operator ☒ Owner and Operator
☐ Occupational Licensee ☐ Volunteer Cleanup Applicant ☐ Other: _____

TNRCC Use Only ☐ Superfund ☐ PST ☐ Respondent

6. General Customer Information
☐ New Customer ☒ Change to Customer Information ☐ Change in Regulated Entity Ownership ☐ No Change*
*If "No Change" and Section I is complete, skip to Section III - Regulated Entity Information.

7. Type of Customer: ☐ Individual ☐ Sole Proprietorship - D.B.A. ☐ Partnership ☐ Corporation
☐ Federal Government ☐ State Government ☐ County Government ☒ City Government
☐ Other Government _____ ☐ Other _____

8. Customer Name *(If an individual, please print last name first)*
City of Houston - Building Services Department

9. Mailing Address: P.O. Box 1562

City	State	ZIP	ZIP + 4
Houston	TX	77251	1562

10. Country Mailing Information *if outside USA*

11. E-Mail Address *if applicable*
tbadar@bsd.ci.houston.tx.us

12. Telephone Number
(713)837-9474

13. Extension or Code

14. Fax Number *if applicable*
(713)221-0434

15. Federal Tax ID *(9 digits)*

16. State Franchise Tax ID Number *if applicable*

17. DUNS Number *if applicable (9 digits)*

18. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher

19. Independently Owned and Operated?
☐ YES ☒ NO

SECTION III: Regulated Entity Information

20. General Regulated Entity Information
☒ New Regulated Entity ☐ Change to Regulated Entity Information ☐ No Change*
*If "No Change" and Section I is complete, skip to Section IV - Preparer Information.

21. Regulated Entity Name *(If an individual, please print last name first)*
Heights Service Center

22. Street Address: 3602 Center Street *(No P.O. Boxes)*				
	City Houston	State TX	ZIP 77007	ZIP + 4
23. Mailing Address: Same				
	City	State	ZIP	ZIP + 4
24. E-Mail Address: tbadar@bsd.ci.houston.tx.us				
25. Telephone Number (713)837-9474	26. Extension or Code	27. Fax Number *if applicable* (713)221-0434		
28. Primary SIC Code *(4 digits)* 9511	29. Secondary SIC Code *(4 digits)*	30. Primary NAICS Code *(5 or 6 digits)* 924110	31. Secondary NAICS Code *(5 or 6 digits)*	

32. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*
Formerly, a shop for maintenance of vehicles and equipment. Currently used as a storage facility for equipment such as solid waste recycling containers.

Questions 33 - 37 address geographic location. Please refer to the instructions for applicability.

33. County: **Harris**

34. Description of Physical Location
Northwest corner of Center and Harvard Streets.

35. Nearest City	State	Nearest ZIP
Houston	TX	77007

36. Latitude (N)			37. Longitude (W)		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	46	12	95	23	45

38. TNRCC Programs In Which This Regulated Entity Participates *Not all programs have been listed. Please add to this list as needed. If you don't know or are unsure, please mark "unknown."*

☐ Animal Feeding Operation	☐ Petroleum Storage Tank	☐ Water Rights
☐ Title V – Air	☐ Wastewater Permit	☒ Voluntary Cleanup Program
☐ Industrial & Hazardous Waste	☐ Water Districts	☐
☐ Municipal Solid Waste	☐ Water Utilities	☐ Unknown
☐ New Source Review - Air	☐ Licensing - TYPE(s)	

SECTION IV: Preparer Information

39. Name Tanwir Badar, P.E.		40. Title Deputy Assistant Director
41. Telephone Number (713)837-9474	42. Extension or Code	43. Fax Number *if applicable* (713)221-0434
44. E-Mail Address: tbadar@bsd.ci.houston.tx.us		

HOLD FOR PICK-UP
City of Houston
Public Works and Engineering
Real Estate Division

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Kathleen Hartnett White, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

May 29, 2002

RECORDERS MEMORANDUM
AT THE TIME OF RECORDATION, THIS
INSTRUMENT WAS FOUND TO BE INADEQUATE
FOR THE BEST PHOTOGRAPHIC REPRODUCTION
BECAUSE OF ILLEGIBILITY, CARBON OR
PHOTO COPY, DISCOLORED PAPER, ETC.

