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FINAL CONTAMINATION ASSESSMENT REPORT FUEL FARM 216 NAS CORPUS CHRISTI TX

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Comprehensive Long-Term Environmental Action Navy
Naval Air Station Corpus Christi
Corpus Christi, Nueces County, Texas
Facility ID No. 0028854
LPST ID No. 91734
CTO-0102

Final
Contamination Assessment Report

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina

SouthDiv Contract No.:
N62467-89-D-0318

Prepared by:

EnSafe/Allen & Hoshall
Nashville Branch
311 Plus Park Boulevard, Suite 130
Nashville, Tennessee 37217
(615) 399-8800

November 3, 1995

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19. Abstract

A Contamination Assessment was conducted for Fuel Farm 216 and Tank Nest 162 at NAS Corpus Christi. The objectives of the investigation were to determine the nature and extent of contaminants in groundwater, to establish the nature and extent of hydrocarbon free-product within the Fuel Farm, and to characterize the nature and extent of soil contaminants within the Fuel Farm area. This investigation identified parameters above state action levels in both soil and groundwater.

Groundwater in the northern, northwestern, and northeastern areas of the site has been impacted by petroleum hydrocarbon releases based upon historic remediation efforts by site personnel, recent water level and product measurements, and analytical results of groundwater samples collected across the site. Four semivolatile compounds were also detected as dissolved-phase constituents in collected groundwater samples.

Based upon analytical results from soil samples collected throughout the site, soils located at the groundwater interface beneath the site are impacted by petroleum hydrocarbons. Concentrations of total petroleum hydrocarbon (TPH) and/or benzene in thirty soil samples exceeded Texas Natural Resource Conservation Commission (TNRCC) action levels. These petroleum-impacted soils are mainly located above 10 feet below ground surface. Only five samples collected from below 10 feet in depth displayed elevated concentrations of TPH and/or benzene.

Several semivolatile compounds were detected in soil samples collected for laboratory analysis. The semivolatile compounds identified are associated with the petroleum hydrocarbons stored at the site. Most concentrations of individual compounds are relatively low.

The tanks at the Fuel Farm appear to have been closed in place. One tank was uncovered and verified to be filled to its top with a cement/sand slurry. The tank appeared to be intact with no visual evidence of integrity failure. Lines associated with the uncovered tank appeared rusty and had visual staining on adjacent soil.

The seawall at the site appears to inhibit further northward movement of the free-product plume. The plume spreads laterally east to west along the seawall approximately 600 feet and extends to the south approximately 400 feet.

The contamination assessment completed for the Fuel Farm 216 and Tank Nest 162 site has adequately delineated the nature and extent of the hydrocarbon free-product, groundwater and soil contamination, and has provided some initial aquifer parameter data. If required for specific remedial alternatives, additional contaminant or hydrologic assessment may be performed during a pre-design phase of remedial action. The continuation of the current weekly hydrocarbon product recovery, the development of a dissolved-phase groundwater monitoring program, and the preparation of a remedial action plan for further recovery of hydrocarbon free-product should be considered minimum requirements for further action at the site.

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Final
Contamination Assessment Report
Fuel Farm 216
Naval Air Station Corpus Christi
Corpus Christi (Nueces County), Texas

LPST ID No. 91734
Facility ID No. 0028854

Prepared For:

Commanding Officer
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Appendix H Site Health and Safety Plan

Acronyms, Initialisms, and Abbreviations

The following list contains many of the acronyms, initialisms, and abbreviations and the units of measure used in this report.

AVGAS	Aviation Gasoline
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Total Xylenes
BTOC	Below Top of Casing
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CTO	Contract Task Order
E/A&H	EnSafe/Allen and Hoshall
ft/ft	feet per foot
JP-4	Jet fuel
LPST	Leaking Petroleum Storage Tank
mg/L	milligram per liter
mg/kg	milligram per kilogram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
msl	Mean Sea Level
MW	Monitoring Well
NAS	Naval Air Station
PAH	Polynuclear Aromatic Hydrocarbon
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	parts per million
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SB	Soil Boring
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
RAP	Remedial Action Plan
TDS	Total Dissolved Solids
TNRCC	Texas Natural Resource Conservation Commission
TPH	Total Petroleum Hydrocarbon
TWC	Texas Water Commission
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
UST	Underground Storage Tank
WWTP	Wastewater Treatment Plant

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1.0 REPORT SUMMARY

EnSafe/Allen and Hoshall (E/A&H) was retained by the United States Navy's Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) in Charleston, South Carolina to delineate the horizontal and vertical extent of soil and groundwater contamination and the distribution of free-product at the Fuel Farm 216 facility (Facility 216, Leaking Petroleum Storage Tank Identification Number [LPST] ID. No. 91734, Facility ID. No. 0028854) at the Corpus Christi Naval Air Station (NAS), Corpus Christi, Nueces County, Texas. Fuel Farm 216 contains 36 25,000-gallon underground storage tanks (USTs) which stored jet fuel and aviation gasoline (AVGAS) for flight operations based at NAS Corpus Christi. The fuel farm was closed in 1987 and each UST was closed in place by filling the tank with an inert slurry and demolishing all associated controls and piping to 2 feet below ground surface (bgs).

An additional area immediately adjacent to Fuel Farm 216 was also investigated as part of the field activities. The area, designated Tank Nest 162 (LPST ID. No. 100773), contained two 10,000-gallon USTs used to store diesel fuel. The tanks were installed in 1942 and in service until January 1986. Both tanks were closed by removal on October 12, 1991.

For reporting purposes, both Fuel Farm 216 and Tank Nest 162 will be grouped together and discussed as one site (the site). The grouping is justified due to the sites' immediate proximity to one another and the overlapping of constituents of concern at both sites.

Contamination Assessment Findings

In March 1995, E/A&H began implementation of its Contamination Assessment Plan (CAP) (E/A&H, February 6, 1995). Field investigation activities included sampling the original 15 groundwater monitoring wells at the site, installation of 12 soil borings, and installation of an additional 12 monitoring wells. Well gauging activities conducted on all new and original wells

indicated measurable thicknesses of free-product in monitoring wells in the northern area of the site, in an approximate T-shaped pattern extending south from the sea wall.

Groundwater samples collected from the 15 original onsite wells indicated free-product in four of the wells. Laboratory analysis of the remaining 11 wells indicated dissolved-phase total petroleum hydrocarbon (TPH) concentrations in two wells, and dissolved concentrations of benzene in three wells. In addition, concentrations of selected polynuclear aromatic hydrocarbon (PAH) compounds were identified in four of the 11 onsite wells sampled.

Laboratory analysis of soil samples collected from soil borings revealed the presence of TPH concentrations above applicable Texas Natural Resource Conservation Commission (TNRCC) action level concentrations of 100 milligrams per kilograms (mg/kg) in the south-central, eastern, and northeastern areas of the site. Benzene, above the action level of 0.5 mg/kg, was detected in one localized area. PAHs were found in soil samples collected from soil borings and monitoring wells installed throughout the site.

Recommendations

E/A&H recommends:

- Prepare a Remedial Action Plan (RAP) to address alternative methods for removing free-product from the subsurface. Subsequent to discussions with the TNRCC and possibly a risk assessment, if necessary, amend the RAP to include a plan for soil remediation activities.

- Monitor all wells in the Fuel Farm 216 and Tank Nest 162 areas not containing measurable thicknesses of free-product quarterly for one year to ascertain the full extent of the dissolved hydrocarbon plume.

- Continue weekly pumping of free-product from monitoring wells containing measurable thicknesses of hydrocarbons. Continue to report monthly quantities of free-product and groundwater removed on a quarterly basis to the Texas Natural Resource Conservation Commission.

These recommendations are based upon:

- The presence of measurable thicknesses of free-product, up to 1.2 feet thick, in several wells at the site.

- Analytical results indicating soil TPH and benzene concentrations exceed applicable action level standards.

- Lack of historic groundwater monitoring results to determine the extent of the dissolved-phase hydrocarbon plume and fluctuations based on seasonal variations in groundwater.

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2.0 CHRONOLOGY OF EVENTS

This section briefly describes and dates significant events resulting from the petroleum release and any activities conducted in response at the site. These events start with the date of tank installation and continue through the most recent activities described in this report.

Early 1940s

Fuel Farm 216 tank system is installed. The fuel farm consists of 36 25,000 gallon tanks using an aqua drive system to supply aviation fuel to the NAS. Tanks 162-1 and 162-2 were also installed at this time. These 10,000-gallon tanks are used to store diesel fuel during their useful life.

Prior to 1979

Twelve of the 36 tanks are taken out of service, without any known physical modifications.

Early 1980s

Free-product is identified by NAS personnel in a well constructed of 55-gallon barrels driven into the ground to a depth of 15 feet.

November 1982

Geraghty and Miller, Inc., is retained by the Navy for a hydrogeologic investigation of the fuel farm to determine the nature and extent of free-product in the subsurface.

March 1983

Geraghty and Miller performs additional investigative activities at the fuel farm. Fifteen observation wells are installed. Geraghty and Miller estimates the volume of fuel in the subsurface to be 77,000 gallons. Of this quantity, it is estimated that 20,000 gallons of fuel is recoverable.

1985

Fuel recovery efforts begin as a pilot oil (fuel) recovery system begins operation to recover free-product from the subsurface. The system consists of 55-gallon drums welded together and driven into the ground. Fuel and water are recovered through the use of a submersible pump.

January 1986

Tanks 162-1 and 162-2 are taken out of service, but remain in place.

November 1986

The State of Texas and the Navy enter into a Consent Decree pertaining to environmental concerns at NAS Corpus Christi, including Fuel Farm 216.

March 1987

ERT Consultants is retained by the Navy to perform an engineering evaluation of the pilot oil recovery system installed in 1985.

September 1987

A Memorandum of Understanding pertaining to Fuel Farm 216 is sent by the Navy to the State, as required by Consent Decree. This memorandum includes a proposal for installing an additional recovery well and additional monitoring wells.

November 1987

Closure of Fuel Farm 216 is completed and tanks are abandoned in place. All 36 tanks are filled with a mixture of sand/cement. Lines are cut and plugged. Valve boxes and the aqua drive system are cut to 2 feet bgs and then covered with soil.

December 1987

Five monitoring wells and one recovery well are installed to estimate the extent of the fuel plume and to aid in fuel recovery.

October 1991

Tanks 162-1 and 162-2 are closed through removal. During excavation, soil contamination is noted but no free-product is encountered. The onsite representative from the Texas Water Commission (TWC) directs returning contaminated soil to the excavation pending a RAP for the site.

December 1994

EnSafe is retained by SOUTHNAVFACENGCOM to determine the horizontal and vertical extent of the fuel plume, soil, and groundwater contamination.

March 1995

EnSafe begins assessment of Fuel Farm 216. Twelve groundwater wells and 12 soil borings are installed. Both groundwater and soil samples are collected and analyzed. Tank closure activities are verified.

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3.0 CONTAMINATION ASSESSMENT

This report is designated as a Contamination Assessment Report as specified in the Navy contract statement of work. However, this report contains all the elements of a Comprehensive Site Assessment Report as specified in the TNRCC's *Reporting Guidelines for LPST Cleanups in Texas* (PST 93-01, February 1993). This report also contains the information, site background, and history specified for sites under a Limited Site Assessment. No formal Limited Site Assessment document has been produced for this site; however, a Limited Site Assessment Report Form (TWC-0927) maybe completed and submitted upon request by the TNRCC.

This assessment was conducted to investigate the horizontal and vertical extent of contamination associated with fuel storage tanks from Fuel Farm 216 and Tank Nest 162. This CAR describes the methodologies, activities, and results of the assessment.

3.1 Description of Release and Abatement Measures

3.1.1 Description of the UST System

NAS Corpus Christi is located on the Gulf of Mexico in south Texas adjacent to the City of Corpus Christi (Figure 3-1). Fuel Farm 216 is in the northwestern portion of NAS Corpus Christi (Figure 3-2).

Thirty-six 25,000-gallon jet fuel and aviation gasoline (AVGAS) tanks are located at Fuel Farm 216 as shown in Figure 3-3. The fuel farm operations used an aqua drive system to transfer fuel from the fuel farm to both the landplane and seaplane hangars. The water-driven displacement system was used to move fuel from each tank and to fill each tank. Water was stored in a 200,000-gallon underground reservoir at the site. The storage tanks were interconnected with an extensive system of water-drive and fuel filling and dispensing lines. The entire operation was completely free of mechanized equipment, except for the central water pump.