Mr. Tanwir Badar, P.E.
Deputy Assistant Director
City of Houston
P.O. Box 1562
Houston, Texas 77251-1562

Re: Certificate of Completion (COC), 3602 Center Street, Houston (Harris County), TX; Voluntary Cleanup Program (VCP) No. 700

Dear Mr. Badar:

The Texas Natural Resource Conservation Commission (TNRCC) has reviewed the report entitled "Phase III Environmental Assessment" as well as other requested information. Based on this review, the TNRCC has determined that the report and other submitted information indicate that cleanup of the site has attained Risk Reduction Standard (RRS) No. 2 (Closure to Health-Based Standards and Criteria), in accordance with 30 Texas Administrative Code (TAC) §335.555 Therefore, the TNRCC agrees that no further action is necessary and issues the enclosed COC.

Response actions attaining RRS No. 2 must record such facts in the real property records of the county in which the site is located in accordance with 30 TAC Chapter 335, Subchapter S (i.e., Risk Reduction Rules). By filing the COC in the real property records pursuant to 30 TAC §333.9, VCP applicants satisfy this requirement.

Please submit proof of filing the COC in the real property records no later than 60 days from the date of this letter to my attention at the TNRCC, Voluntary Cleanup Section, mail code MC-221, at the letterhead address. You may contact me with any questions or comments you have at (512) 239-6753.

Sincerely,

Joe Bell

Joe Bell, Project Manager
Voluntary Cleanup Section
Remediation Division

JB/pf/ts

Enclosures

ANY PROVISION HEREIN WHICH RESTRICTS THE SALE, RENTAL OR USE OF THE DESCRIBED REAL PROPERTY BECAUSE OF COLOR OR RACE IS INVALID AND UNENFORCEABLE UNDER FEDERAL LAW
THE STATE OF TEXAS
COUNTY OF HARRIS
I hereby certify that this instrument was FILED in File Number Sequence on the date and at the time stamped hereon by me, and was duly RECORDED in the Official Public Records of Real Property of Harris County, Texas on

JUN - 6 2002

COUNTY CLERK
HARRIS COUNTY, TEXAS

V851839

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

06/06/02 300767677 V851839 $17.00

VOLUNTARY CLEANUP PROGRAM
FINAL CERTIFICATE OF COMPLETION

As provided for in §361.609, Subchapter S, Solid Waste Disposal Act (SWDA), Texas Health and Safety Code.

I, JACQUELINE S. HARDEE, P.E., DIRECTOR OF THE REMEDIATION DIVISION, TEXAS NATURAL RESOURCE CONSERVATION COMMISSION (TNRCC), CERTIFY UNDER §361.609, SWDA, TEXAS HEALTH AND SAFETY CODE, THAT NECESSARY RESPONSE ACTIONS HAVE BEEN COMPLETED FOR VCP NO.700 AS OF APRIL 18, 2002 FOR THE TRACT OF LAND DESCRIBED IN EXHIBIT "A". CERTIFICATION IS BASED ON THE AFFIDAVIT OF COMPLETION OF RESPONSE ACTION, EXHIBIT "B" AND ON ADDITIONAL SITE INFORMATION MAINTAINED IN TNRCC FILES. AN APPLICANT WHO ON THE DATE OF APPLICATION SUBMITTAL WAS NOT A RESPONSIBLE PARTY UNDER §361.271 OR §361.275(g) SWDA, AND ALL PERSONS (e.g., FUTURE OWNERS, FUTURE LESSEES, FUTURE OPERATORS AND LENDERS) WHO ON THE DATE OF ISSUANCE OF THIS CERTIFICATE WERE NOT RESPONSIBLE PARTIES UNDER §361.271 OR §361.275(g), SWDA ARE QUALIFIED TO OBTAIN THE PROTECTION FROM LIABILITY PROVIDED BY §361.610, SUBCHAPTER S, SWDA.

EXECUTED this 28th *day of* May, 2002

Jacqueline S. Hardee, P.E., Director
Remediation Division

STATE OF TEXAS
TRAVIS COUNTY

BEFORE ME, on this the 28th day of May, personally appeared Jacqueline S. Hardee, P.E., Director, Remediation Division, of the Texas Natural Resource Conservation Commission, known to me to be the person and agent of said commission whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 28th day of May, 2002

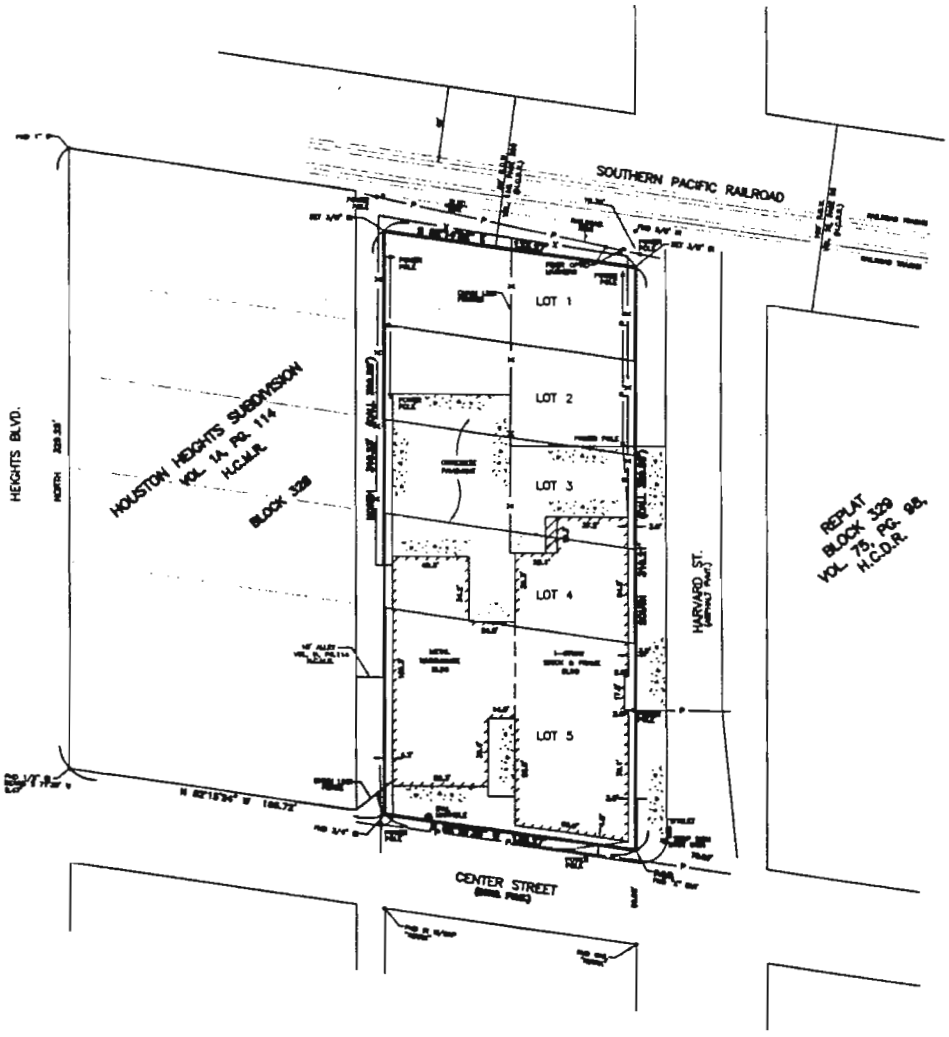
TAMARA M. SVJAGINTSEV
MY COMMISSION EXPIRES
JULY 27, 2005

Notary Public in and for the State of Texas

552-76-8874

552-76-0075

Exhibit A
VCP No. 700



SURVEY OF 40,965 SQUARE FEET OR 0.9404 OF AN ACRE TRACT OF LAND BEING ALL OF LOTS 1, 2, 3, 4, AND 5, BLOCK 328, OF THE HOUSTON HEIGHTS ADDITION, RECORDED IN VOLUME 1A, PAGE 114, HARRIS COUNTY MAP RECORDS; SAID 0.9404 OF AN ACRE OF LAND BEING OUT OF A CERTAIN 0.9984 OF AN ACRE OF LAND DESCRIBED IN A DEED DATED SEPTEMBER 4, 1981, TO THE CITY OF HOUSTON, RECORDED UNDER HARRIS COUNTY CLERK'S FILE NO. H148333, LOCATED IN THE JOHN AUSTIN TWO LEAGUE GRANT, ABSTRACT NO. 1, HARRIS COUNTY, TEXAS.

NOTES:

1. BEARING ORIENTATION PER THE DEED RECORDED UNDER HARRIS COUNTY CLERK'S FILE NO. H148333.
2. A FIELD NOTE DESCRIPTION ACCOMPANIES THIS MAP.

STATE OF TEXAS
REGISTERED
LEO M. DELATORRE
5113
PROFESSIONAL
LAND SURVEYOR

LANDTECH CONSULTANTS, INC.
Civil Engineering • Land Surveying
2527 North Loop West
Suite 224
Houston, Texas 77008

DATE:	[illegible]
SCALE:	1" = 30'
DRAWING No.:	[illegible]
JOB No.:	[illegible]
SHT.	1 OF 1

EXHIBIT "B"
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
VOLUNTARY CLEANUP PROGRAM
AFFIDAVIT OF COMPLETION OF RESPONSE ACTION