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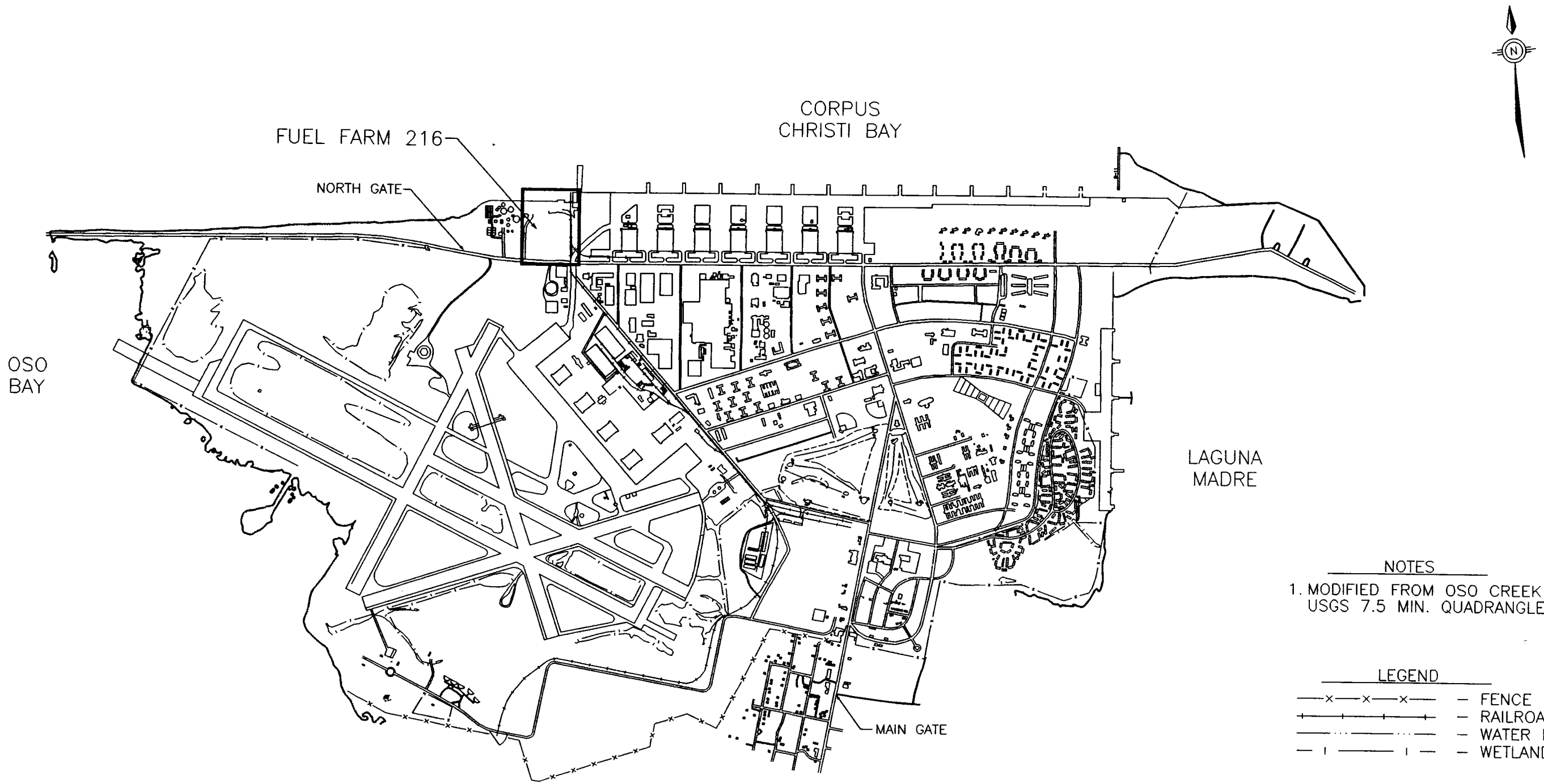
CONTAMINATION ASSESSMENT
REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3-1
LOCATION MAP

DWG DATE:5/31/95 | DWG NAME:CTO1021N



NOTES

1. MODIFIED FROM OSO CREEK NE, TEX. USGS 7.5 MIN. QUADRANGLE MAP.

LEGEND

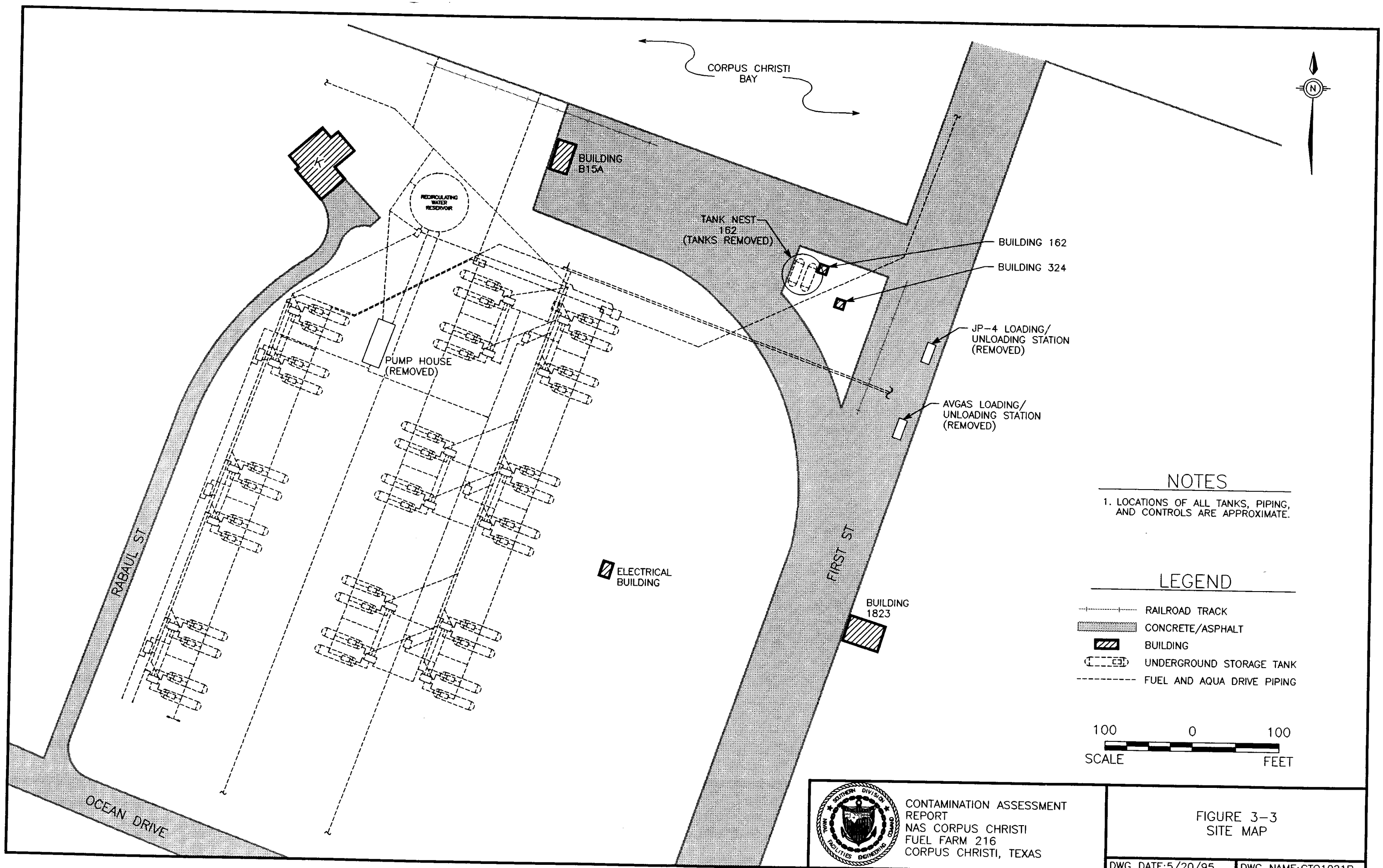
- FENCE
- RAILROAD
- WATER FRONT
- WETLANDS

600 0 600
SCALE FEET

CONTAMINATION ASSESSMENT
REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3-2
VICINITY MAP

DWG DATE:5/20/95 | DWG NAME:CTO1021A


CORPUS CHRISTI BAY
N
BUILDING B15A
K
RECIRCULATING WATER RESERVOIR
TANK NEST 162 (TANKS REMOVED)
BUILDING 162
BUILDING 324
JP-4 LOADING/ UNLOADING STATION (REMOVED)
AVGAS LOADING/ UNLOADING STATION (REMOVED)
PUMP HOUSE (REMOVED)
ELECTRICAL BUILDING
BUILDING 1823
RABAUL ST
FIRST ST
OCEAN DRIVE
NOTES
1. LOCATIONS OF ALL TANKS, PIPING, AND CONTROLS ARE APPROXIMATE.
LEGEND
RAILROAD TRACK
CONCRETE/ASPHALT
BUILDING
UNDERGROUND STORAGE TANK
FUEL AND AQUA DRIVE PIPING
100 0 100
SCALE FEET
CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS
FIGURE 3-3
SITE MAP
DWG DATE:5/20/95
DWG NAME:CTO1021B

Fuel was transported to NAS Corpus Christi using a variety of methods, including ship, railcar and tanker truck. Two fuel unloading/loading stations were situated to the east of the tanks, as indicated in Figure 3-3. It is unknown when these stations were installed but it is believed to have been later than the tank farm.

Two diesel tanks located at Tank Nest 162, next to Fuel Farm 216, were also installed during the early 1940s. These tanks were part of a fueling station for base vehicles. The tanks only distribution point was at Building 162 (see Figure 3-3).

3.1.2 Cause of Release, Volume Lost, Method of Discovery, and TNRCC Notification

Previous audits of fuel management records indicate that approximately 20 million gallons of fuel are unaccounted for in the 40-year life span of the fuel farm. Although records indicate that tanks did leak and were repaired, no records indicate which of the 36 tanks leaked and subsequently were repaired or that a specific spill occurred.

In the early 1980s, Navy personnel identified a layer of fuel floating on top of the groundwater near Fuel Farm 216. The fuel was tested by the Navy and found to consist of 60 percent JP-4 and 40 percent high octane gasoline.

After identification of the fuel plume, Geraghty and Miller, Inc., a groundwater consulting firm, was retained to investigate the nature and extent of the fuel plume and to evaluate alternatives to remove the fuel from the subsurface (Geraghty and Miller, 1983). As a result of this investigation, it was concluded that approximately 77,000 gallons of fuel could be in the subsurface, with 20,000 gallons estimated to be recoverable. In 1985, fuel recovery efforts began based on Geraghty and Miller's recommendations, with the installation of a pilot oil (fuel) recovery system.

In 1986, the State of Texas and the Navy entered into a Consent Decree pertaining to environmental concerns at NAS Corpus Christi, including Fuel Farm 216. As a part of this Consent Decree, the pilot oil recovery system was to be evaluated and further investigative activities performed.

In 1987 a subsequent study by the consulting firm ERT (ERT, 1987) predicted that 22 years would be required to remove the 20,000 gallons of recoverable fuel given the operational activity of the pilot oil recovery system. ERT also suggested that the recovery rate was directly tied to the complex hydrogeology within the fuel farm subsurface.

No spills or leaks are known to be related to tanks within Tank Nest 162, which were removed in October 1991. Once removed, the tanks were surveyed for integrity and several holes were noted. Soil contamination was identified through analysis of soil samples collected. Due to the extent of contamination and its closeness to Fuel Farm 216, the contaminated soil was placed back in the excavation. Closure activities were performed with TWC officials present. A copy of the tank closure report for Tanks 162-1 and 162-2 submitted to the TWC is included in Appendix A.

3.1.3 Abatement and Containment Measures

During the life span of Fuel Farm 216, maintenance appears to have been regular on all tanks and associated piping. Records indicate that throughout the life of the fuel farm, tanks were taken out of service when leaks were suspected until repairs could be performed.

In 1987, Fuel Farm 216 was abandoned with in-place closure activities. All 36 tanks and the underground water reservoir were reportedly filled with a sand/cement slurry. All associated controls, including valve boxes and the aqua drive system were salvaged or demolished to 2 feet bgs. The loading/unloading stations were also removed at this time. As a part of EnSafe's site

investigation, closure activities were verified by exposing a tank and associated controls. Verification of tank closure is summarized in Appendix A.

Tank Nest 162 was abandoned in 1991, with the removal of the two tanks. All associated controls were removed or demolished in place (see Appendix A - Tank Closure Report).

Since 1985, fuel recovery activities have been ongoing. Two pilot recovery systems have been installed on the site to recover free-product; however, since at least 1994, fuel has not been present in these wells. Summary records of the amount of fuel collected by the recovery systems have been submitted to TNRCC semi-annually.

Measurable thicknesses of fuel have been present in several groundwater monitoring wells across the site. Since 1994, fuel has been recovered weekly from these wells by portable pump and/or bailer by NAS environmental personnel. Summaries indicating the amount of fuel collected from the groundwater monitoring wells have been submitted to TNRCC semi-annually.

3.2 Site Investigation

E/A&H personnel assessed contamination at Fuel Farm 216 between March 15 and May 5, 1995. During the site assessment, 11 of 15 existing groundwater monitoring wells were sampled for laboratory analysis. Twenty-four soil borings were installed, 12 of which were converted to monitoring wells. Soil samples were collected from borings for laboratory analysis, and depths to product and/or groundwater in all wells at the site were measured.

3.2.1 Site Description

NAS Corpus Christi, located on the Gulf of Mexico, is adjacent to the City of Corpus Christi (see Figure 3-1). The base is approximately 200 miles southwest of Houston and 160 miles north of Brownsville. Fuel Farm 216 is located along Corpus Christi Bay, in the northwestern portion of the base.

The site consists of 36 underground storage tanks (Figure 3-3) installed in the early 1940s and used for approximately 40 years to store JP-4 jet fuel and aviation gasoline (AVGAS). All the tanks and the underground water storage reservoir were reportedly abandoned and filled with a sand/cement mixture in 1987 (see Section 3.1.3.)

Presently, the site is primarily a level, grassy field on which five small buildings are either located or adjacent to (see Figure 3-3). There is very little relief across either the site or the rest of the NAS. Part of the northern portion of the site is covered by a concrete slab, which is the remains of a machine shop and fuel unloading facility. Corpus Christi Bay lies immediately north of the site. To the east is a level grassy area and an adjacent aircraft taxiway, followed by several aircraft hangars used by government agencies such as the U.S. Coast Guard and the U.S. Army. South of the site is Ocean Drive and an aircraft taxiway. West of the site is the NAS Corpus Christi Wastewater Treatment Plant (WWTP) and the North Gate entrance/exit to NAS Corpus Christi.

3.2.2 Soil Classification

Soils of Nueces County have been mapped and described in general by Franki and others (1965). The United States Department of Agriculture (USDA) has mapped three soil units at NAS Corpus Christi; the Galveston-Mustang soil series, Made Land and Fill.

Galveston soil consists of a surface layer ranging from nearly white to grayish-brown humus and silty loam. The surface layer is usually less than 10 inches thick, contains minor humus and is typically light gray. It is underlain by a zone of light gray fine sand ranging from 3 to 4 feet thick. Runoff from Galveston soils is very slow due to high porosity and permeability. These soils remain moist in their lower layers throughout most of the year. Mustang soils consist of nearly level, deep, sandy soils that are wet and locally salty. These soils generally occupy low areas and are occasionally flooded at high tide. Generally, Mustang soils consist of an upper

soil layer that is light gray and approximately 12 inches thick. It is moist throughout the year and has few faint yellowish-brown mottles.

Made Land consists of sand, mud, and shells that have been excavated from the floor of lagoons and bays. These soils are typically deep, undulating, and of variable permeability. They are generally clayey, saline, and covered with 6 to 8 inches of topsoil for vegetative purposes.

Made Land soils are found within the west, north, and eastern areas of NAS Corpus Christi. Galveston-Mustang series soils are found in the central portion of the base. Fill consists of sandy soil which has been used to raise the original land surface to a uniform height for runway sites. The majority of the site appears to consist of Fill soils (area where tanks are located) with the area closest to Corpus Christi Bay composed of Made Land soil.

3.2.3 Background Water Quality

To determine the applicable cleanup criteria and the potential usability of the site groundwater, groundwater samples were collected from each monitoring well and submitted to the laboratory for Total Dissolved Solids (TDS) analysis. Results indicate the groundwater samples contained from 350 to 24,000 milligrams per liter (mg/L) TDS. Seven of the 11 wells sampled indicate TDS concentrations below 3,000 mg/L. Two wells sampled had TDS concentrations between 3,000 and 10,000 mg/L, while two wells contained TDS concentrations above 10,000 mg/L.

A well survey of NAS Corpus Christi and surrounding areas indicates that no potable groundwater wells are located within a 0.5-mile radius of the fuel farm. On the basis of the surficial aquifer's TDS values and this survey, the groundwater at the site falls within the state's Group II category, which includes most of the proficient drinking water aquifers in the state. Results of the potable well survey and TDS analytical data sheets are included in Appendix B.

3.2.4 Regional Geology and Hydrogeology

Geology/Stratigraphy

The geology of the Corpus Christi region has been described in detail by Brown and others (1976), Woodman and others (1978), and Kier and White (1978). The coastal plain of the Corpus Christi area is underlain by Pleistocene river delta and shoreline sediments deposited during interglacial periods. Approximately 30,000 years ago, deep erosion occurred in the valleys of the Nueces, Oransis, and Mission Rivers in response to sea-level decline during continental glaciation. Approximately 18,000 years ago, the sea level rose, marking the start of the Holocene. During this interval, river valleys which extended across the dry, continental shelf, slowly filled with estuarine and then marine sediments. Sea level reached its approximate present position about 3,000 years ago.

The deeper sedimentary units beneath Corpus Christi generally strike parallel to the present Gulf of Mexico shoreline and dip gently to moderately to the Gulf. Distribution of these units is relatively well understood due to the extensive history of petroleum exploration in the area.

Stratigraphic units underlying the Corpus Christi area, in order of decreasing age, include the Goliad Sand, Willis Formation, Lissie Formation, Montgomery Formation, and the Beaumont Formation. The Willis, Lissie, Montgomery, and Beaumont Formations correspond generally with coastal plain terraces formed by successive lowerings of the sea level. The Goliad Sand, Lissie, and Beaumont Formations are known to contain fresh to slightly saline water in the Corpus Christi area.

The Beaumont Formation, which immediately underlies the Corpus Christi area, is characterized by a barrier island and beach deposit facies consisting of mostly fine-grained sand and shells. The barrier island and beach deposits of the Beaumont are typically less than 60 feet thick and are probably part of the Ingleside Barrier Island system.

Corpus Christi is in Zone 0 of the Seismic Risk Map of the Conterminous United States. Areas within this zone are those with essentially no potential risk of seismic activity.

Hydrogeology

Details of the hydrogeology of the Corpus Christi area have been published by Woodman and others (1978) and by Baker (1978). Water table aquifers consist of unconsolidated alluvium and barrier island deposits of Holocene Age and of the Lissie and Beaumont Formations of Pleistocene Age which comprise important units of the Chicot Aquifer system beneath the Corpus Christi area. The Chicot Aquifer varies in depth from surface and near-surface to approximately 1,000 feet bgs. Woodman and others (1978) suggest that, although no exact distinction between water table and artesian aquifers can be determined, wells greater than 200 feet deep generally encounter artesian conditions. Beneath the Chicot Aquifer and extending to a depth of approximately 2,800 feet is the artesian Evangeline Aquifer of the Pliocene Goliad Sand. The artesian aquifers become increasingly saline with depth. The Chicot and Evangeline aquifers are differentiated on the basis of static water levels and hydraulic conductivity.

Shallow water-table conditions exist within the immediate NAS Corpus Christi areas in the upper sand-dominated units of the Beaumont Formation and unconsolidated Holocene deposits. This sand-dominated material has an estimated permeability of 10^{-1} to 10^{-2} centimeters per second (cm/s) (Woodman and others, 1978). The flow net presented by Woodman and others (1978) indicates a flow direction for the general area toward Corpus Christi Bay. Flow direction in the artesian aquifer is similar to that of the water table aquifer.

3.2.5 Site Geology and Hydrogeology

The following stratigraphic and hydrogeologic descriptions were derived from site boring log information and field observations obtained by the E/A&H geologist. The soil boring logs are presented in Appendix C.

Site Geology/Stratigraphy

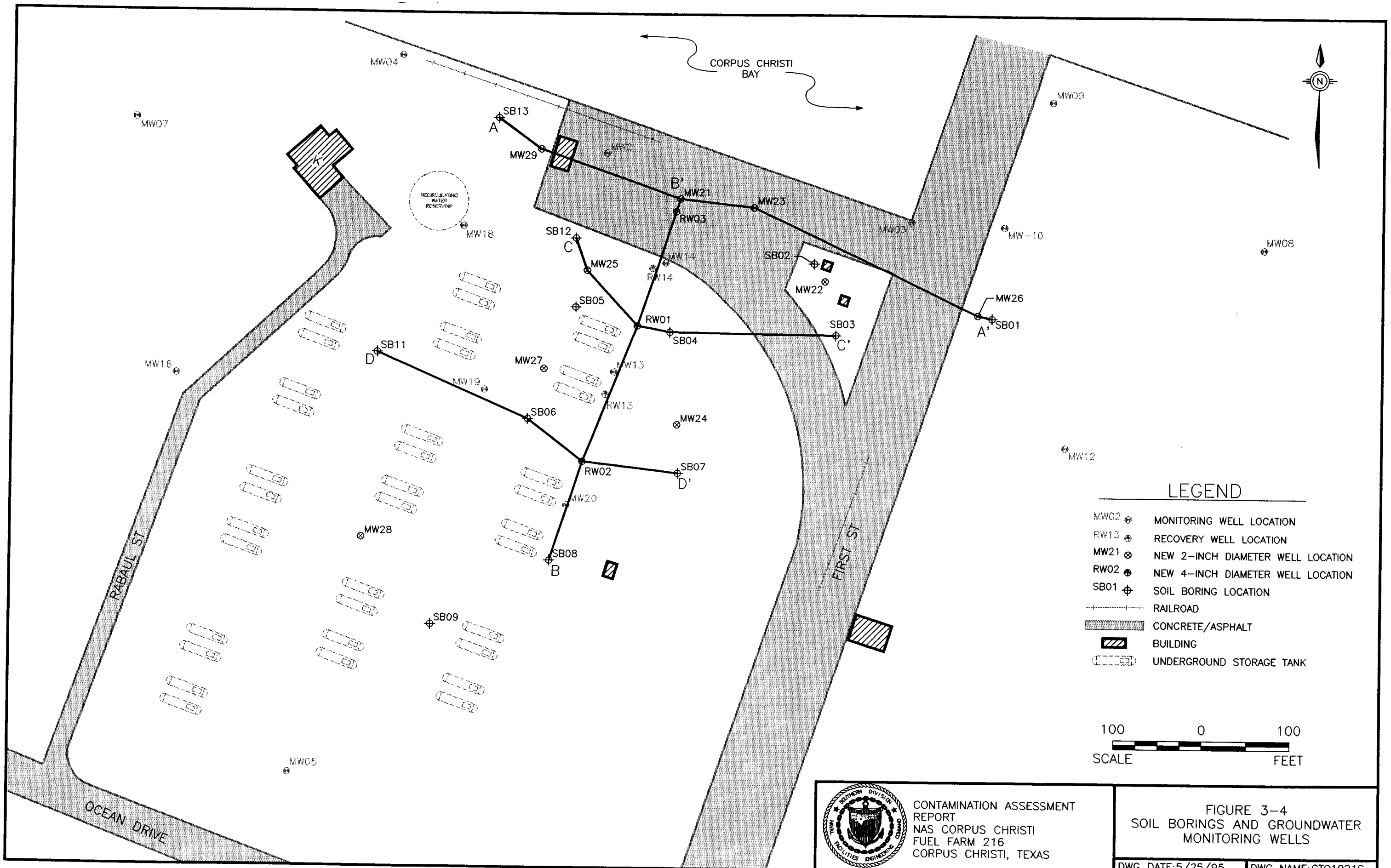
Soils encountered within the borings advanced at the site consist of a very fine sand, silt, sandy to silty clays, and hard plastic clay which may or may not contain intermixed caliche. The dominant soil type is sandy to silty clays. Soils were field classified by an experienced geologist according to the Unified Soil Classification System (USCS).

Figure 3-4 illustrates the location of soil borings and monitoring wells installed as part of the investigation. Figure 3-4 also illustrates the location of cross sections constructed to depict the geologic conditions at the site. Cross-sections in Figure 3-5, Figure 3-6, Figure 3-7, and Figure 3-8 illustrate the local geologic conditions observed.

Immediately underlying the topsoil at the site is a tan, very fine, poorly graded, dry, loose, sand. This is the material classified as Fill by the USDA. As shown in the cross sections, the fill material was encountered at depths ranging from 1 to 8 feet bgs across the site. Underlying the sand, from a depth of 2 to 12 bgs, are finer sediments consisting of gray-green, moist to wet, silts, and variably sandy, variably silty clays.

In most areas of the site, a gray-green, plastic, stiff to hard, clay containing hard, white caliche nodules at depth underlies the sands and silts at approximately 4 to 18 feet bgs (see Figures 3-5, 3-6, and 3-8). Contacts between the silty clay and underlying plastic clay are sharp. Beneath the gray-green clay and intermixed caliche, silts and silty clays are again encountered.