The City of Houston (Applicant) has completed response actions, if necessary, pursuant to Chapter 361, Subchapter S, SWDA, at the tract of land described in Exhibit "A" to this certificate that pertains to Heights Service Center (Site), VCP No. 700 located at 3602 Center Street in Houston (Harris County) Texas. The Site was owned by the City of Houston at the time the application to participate in the Voluntary Cleanup Program was filed. The Applicant has submitted and received approval from the Texas Natural Resource Conservation Commission Voluntary Cleanup Section on all plans and reports required by the Voluntary Cleanup Agreement. The plans and reports were prepared using a prudent degree of inquiry of the site consistent with accepted industry standards to identify all hazardous substances, waste and contaminated media of regulatory concern. The response actions for the site have achieved response action levels acceptable for residential land use as determined by the standards of the TNRCC. The response action eliminated substantial present or future risk to public health and safety and to the environment from releases and threatened releases of hazardous substances and/or contaminants at or from the site. The Applicant has not acquired this certificate of completion by fraud, misrepresentation, or knowing failure to disclose material information. Further information concerning the response action at this Site may be found in the final report at the central office of the TNRCC under VCP No.700.

The preceding is true and correct to the best of my knowledge and belief

Applicant

By: Tanwir Badar

Print Name: Tanwir Badar
Deputy Assistant Director
Building Services Department
City of Houston

STATE OF
COUNTY OF

This instrument was acknowledged before me on March 27, 2002 by Beatrice Hernandez-Hurst.

Notary Public in and for the State of

BEATRICE HERNANDEZ-HURST
NOTARY PUBLIC, STATE OF TEXAS
MY COMMISSION EXPIRES
AUG. 3, 2004

RECEIVED
MAR 29 2002
CORRIGAN CONSULTING, INC.

552-76-0077