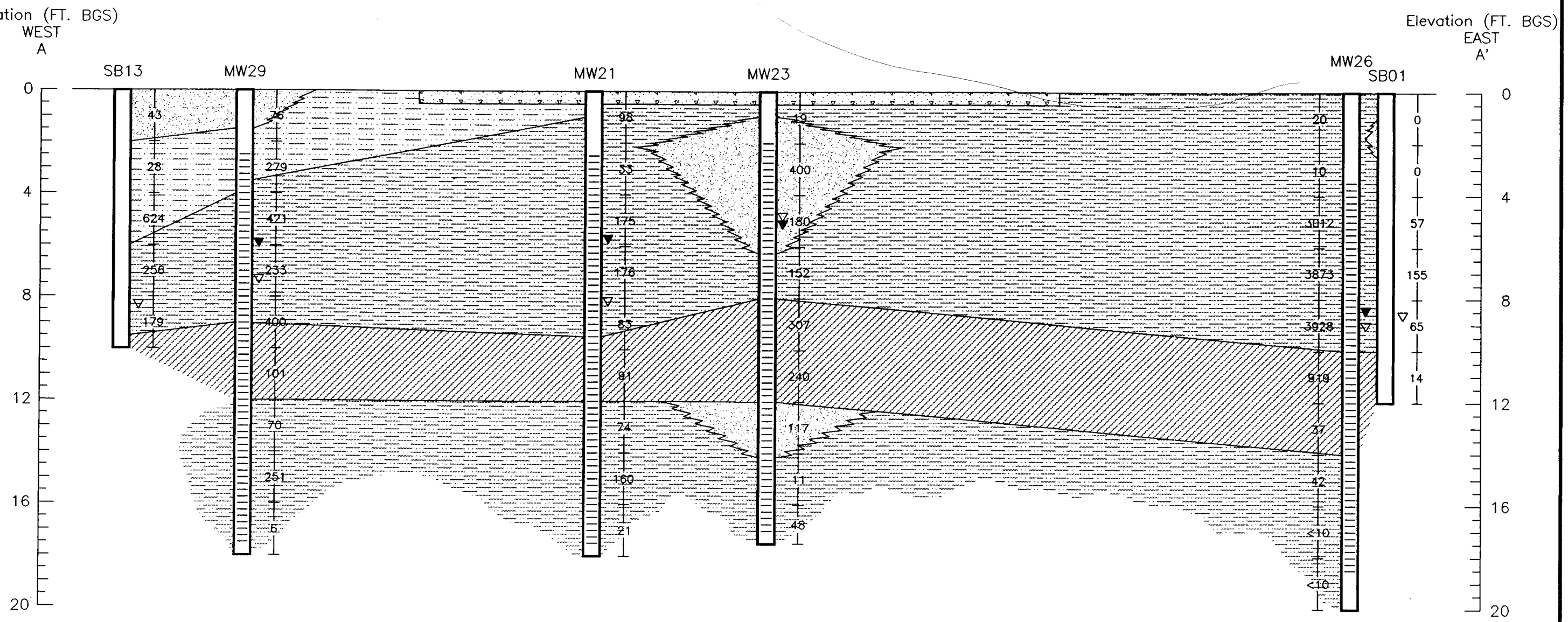
In certain areas of the site (northern and eastern) moisture content increases significantly within these lower silty and silty clays. Some intervals within this unit exhibit shrinkage cracks which may be increasing its water-storage capacity. These highly saturated silty clays were found to occur below depths of 12 to 15 feet bgs in selected borings.



CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3-4
SOIL BORINGS AND GROUNDWATER MONITORING WELLS

DWG DATE:5/25/95 | DWG NAME:CTO1021C



LEGEND

MW21 RW01	MONITORING WELL DESIGNATION
SB01	SOIL BORING DESIGNATION
	CONCRETE
	FINE, POORLY GRADED SAND
	SANDY SILT, SANDY CLAY, GRAY–GREEN
	SILTS AND SILTY CLAYS, GRAY–GREEN
	CLAY, GRAY–GREEN, STIFF, CALICHE IN PART
21	MEASURED VOLATILE CONCENTRATION (ppm) WITH PID
▼	PIEZOMETRIC SURFACE (ft bgs)
▽	SATURATED SOIL CONDITIONS (ft. bgs)
FT. BGS	FEET BELOW GROUND SURFACE
	SCREENED INTERVAL

VERTICAL SCALE: 1" = 4'

0 — 4

0 — 50

HORIZONTAL SCALE: 1" = 50'

VERTICAL EXAGGERATION = 12.5:1

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
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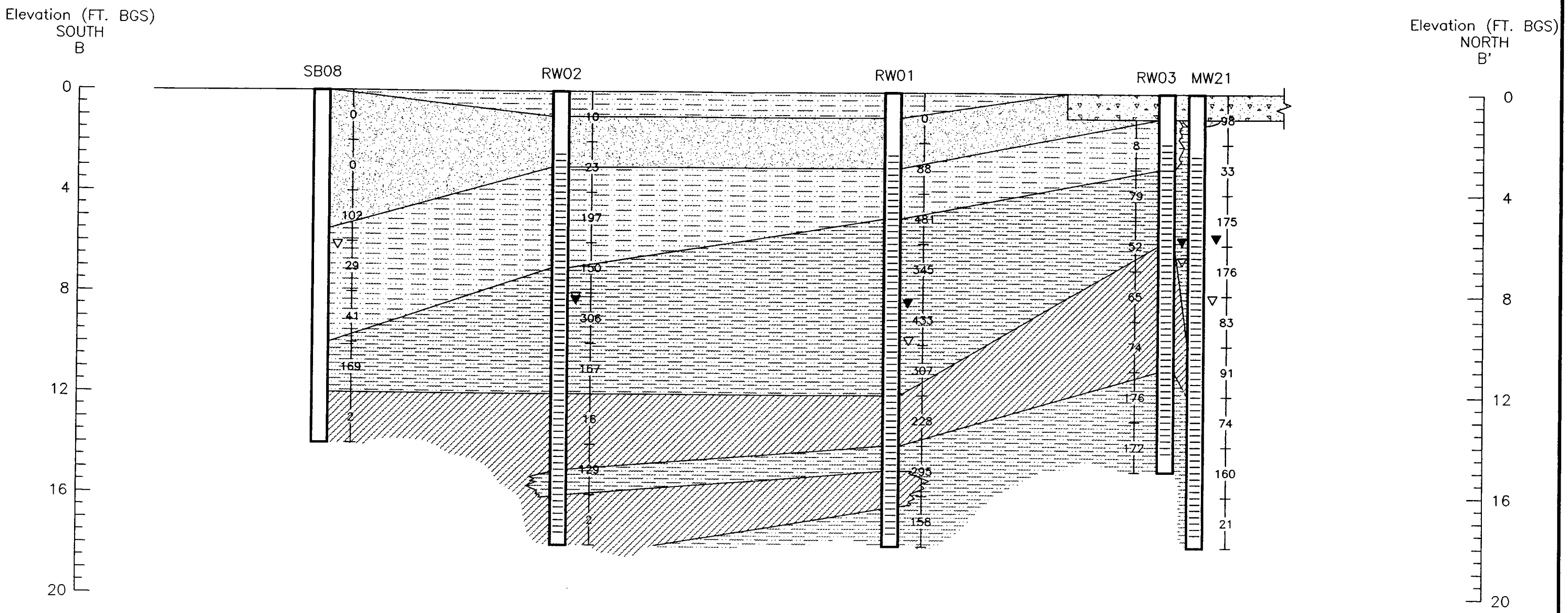
CORPUS CHRISTI, TEXAS

FIGURE 3–5
GENERALIZED GEOLOGIC CROSS–SECTION A–A'

DWG DATE:5/25/95 | DWG NAME:CTO1021D



LEGEND

MW21 RW01	MONITORING WELL DESIGNATION
SB01	SOIL BORING DESIGNATION
	CONCRETE
	FINE, POORLY GRADED SAND
	SANDY SILT, SANDY CLAY, GRAY–GREEN
	SILTS AND SILTY CLAYS, GRAY–GREEN
	CLAY, GRAY–GREEN, STIFF, CALICHE IN PART
21	MEASURED VOLATILE CONCENTRATION (ppm) WITH PID
▼	PIEZOMETRIC SURFACE (ft bgs)
▽	SATURATED SOIL CONDITIONS (ft. bgs)
FT. BGS	FEET BELOW GROUND SURFACE
	SCREENED INTERVAL

VERTICAL SCALE: 1" = 4'

0 — 4

0 — 50

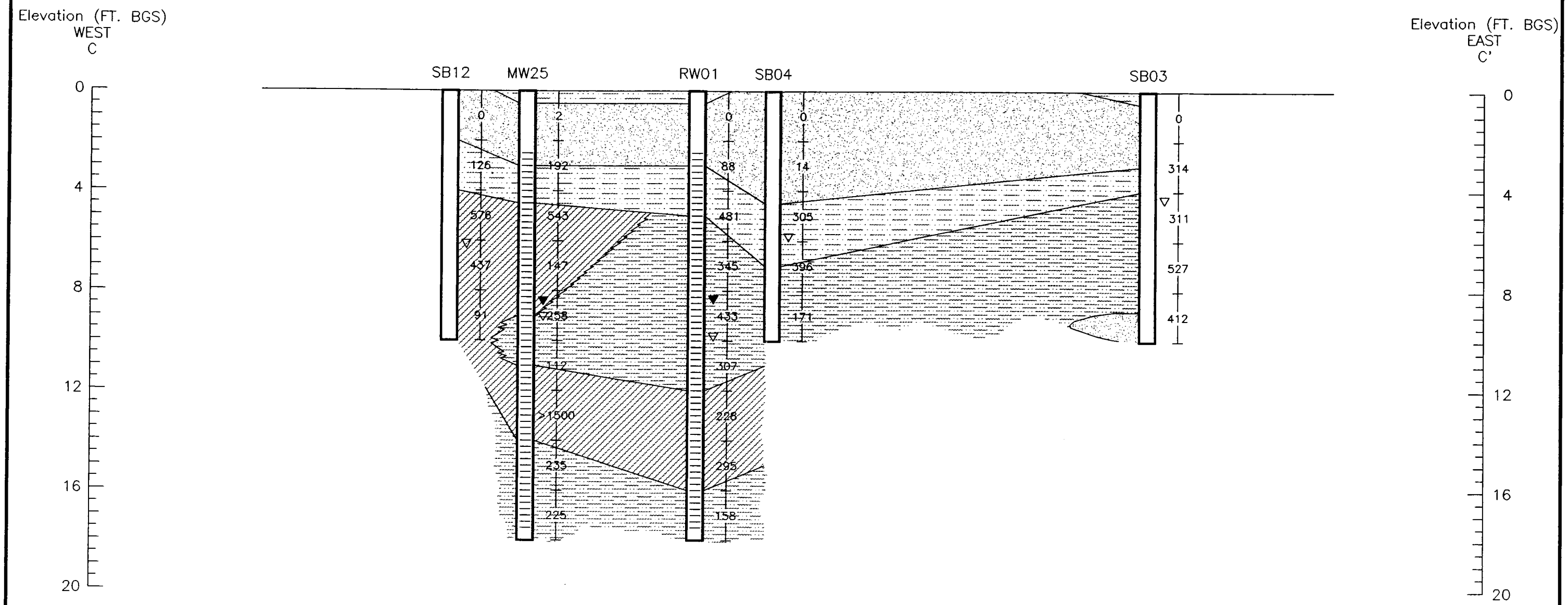
HORIZONTAL SCALE: 1" = 50'

VERTICAL EXAGGERATION = 12.5:1

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3–6
GENERALIZED GEOLOGIC CROSS–SECTION B–B'

DWG DATE:5/25/95 | DWG NAME:CTO1021E



LEGEND

MW21 RW01	MONITORING WELL DESIGNATION
SB01	SOIL BORING DESIGNATION
	CONCRETE
	FINE, POORLY GRADED SAND
	SANDY SILT, SANDY CLAY, GRAY–GREEN
	SILTS AND SILTY CLAYS, GRAY–GREEN
	CLAY, GRAY–GREEN, STIFF, CALICHE IN PART
21	MEASURED VOLATILE CONCENTRATION (ppm) WITH PID
▼	PIEZOMETRIC SURFACE (ft bgs)
▽	SATURATED SOIL CONDITIONS (ft. bgs)
FT. BGS	FEET BELOW GROUND SURFACE
	SCREENED INTERVAL

VERTICAL SCALE: 1" = 4'

0 — 4

0 — 50

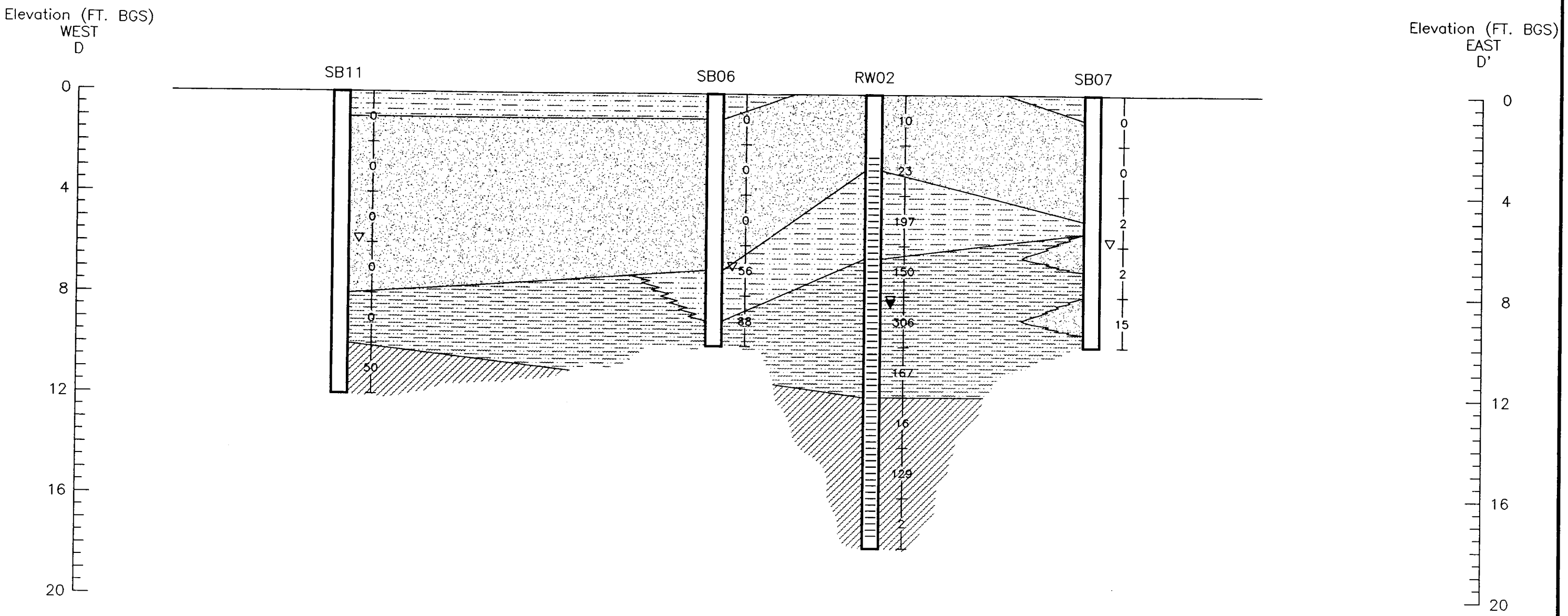
HORIZONTAL SCALE: 1" = 50'

VERTICAL EXAGGERATION = 12.5:1

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3–7
GENERALIZED GEOLOGIC CROSS–SECTION C–C'

DWG DATE:5/25/95 | DWG NAME:CTO1021F



LEGEND

MW21 RW01	MONITORING WELL DESIGNATION
SB01	SOIL BORING DESIGNATION
	CONCRETE
	FINE, POORLY GRADED SAND
	SANDY SILT, SANDY CLAY, GRAY–GREEN
	SILTS AND SILTY CLAYS, GRAY–GREEN
	CLAY, GRAY–GREEN, STIFF, CALICHE IN PART
21	MEASURED VOLATILE CONCENTRATION (ppm) WITH PID
▼	PIEZOMETRIC SURFACE (ft bgs)
▽	SATURATED SOIL CONDITIONS (ft. bgs)
FT. BGS	FEET BELOW GROUND SURFACE
	SCREENED INTERVAL

VERTICAL SCALE: 1" = 4'

0 — 4

0 — 50

HORIZONTAL SCALE: 1" = 50'

VERTICAL EXAGGERATION = 12.5:1

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3–8
GENERALIZED GEOLOGIC CROSS–SECTION D–D'

DWG DATE:5/25/95 | DWG NAME:CTO1021G

Site Hydrogeology

While advancing the soil borings and installing monitoring wells as part of this investigation, the presence of groundwater and the depth at which it occurred was noted. The depth at which groundwater occurred varied from approximately 3 feet to approximately 9 feet bgs. The groundwater was found to occur at shallow, perched intervals and at distinct, deeper intervals controlled by the porosity and permeability of the sediments. The most saturated interval exists within the silts and silty clays underlying the hard, plastic gray-green clay interval; therefore, the sediments at the site exhibit semi-confined hydrogeologic conditions. These findings are consistent with the previous studies performed at the site.

Table 3-1 lists the groundwater elevations in the wells derived from static water level measurements taken on March 13, 1995 and May 5, 1995. Table 3-1 also contains details concerning measured casing elevations and product thickness measurements. Figure 3-9 illustrates the potentiometric surface as depicted from the March groundwater sampling event elevations. Figure 3-10 depicts the potentiometric surface from elevations measured in May 1995. Groundwater measurements were obtained from all wells on the site during the respective period (12 additional wells were installed after the March event and before the May measurements); however, only two of the wells existing onsite in March were screened to intercept the groundwater table. Slight variations in the groundwater elevations can be attributed to the different screenings and thus the potentiometric maps may depict only the general flow of groundwater.

Variations in the potentiometric surface across the site appear to be complex due to the influences of the seawall and adjacent pier, the large portion of concrete covering the site and the potential tidal influences. The groundwater apparently forms a mound at the intersection of a pier and the seawall in the northeastern portion of the site. The water elevation of Corpus Christi Bay at the seawall is lower than the water elevations within wells close to the seawall.

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Table 3-1
Groundwater/Product Elevations

MW ID	Measured	TOC Elevation (ft. above msl)	Depth to Product	Depth to Water	Product Thickness	Product Elevation	Corrected Water Elevation*
MW 2	3-14-95	10.37	—	5.91	Sheen	—	4.46
	5-5-95	10.37	—	7.22		—	3.15
MW 3	3-14-95	12.53	—	4.98	—	—	7.55
	5-5-95		—	6.96	—	—	5.57
MW 4	3-14-95	9.58	—	4.95	—	—	4.63
	5-5-95		—	6.41			3.17
MW 5	3-15-95	14.39	—	9.40	—	—	4.99
	5-5-95		—	10.18	—	—	4.21
MW 7	3-14-95	11.28	—	7.57	—	—	3.71
	5-5-95		—	8.80	—	—	2.48
MW 8	3-13-95	10.62	—	3.89	—	—	6.73
	5-5-95		—	5.75	—	—	4.87
MW 9	7-14-95	11.53	—	5.48	—	—	6.05
	5-5-95		—	5.88	—	—	5.65
MW 10	3-13-95	12.86	—	5.70	—	—	7.16
	5-5-95		—	7.05	—	—	5.81
MW 12	3-13-95	12.52	—	6.75	—	—	5.77
	5-5-95		—	7.65	—	—	4.87
MW 13	3-14-95	13.28	9.62	9.63	0.01	3.66	3.66
	5-5-95	—	-	9.99	—	—	3.29

Table 3-1
Groundwater/Product Elevations

MW ID	Measured	TOC Elevation (ft. above msl)	Depth to Product	Depth to Water	Product Thickness	Product Elevation	Corrected Water Elevation*
MW 14	3-14-95	11.26	6.58	6.46	0.12	4.68	4.90
	5-5-95		8.26	8.47	0.21	3.00	2.97
MW 16	3-15-95	12.23	—	7.99	—	—	4.24
	5-5-95		—	8.82	—	—	3.41
MW 18	3-15-95	12.03	—	8.37	—	—	3.66
	5-5-95		9.01	9.02	0.01	3.02	3.02
MW 19	3-15-95	13.28	—	9.14	—	—	4.14
	5-5-95		—	9.78	—	—	3.50
MW 20	3-14-95	13.57	9.00	10.08	1.08	4.57	4.40
	5-5-95	13.57	9.81	9.81	Sheen	—	3.76
MW 21	5-5-95	11.31	8.28	9.48	1.20	3.03	2.83
MW 22	5-5-95	13.49	10.35	10.56	0.21	3.14	3.11
MW 23	5-5-95	11.01	—	7.41	—	—	3.60
MW 24	5-5-95	14.32	—	10.83	—	—	3.49
MW 25	5-5-95	13.72	10.75	10.75	Sheen	2.97	2.97
MW 26	5-5-95	13.51	10.08	10.77	0.69	3.43	3.32
MW 27	5-5-95	13.54	—	9.57	—	—	3.97
MW 28	5-5-95	13.74	—	9.92	—	—	3.82
MW 29	5-5-95	10.73	—	8.03	—	—	2.70

Table 3-1
Groundwater/Product Elevations

MW ID	Measured	TOC Elevation (ft. above msl)	Depth to Product	Depth to Water	Product Thickness	Product Elevation	Corrected Water Elevation*
RW-1	5-5-95	14.16	—	11.05	—	—	3.11
RW-2	5-5-95	14.21	10.62	10.63	0.01	3.59	3.59
RW-3	5-5-95	11.21	8.34	8.39	0.05	2.87	2.86
Corpus Christi Bay	5-5-95	8.93	—	8.51	—	—	0.42

Notes:
TOC = Top of Casing
msl = mean sea level
* Corrected water levels based on estimated specific gravity of 0.84 for hydrocarbons at site.
Total potential at monitoring well = *aqueous potential at monitoring well + (specific gravity of free product x thickness of free product at monitoring well)*

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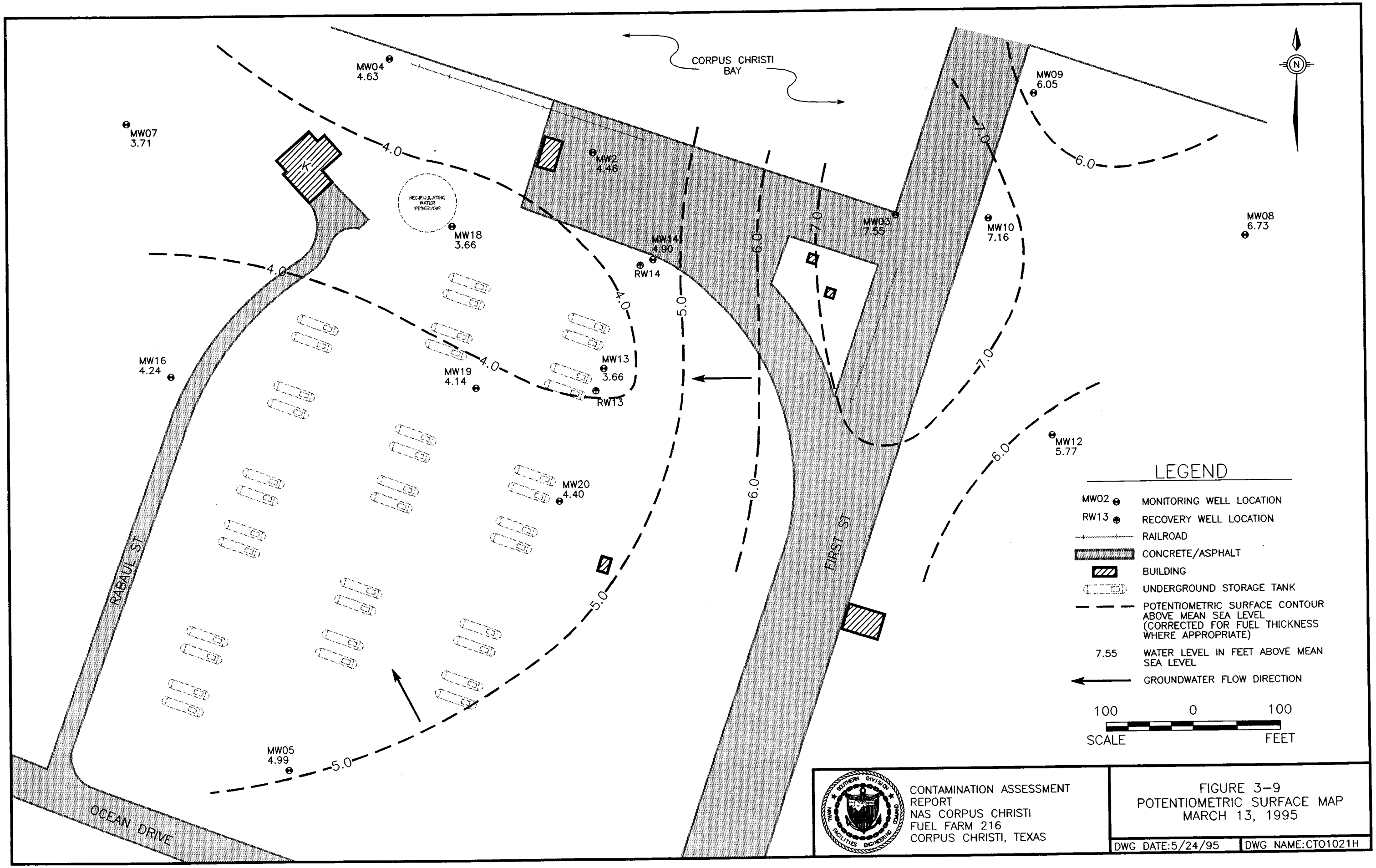
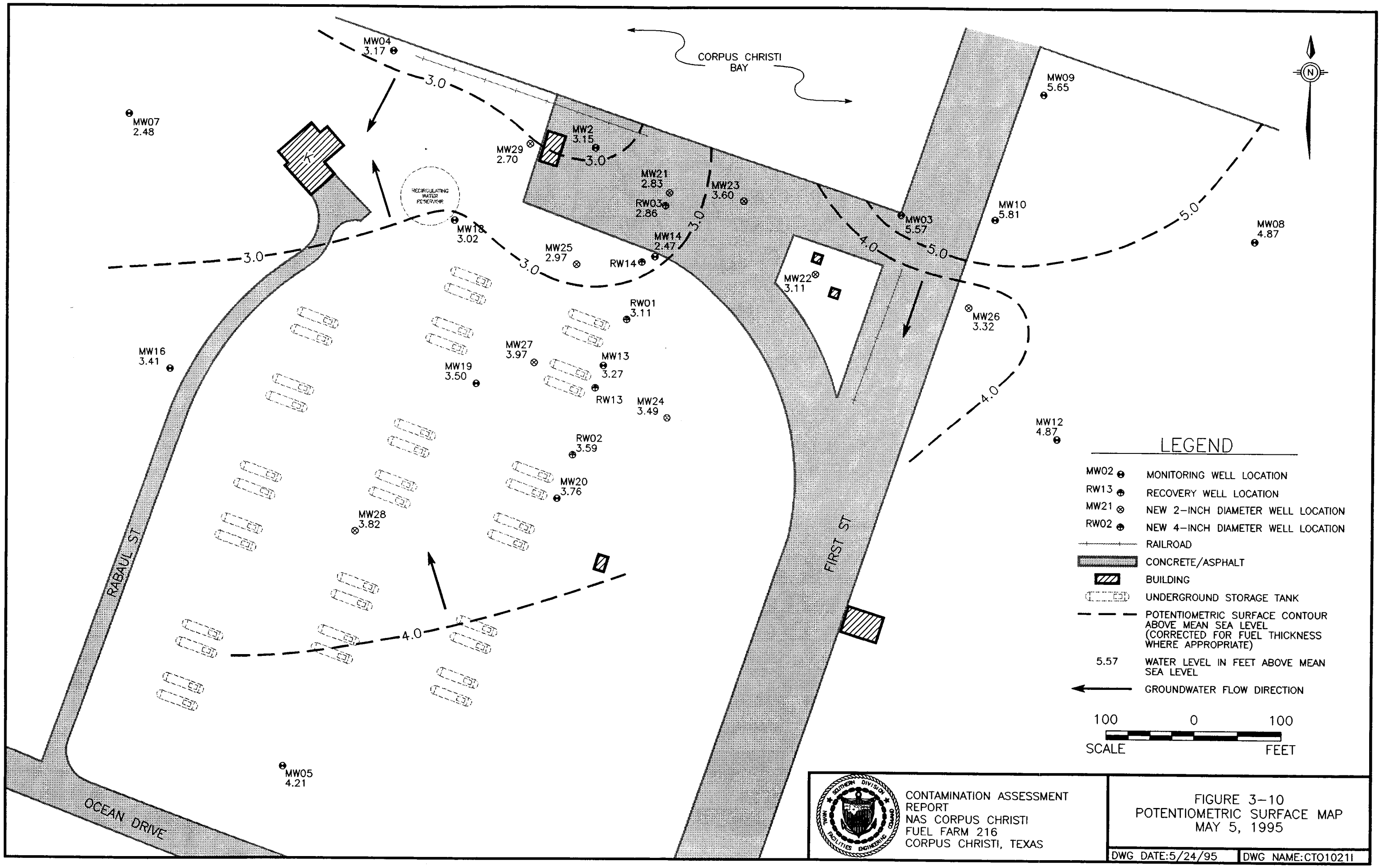

CORPUS CHRISTI BAY
MW04 4.63
MW07 3.71
MW2 4.46
MW09 6.05
MW03 7.55
MW10 7.16
MW08 6.73
MW14 4.90
RW14
MW18 3.66
MW16 4.24
MW19 4.14
MW13 3.66
RW13
MW12 5.77
MW20 4.40
MW05 4.99
RECIRCULATING WATER RESERVOIR
RABAUL ST
FIRST ST
OCEAN DRIVE
4.0
5.0
6.0
7.0
LEGEND
MW02 MONITORING WELL LOCATION
RW13 RECOVERY WELL LOCATION
RAILROAD
CONCRETE/ASPHALT
BUILDING
UNDERGROUND STORAGE TANK
POTENTIOMETRIC SURFACE CONTOUR ABOVE MEAN SEA LEVEL (CORRECTED FOR FUEL THICKNESS WHERE APPROPRIATE)
7.55 WATER LEVEL IN FEET ABOVE MEAN SEA LEVEL
GROUNDWATER FLOW DIRECTION
100 0 100
SCALE FEET
CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS
FIGURE 3-9
POTENTIOMETRIC SURFACE MAP
MARCH 13, 1995
DWG DATE:5/24/95
DWG NAME:CTO1021H


CORPUS CHRISTI BAY
MW04 3.17
MW07 2.48
MW09 5.65
MW2 3.15
MW29 2.70
MW21 2.83
MW23 3.60
RW03 2.86
MW10 5.81
MW03 5.57
MW08 4.87
MW18 3.02
MW14 2.47
MW25 2.97
RW14
MW22 3.11
RW01 3.11
MW26 3.32
MW16 3.41
MW27 3.97
MW13 3.27
MW19 3.50
RW13
MW24 3.49
MW12 4.87
RW02 3.59
MW20 3.76
MW28 3.82
MW05 4.21
RECIRCULATING WATER RESERVOIR
RABAUL ST
FIRST ST
OCEAN DRIVE
3.0
4.0
5.0
LEGEND
MW02 MONITORING WELL LOCATION
RW13 RECOVERY WELL LOCATION
MW21 NEW 2-INCH DIAMETER WELL LOCATION
RW02 NEW 4-INCH DIAMETER WELL LOCATION
RAILROAD
CONCRETE/ASPHALT
BUILDING
UNDERGROUND STORAGE TANK
POTENTIOMETRIC SURFACE CONTOUR ABOVE MEAN SEA LEVEL (CORRECTED FOR FUEL THICKNESS WHERE APPROPRIATE)
5.57 WATER LEVEL IN FEET ABOVE MEAN SEA LEVEL
GROUNDWATER FLOW DIRECTION
100 0 100
SCALE FEET
CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS
FIGURE 3-10
POTENTIOMETRIC SURFACE MAP
MAY 5, 1995
DWG DATE:5/24/95
DWG NAME:CTO1021I

The mounding is apparently controlled by the variations in stratigraphy and the impervious seawall. From this mound, the majority of the groundwater flows west-northwest across the site. East of the mound, groundwater flows east. The gradient at the site ranges from 0.001 feet per foot (ft/ft) to 0.016 ft/ft.

3.2.6 Potential Receptors

Potential receptors at the site consist of buried underground utilities and Corpus Christi Bay. Storm sewers located with the boundaries of the site were assessed for petroleum vapors utilizing a photoionization detector (PID). No vapors were detected or petroleum sheen visually noted. Due to access difficulties, electrical, telephone, and water utility manholes were not uncovered and assessed for vapors or sheen.

Although electrical, telephone, water, and storm sewer lines and trenches are known to be in the vicinity of the fuel farm and could have contributed to contamination migration at one time, the majority of these utilities were reportedly cut and plugged when the fuel farm and surrounding facilities were closed.

Corpus Christi Bay lies immediately north of the site and is separated from the fuel farm by a poured concrete seawall. The seawall reportedly extends at least 15 feet below mean sea level. Expansion joints within the concrete contain a black rubberized compound to prevent any inflow or outflow from either side of the seawall.

Due to the seawall depth, floating product has apparently been prevented from migrating into Corpus Christi Bay. Visual observations of the bay water confirm that free-phase hydrocarbons are not exiting the seawall into the bay, because no hydrocarbon sheen has been identified. There are no recorded historical observations of any petroleum release to the bay waters from the site. The bay waters were not sampled for dissolved-phase hydrocarbon constituents as part of this investigation.

3.3 Soil Assessment

Soil borings were completed using the methods and guidelines established in the CAP submitted to the TNRCC on February 6, 1995. The investigation included advancement of 24 soil borings and submittal of 59 soil samples for laboratory analysis. Twelve of the 24 soil borings were converted to monitoring wells.

3.3.1 Soil Sampling Rationale

Soil borings were installed on the basis of information from the previous investigations, a suspected westerly groundwater flow direction, and the accessibility of desired sampling locations. The known locations of free-product suggested that contamination was restricted to the area bordered by the concrete drives and the area beneath the concrete slab to the north (see Figure 3-4). Soil borings were advanced to intercept groundwater, further define the areal extent of free-product, and evaluate the presence of soil contamination.

Sixteen soil borings were placed in the areas initially believed to be beyond the boundaries of the free-product plume, to the south, east and west. Six of these borings were subsequently converted to monitoring wells. Four borings, which were converted to monitoring wells, were advanced within the known free-product plume to better define areal extent. Three soil borings were placed in the area of Tank Nest 162 to assess soil contamination indicated during tank closure activities. One of three soil borings in the Tank Nest 162 area was converted to a monitoring well (MW22).

Soil borings were advanced to a total depth of at least 10 feet. Borings SB01, SB08, and SB11 were advanced to depths of 12 feet, 14 feet, and 12 feet bgs, respectively. Borings converted to monitoring wells were advanced to depths ranging from 14 to 19 feet bgs. Details of monitoring well construction are discussed in Section 3.5.1.

3.3.2 Soil Sampling Procedures

Soil borings were completed using 4.25-inch inside diameter (ID) hollow-stem auger drilling techniques in conjunction with continuous split spoon sampling. Hollow-stem augers with a 6.25-inch ID were used to install the 2-inch diameter monitoring wells. The 4-inch diameter monitoring wells were installed using 8.25-inch ID hollow-stem augers.

At the conclusion of each work day, all soil borings not converted to monitoring wells were abandoned by grouting the boring from total depth to the ground surface with a Portland cement and bentonite slurry mixture.

All soil samples were field classified in accordance with the Unified Soil Classification System (USCS) and documented with other pertinent field information on individual boring logs. Boring logs maintained for each borehole include measured PID concentrations, soil types, and other relevant field information (Appendix C).

Soil samples were collected continuously from the surface to each boring's terminal depth. Samples were collected in a 2-foot long split-spoon sampler. The sampler, attached to drill rods, rested inside and was advanced with the lead auger during auger advancement. At each 2-foot interval, the sampler was withdrawn from the borehole, removed from the drill rod, and opened by the E/A&H geologist. Soil samples collected were placed directly into laboratory supplied and prepared soil jars using disposable spatulas. Samples were obtained for benzene, toluene, ethylbenzene, and total xylenes (BTEX), TPH, and PAH analysis.

Headspace samples were collected and screened from each sampling interval. A portion of each sample from the 2-foot split spoon interval was placed in a 1-quart resealable plastic headspace bag and allowed to equilibrate for approximately 15 minutes before volatile screening. The screening was accomplished by placing the PID probe tip (Environmental Instruments Model

580B) into the headspace bag and measuring any organic vapor concentrations that may have escaped from the soil into the surrounding bag.

The soil sample with the most elevated PID reading and the soil sample from either the soil-water interface or the boring's terminal depth were submitted for laboratory analysis. To gain additional information, a soil sample above the soil-water interface was submitted for laboratory analysis as well from 15 of the 24 borings.

Soil samples selected for laboratory analysis were labeled, packed on ice, and shipped by overnight courier to Savannah Laboratories. Strict chain-of-custody procedures were adhered to at all times. Soil samples were analyzed for BTEX using U.S. Environmental Protection Agency (USEPA) Method 8020, TPH using USEPA Method 418.1, and PAHs using USEPA Method 8270. In addition selected samples were analyzed for TPH using USEPA Method 8015 to further define the type of hydrocarbons present. Field, rinsate, potable water, and trip blanks were collected during sampling activities and accompanied the sample kit as standard quality assurance/quality control (QA/QC) practice. Field and rinsate blanks were collected weekly. Rinsate blanks were collected from a decontaminated 2-foot split-spoon sampler. One potable water blank was collected as the source of water for the assessment activities did not change. Duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples also were collected as part of QA/QC procedures. Duplicates were collected every 20 samples and MS/MSD samples were collected at the rate of one per 20 samples, or as the laboratory deemed necessary.

All downhole equipment and sampling tools were decontaminated with a hot potable water pressure wash before and between each sample location. In order to minimize the potential for cross contamination during sample collection, split-spoon samplers were completely disassembled and cleaned with the three-step decontamination procedure outlined below:

- Potable water with Liquinox wash
- Potable water rinse
- Final distilled water rinse

Split-spoon samplers were allowed to air dry before reassembly. Sample spatulas and other sampling equipment underwent the same decontamination procedures as outlined above. Clean disposable latex gloves were worn during sample collection and during all decontamination procedures.

All soil cuttings generated during site investigation activities were contained within 55-gallon drums. The drums were marked with the boring number, date and contents, and positioned at a designated storage area onsite pending analytical results from two composite soil samples collected for laboratory analysis.

3.3.3 Soil Analytical Results

TNRCC has established action levels for LPST sites based on the type of soils present and petroleum product stored (RG-17 PST, October 1993). The soils at the site are predominantly fine grained and thus the following action levels have been used in this report.

Constituents	Soil Action Levels Fine Grained Soils (in ppm)
Benzene	0.500
Ethylbenzene	70
Toluene	100
Xylenes	560
TPH	100

Since the fuel farm at one time stored jet fuel and aviation gasoline, the TNRCC's more restrictive action level of 100 mg/kg for TPH has been used.

Soil analytical results are summarized in Table 3-2. In general, soil contamination above action levels was indicated in the northern portion of the site adjacent to, and under, the concrete slab. Soil contamination was also indicated in the northeastern portion of the site, near and across the concrete drive, from Tank Nest 162.

Green and black staining and a prominent hydrocarbon odor were noted in the lower intervals of most borings installed. A hydrocarbon "sheen" or "rainbow" was noted within the spilt-spoon containing soil in borings MW23 (10 to 14 feet), MW25 (13 to 16 feet), MW26 (10 to 14 feet), and MW27 (8 to 10 feet).

The following sections discuss the nature and extent of soil contamination present at the site. Soil analytical data sheets provided by the laboratory are included in Appendix C.

TPH

Laboratory results indicated TPH concentrations above the TNRCC's action level of 100 mg/kg in 21 of the 59 samples analyzed. The areal extent of TPH concentrations above action levels are displayed in Figure 3-11. As Figure 3-11 indicates, TPH concentrations in soil above 100 mg/kg were found to be confined primarily to the northern portion of the site, in the vicinity of the known free-product plume. The majority of the TPH contamination was limited to the top 10 feet of soils and generally decreased with increasing depth in most borings.

Headspace analyses indicate organic vapor concentrations in the borings installed, and generally correlate well with samples containing measurable TPH concentrations. The highest PID reading was greater than 3,000 ppm, measured in boring MW26 in the 6 to 8 foot and 8 to 10 foot intervals. The TPH analytical result for the soil sample collected is 2000 mg/kg. As with nearly all intervals in which elevated PID readings were obtained, this sample displayed a hydrocarbon odor and green staining. All headspace screenings values are included in the boring logs in Appendix C.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	SB01 6-8' 216SB00108 3-27-95	SB01 10-12' 216SB00112 3-27-95	SB02 6-8' 216SB00208 3-27-95	SB02 8-10' 216SB00210 3-27-95	SB03 6-8' 216SB00308 3-27-95	SB03 8-10' 216SB00310 3-27-95	SB04 2-4' 216SB00404 3-27-95	SB04 6-8' 216SB00408 3-27-95
TPH (418.1)	60	<13	260	360	100	70	<11	1,600
Modified TPH (8015)								
HC as Gasolines	870	NA	NA	260	NA	NA	NA	NA
HC as Kerosene	580	NA	NA	450J	NA	NA	NA	NA
HC as Diesel Fuel	<240	NA	NA	<250	NA	NA	NA	NA
HC as Heavy Oils	<780	NA	NA	<820	NA	NA	NA	NA
HC as Mineral Spirits	<240	NA	NA	<250	NA	NA	NA	NA
HC as Naphtha	<240	NA	NA	<250	NA	NA	NA	NA
HC as Varsol	<240	NA	NA	<250	NA	NA	NA	NA
HC as Fuel Oil	<780	NA	NA	<820	NA	NA	NA	NA
Volatiles								
Benzene	15.0	0.13	6.4	10.0	16.0	6.1	<0.0057	70J
Toluene	1.8	<0.0063	<0.625	0.88	1.4	3.8	<0.0057	38J
Ethylbenzene	2.3	0.052	<0.625	<0.625	1.4	3.4	<0.0057	22J
Total Xylene	11.0	0.091	3.3	1.5	6.4	14.0	0.016	160J
Semivolatiles								
Naphthalene	1.3	<0.42	<0.41	0.89	<0.41	<0.38	<0.37	5.0
Fluoranthene	<0.39	<0.42	<0.41	<0.41	<0.41	<0.38	<0.37	<0.4
Phenanthrene	<0.39	<0.42	<0.41	0.57	<0.41	<0.38	<0.37	<0.4
2-Methylnaphthalene	3.6	<0.42	<0.41	2.5	<0.41	<0.38	<0.37	6.6
1-Methylnaphthalene	2.4	<0.42	<0.41	2.0	<0.41	<0.38	<0.37	4.2
Pyrene	<0.39	<0.42	<0.41	<0.41	<0.41	<0.38	<0.37	<0.4

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	SB04 8-10' 216SB00410 3-27-95	DupSB04 8-10' 216HB00410 3-27-95	SB05 4-6' 216SB00506 3-28-95	SB05 8-10' 216SB00510 3-28-95	SB06 4-6' 216SB00606 3-28-95	SB06 8-10' 216SB00610 3-28-95	SB07 4-6' 216SB00706 3-28-95	SB07 8-10' 216SB00710 3-28-95
TPH (418.1)	110J	920J	<12	29	22	29	<11	<12
Modified TPH (8015)								
HC as Gasolines	NA	NA	NA	<12	NA	NA	NA	NA
HC as Kerosene	NA	NA	NA	290J	NA	NA	NA	NA
HC as Diesel Fuel	NA	NA	NA	<240	NA	NA	NA	NA
HC as Heavy Oils	NA	NA	NA	<780	NA	NA	NA	NA
HC as Mineral Spirits	NA	NA	NA	<240	NA	NA	NA	NA
HC as Naphtha	NA	NA	NA	<240	NA	NA	NA	NA
HC as Varsol	NA	NA	NA	<240	NA	NA	NA	NA
HC as Fuel Oil	NA	NA	NA	<780	NA	NA	NA	NA
Volatiles								
Benzene	4.0	5.2	<0.006	0.53	<0.0056	4.7	<0.0057	<0.0059
Toluene	<0.58	30.0	<0.006	<0.24	<0.0056	0.48	<0.0057	<0.0059
Ethylbenzene	13.0	18.0	<0.006	<0.24	<0.0056	0.63	<0.0057	0.42
Total Xylene	47.0J	120.0J	<0.006	0.76	<0.0056	1.7	<0.0057	0.56
Semivolatiles								
Naphthalene	1.7J	<0.41J	<0.39	0.89	<0.37	<0.38	<0.38	<0.39
Fluoranthene	<0.38	<0.41	<0.39	<0.39	<0.37	0.48	<0.38	<0.39
Phenanthrene	<0.38	<0.41	<0.39	<0.39	<0.37	0.43	<0.38	<0.39
2-Methylnaphthalene	2.6J	<0.6J	<0.39	1.7	<0.37	0.48	<0.38	<0.39
1-Methylnaphthalene	1.7J	<0.41J	<0.39	1.3	<0.37	<0.38	<0.38	<0.39
Pyrene	<0.38	<0.41	<0.39	<0.39	<0.37	0.63	<0.38	<0.39

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	SB08 2-4' 216SB00804 3-28-95	SB08 4-6' 216SB00806 3-28-95	SB08 8-10' 216SB00812 3-28-95	SB08 12-14' 216SB00814 3-28-95	SB09 6-8' 216SB00908 3-28-95	SB09 8-10' 216SB00910 3-28-95	SB10 0-2' 216SB01002 3-28-95	SB10 6-8' 216SB01008 3-28-95
TPH (418.1)	<11	<12	22	<13	13	<12	26	91
Modified TPH (8015)								
HC as Gasolines	NA	NA	62	NA	NA	NA	NA	NA
HC as Kerosene	NA	NA	23J	NA	NA	NA	NA	NA
HC as Diesel Fuel	NA	NA	<12	NA	NA	NA	NA	NA
HC as Heavy Oils	NA	NA	<40	NA	NA	NA	NA	NA
HC as Mineral Spirits	NA	NA	<12	NA	NA	NA	NA	NA
HC as Naphtha	NA	NA	<12	NA	NA	NA	NA	NA
HC as Varsol	NA	NA	<12	NA	NA	NA	NA	NA
HC as Fuel Oil	NA	NA	<40	NA	NA	NA	NA	NA
Volatiles								
Benzene	<0.0057	<0.0058	2.2	<0.0067	<0.0059	0.017	<0.11	0.28
Toluene	<0.0057	<0.0058	0.24	<0.0067	<0.0059	<0.0058	<0.11	<0.12
Ethylbenzene	<0.0057	<0.0058	<0.12	<0.0067	<0.0059	<0.0058	<0.11	<0.12
Total Xylene	<0.0057	<0.0058	0.58	<0.0067	<0.0059	<0.0058	<0.11	0.83
Semivolatiles								
Naphthalene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	1.9	<0.39
Fluoranthene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	<0.37	<0.39
Phenanthrene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	<0.37	<0.39
2-Methylnaphthalene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	3.7	0.80
1-Methylnaphthalene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	2.6	0.53
Pyrene	<0.38	<0.38	<0.4	<0.44	<0.39	<0.38	<0.37	<0.39

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	SB10 14-16' 216SB01016 3-28-95	SB11 2-4' 216SB01104 3-29-95	SB11 10-12' 216SB01112 3-29-95	SB12 4-6' 216SB01206 3-29-95	SB12 8-10' 216SB01210 3-29-95	SB13 0-2' 216SB01302 3-29-95	SB13 4-6' 216SB01306 3-29-95	SB13 8-10' 216SB01310 3-29-95
TPH (418.1)	25	<11	<13	5,600	<12	120	24	750
Modified TPH (8015)								
HC as Gasolines	NA	NA	5.7	NA	NA	NA	NA	NA
HC as Kerosene	NA	NA	<13	NA	NA	NA	NA	NA
HC as Diesel Fuel	NA	NA	<13	NA	NA	NA	NA	NA
HC as Heavy Oils	NA	NA	<13	NA	NA	NA	NA	NA
HC as Mineral Spirits	NA	NA	<13	NA	NA	NA	NA	NA
HC as Naphtha	NA	NA	<13	NA	NA	NA	NA	NA
HC as Varsol	NA	NA	<13	NA	NA	NA	NA	NA
HC as Fuel Oil	NA	NA	<43	NA	NA	NA	NA	NA
Volatiles								
Benzene	<0.24	<0.0057	0.34	<0.58	<0.0062	<0.0055	<2.4	0.32
Toluene	1.0	<0.0057	0.064	3.4	<0.0062	<0.0055	<2.4	0.12
Ethylbenzene	<0.24	<0.0057	0.093	20.0	<0.0062	<0.0055	25.0	0.60
Total Xylene	1.2	<0.0057	0.095	51.0	<0.0062	0.0075	26.0	0.29
Semivolatiles								
Naphthalene	<0.39	<0.38	<0.43	1.6	<0.41	<0.46	1.2	1.9
Fluoranthene	<0.39	<0.38	<0.43	<0.38	<0.41	<0.46	0.55	<0.40
Phenanthrene	<0.39	<0.38	<0.43	<0.38	<0.41	<0.46	0.71	0.44
2-Methylnaphthalene	<0.39	<0.38	<0.43	5.4	<0.41	<0.46	4.1	5.4
1-Methylnaphthalene	<0.39	<0.38	<0.43	4.3	<0.41	<0.46	3.1	4.1
Pyrene	<0.39	<0.38	<0.43	<0.38	<0.41	<0.46	<0.40	<0.40

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	MW22 6-8' 216SMW2208 3-30-95	MW22 12-14' 216SMW2214 3-30-95	MW22 16-17' 216SMW2217 3-30-95	MW23 2-4' 216SMW2304 3-30-95	MW23 10-12' 216SMW2312 3-30-95	MW24 2-4' 216SMW2404 3-30-95	MW24 6-8' 216SMW2408 3-30-95	MW24 16-18' 216SMW2418 3-30-95
TPH (418.1)	180	190	97	400	180	17	170	73J
Modified TPH (8015)								
HC as Gasolines	NA	NA	NA	<31	NA	NA	NA	NA
HC as Kerosene	NA	NA	NA	1,300	NA	NA	NA	NA
HC as Diesel Fuel	NA	NA	NA	<250	NA	NA	NA	NA
HC as Heavy Oils	NA	NA	NA	<820	NA	NA	NA	NA
HC as Mineral Spirits	NA	NA	NA	<250	NA	NA	NA	NA
HC as Naphtha	NA	NA	NA	<250	NA	NA	NA	NA
HC as Varsol	NA	NA	NA	<250	NA	NA	NA	NA
HC as Fuel Oil	NA	NA	NA	<820	NA	NA	NA	NA
Volatiles								
Benzene	<0.24	0.036	0.015	<0.625	<0.25	<0.0057	0.055	0.018J
Toluene	0.87	<0.0063	0.013	4.7J	<0.25	<0.0057	<0.029	<0.0056J
Ethylbenzene	5.3	0.056	0.052	4.3J	1.1	<0.0057	0.046	0.041J
Total Xylene	9.6	0.056	0.058	9.4J	2.0	<0.0057	0.24	0.1J
Semivolatiles								
Naphthalene	<0.38	0.56	<0.39	2.9	<0.42	<0.38	<0.38	<0.39
Fluoranthene	0.46	<0.42	<0.39	<0.43	<0.42	<0.38	<0.38	<0.39
Phenanthrene	0.47	<0.42	<0.39	<0.41	<0.42	<0.38	<0.38	<0.39
2-Methylnaphthalene	1.6	2.1	<0.39	5.2	0.45	<0.38	<0.38	<0.39
1-Methylnaphthalene	1.3	1.6	<0.39	4.3	<0.42	<0.38	<0.38	<0.39
Pyrene	<0.38	<0.42	<0.39	<0.41	<0.42	<0.38	<0.38	<0.39

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	DupMW24 16-18' 216HMW2418 3-30-95	MW25 0-2' 216SMW2502 3-31-95	MW25 12-14' 216SMW2514 3-31-95	MW25 16-18' 216SMW2518 3-31-95	MW26 2-4' 216SMW2604 3-31-95	MW26 8-10' 216SMW2610 3-31-95	MW26 16-18' 216SMW2618 3-31-95
TPH (418.1)	34J	18	230	78	70	2000	37
Modified TPH (8015)							
HC as Gasolines	NA	NA	NA	NA	NA	<1.6	NA
HC as Kerosene	NA	NA	NA	NA	NA	<12	NA
HC as Diesel Fuel	NA	NA	NA	NA	NA	<12	NA
HC as Heavy Oils	NA	NA	NA	NA	NA	<41	NA
HC as Mineral Spirits	NA	NA	NA	NA	NA	<12	NA
HC as Naphtha	NA	NA	NA	NA	NA	<12	NA
HC as Varsol	NA	NA	NA	NA	NA	<12	NA
HC as Fuel Oil	NA	NA	NA	NA	NA	<41	NA
Volatiles							
Benzene	<0.012J	<0.0055	0.29J	<0.0058	<0.0054	2.5J	<0.006
Toluene	<0.012	<0.0055	0.80J	<0.0058	<0.0054	<0.031	<0.006
Ethylbenzene	<0.012J	<0.0055	6.0J	0.092	<0.0054	2.4J	<0.006
Total Xylene	<0.012J	<0.0055	50.0J	0.098	<0.0054	1.0J	<0.006
Semivolatiles							
Naphthalene	<0.39	<0.35	2.5	<0.38	<0.36	5.4	<0.39
Fluoranthene	<0.39	<0.35	<0.41	<0.38	<0.36	<0.82	<0.39
Phenanthrene	<0.39	<0.35	<0.41	<0.38	<0.36	<0.82	<0.39
2-Methylnaphthalene	<0.39	<0.35	2.9	0.434	<0.36	7.9	<0.39
1-Methylnaphthalene	<0.39	<0.35	3.2	<0.38	<0.36	5.5	<0.39
Pyrene	<0.39	<0.35	<0.41	<0.38	<0.36	<0.82	<0.39
							<0.39
							<0.39

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

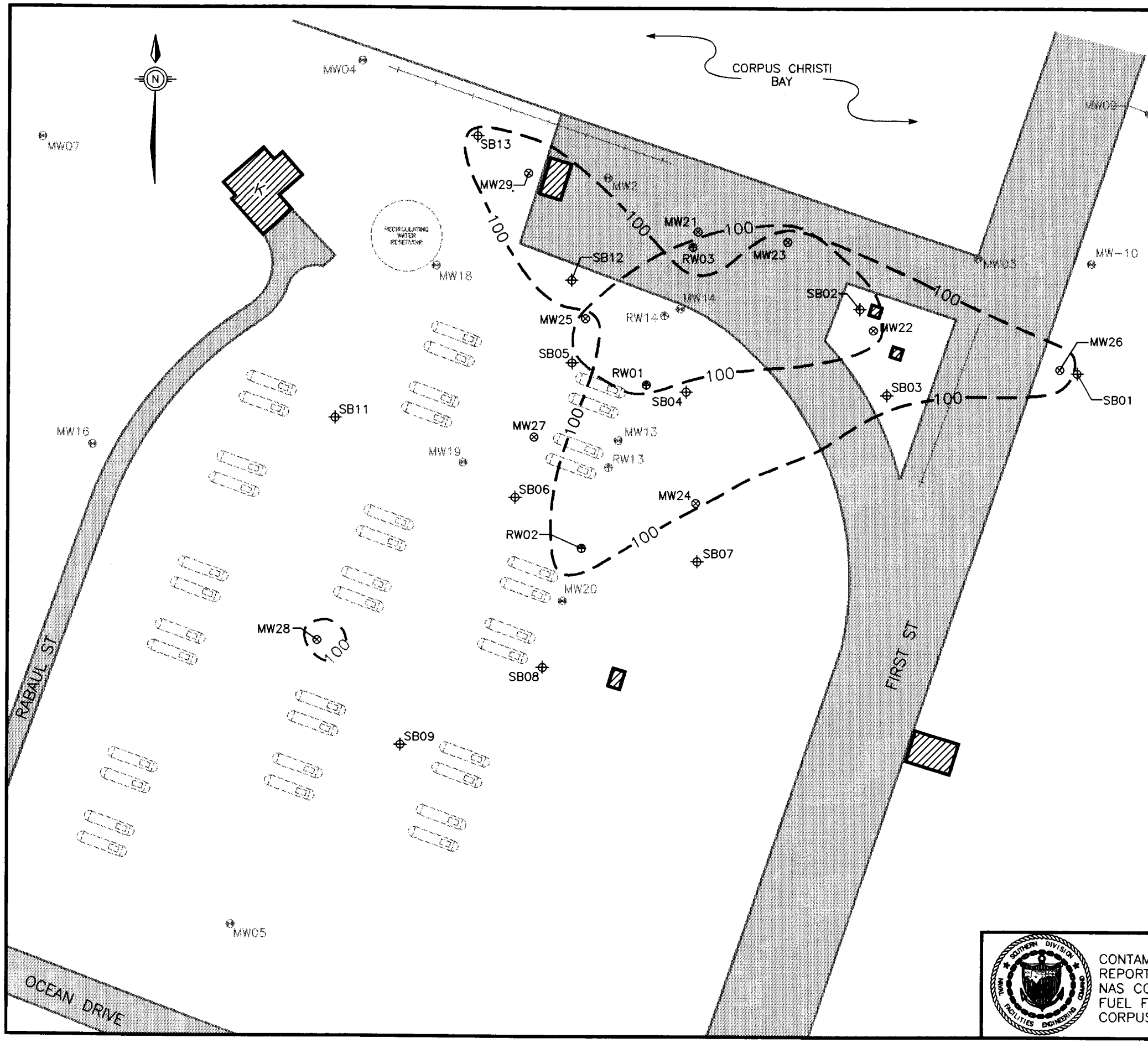
Field ID/Depth Sampled Record ID Date Sampled	MW27 10-12' 216SMW2712 3-31-95	MW27 18-20' 216SMW2720 3-31-95	MW28 0-2' 216SMW2802 4-3-95	MW28 10-12' 216SMW2812 4-3-95	MW28 14-16' 216SMW2816 4-3-95	MW29 4-6' 216SMW2906 4-3-95	MW29 16-18' 216SMW2918 4-3-95	DupMW29 16-18' 216HMW2918 4-3-95
TPH (418.1)	54	<12	18	490	23	1,600	<12	<11
Modified TPH (8015)								
HC as Gasolines	NA	NA	NA	<1.5	NA	NA	NA	NA
HC as Kerosene	NA	NA	NA	54	NA	NA	NA	NA
HC as Diesel Fuel	NA	NA	NA	<23	NA	NA	NA	NA
HC as Heavy Oils	NA	NA	NA	<77	NA	NA	NA	NA
HC as Mineral Spirits	NA	NA	NA	<23	NA	NA	NA	NA
HC as Naphtha	NA	NA	NA	<23	NA	NA	NA	NA
HC as Varsol	NA	NA	NA	<23	NA	NA	NA	NA
HC as Fuel Oil	NA	NA	NA	<77	NA	NA	NA	NA
Volatiles								
Benzene	0.098J	<0.006	<0.0053	0.22	<0.006	<1.1	<0.0058	<0.0057
Toluene	0.26J	<0.006	<0.0053	<0.029	<0.006	3.0	<0.0058	<0.0057
Ethylbenzene	1.1J	<0.006	<0.0053	0.2	<0.006	7.0	<0.0058	<0.0057
Total Xylene	5.9J	<0.006	<0.0053	0.39	<0.006	45.0	<0.0058	<0.0057
Semivolatiles								
Naphthalene	<0.39	<0.39	<0.35	1.7	<0.39	4.3	<0.38	<0.38
Fluoranthene	0.89	<0.39	<0.35	0.4	<0.39	<0.76	<0.38	<0.38
Phenanthrene	0.94	<0.39	<0.35	<0.39	<0.39	<0.76	<0.38	<0.38
2-Methylnaphthalene	<0.39	<0.39	<0.35	4.2	<0.39	6.8	<0.38	<0.38
1-Methylnaphthalene	<0.39	<0.39	<0.35	3.3	<0.39	4.1	<0.38	<0.38
Pyrene	0.72	<0.39	<0.35	0.4	<0.39	<0.76	<0.38	<0.38

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.

Table 3-2
Soil Analytical Results

Field ID/Depth Sampled Record ID Date Sampled	RW-1 4-6' 216SRW1006 4-4-95	RW-1 16-18' 216SRW1018 4-4-95	RW-2 0-2' 216SRW2002 4-4-95	RW-2 8-10' 216SRW2010 4-4-95	RW-3 1-3' 216SRW3003 4-5-95	RW-3 11-13' 216SRW3013 4-5-95	RW-3 13-15' 216SRW3015 4-5-95
TPH (418.1)	4,000	130	<11	3,800	17	450	140
Modified TPH (8015)							
HC as Gasolines	NA	NA	NA	NA	NA	2,500	NA
HC as Kerosene	NA	NA	NA	NA	NA	740	NA
HC as Diesel Fuel	NA	NA	NA	NA	NA	<250	NA
HC as Heavy Oils	NA	NA	NA	NA	NA	<840	NA
HC as Mineral Spirits	NA	NA	NA	NA	NA	<250	NA
HC as Naphtha	NA	NA	NA	NA	NA	<250	NA
HC as Varsol	NA	NA	NA	NA	NA	<250	NA
HC as Fuel Oil	NA	NA	NA	NA	NA	<840	NA
Volatiles							
Benzene	<2.2R	<0.12	<0.005	5.1	<0.0058	16	8.8
Toluene	<2.2R	0.3	<0.005	<1.2	<0.0058	45	24
Ethylbenzene	38J	1.7	<0.005	47	<0.0058	23	<6.1
Total Xylene	170J	7.6	<0.005	120	<0.0058	65	18
Semivolatiles							
Naphthalene	210	0.43	<0.36	6.5	<0.38	2.7	0.89
Fluoranthene	<3.7	<0.39	<0.36	<0.8	<0.38	<0.42	<0.4
Phenanthrene	<3.7	<0.39	<0.36	<0.8	<0.38	<0.42	<0.4
2-Methylnaphthalene	310	0.97	<0.36	9.3	<0.38	3.3	1.9
1-Methylnaphthalene	180	0.57	<0.36	5.8	<0.38	3.0	1.3
Pyrene	<3.7	<0.39	<0.36	<0.8	<0.38	<0.42	<0.4

Notes:
Results are on dry weight basis.
Results are reported in milligram per kilogram (mg/kg).
TPH = Total petroleum hydrocarbons
NA = Not analyzed
J = Estimated value—one or more QC parameters were outside control limits.
R = Unusable data—one or more QC parameters grossly exceeded control limits.



Concentrations of TPH in Soil
Above the Action Level of 100 mg/kg*
Depth Interval: 0–20 feet

Location	TPH Concentration (mg/kg)									
Depth(ft)	0–2	2–4	4–6	6–8	8–10	10–12	11–13	12–14	13–15	16–18
SB02				260	360					
SB03				100						
SB04				1,600	110					
SB04D					920					
SB12			5,600							
SB13	120				750					
MW22				180				190		
MW23		400				180				
MW24				170						
MW25								230		
MW26					2,000					
MW28						490				
MW29			1,600							
RW01			4,000							130
RW02				3,800						
RW03							450		140	

* In some cases, soil samples were obtained from other intervals at each location,with results indicating TPH concentrations below 100 mg/kg. See Table 3–2 for complete soil analytical data.

LEGEND

- MW02 — MONITORING WELL LOCATION
- RW13 — RECOVERY WELL LOCATION
- MW21 — NEW 2–INCH DIAMETER WELL LOCATION
- RW02 — NEW 4–INCH DIAMETER WELL LOCATION
- SB01 — SOIL BORING LOCATION
- RAILROAD
- CONCRETE/ASPHALT
- BUILDING
- UNDERGROUND STORAGE TANK
- TPH ISOPLETH (mg/kg) DEPTH INTERVAL 0–10 FEET
- TPH ISOPLETH (mg/kg) DEPTH INTERVAL 10–20 FEET

100 0 100
SCALE FEET

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3–11
EXTENT OF TPH CONTAMINATION IN SOIL

DWG DATE:5/24/95 | DWG NAME:CTO1021J

BTEX

Of the BTEX compounds analyzed, laboratory results indicate only one compound (benzene) was detected above the TNRCC action level. Benzene was detected in 13 of 59 soil samples analyzed in concentrations above the TNRCC action level of 0.5 mg/kg (see Table 3-2). Figure 3-12 displays the areal extent of benzene concentrations in soil. As shown in Figure 3-12, the benzene concentrations above TNRCC action levels, in soils less than 10 feet deep, extends from the east-central portion of the tank farm to east of the tank farm. Benzene concentrations above action levels in the interval 10 to 20 feet bgs are apparently confined to an area beneath the concrete slab near RW03 (Figure 3-12).

As with the TPH results, concentrations of benzene above TNRCC action levels generally coincided with the area in which free-product has been observed. The highest benzene result (70.0 mg/kg) was in the sample collected from the 6- to 8-foot interval in boring SB04. The level of contamination decreased significantly with depth, as seen in Table 3-2.

PAHs

Laboratory results indicate elevated PAH concentrations are present in 28 of 59 soil samples analyzed (see Table 3-2). The most common PAH compounds in the soil samples include naphthalene, 2-methylnaphthalene, and 1-methylnaphthalene. Other PAH compounds present include phenanthrene (seven samples), fluoranthene (four samples), and pyrene (three samples). These PAH compounds are related constituents of petroleum products stored at Fuel Farm 216.

PAH compounds were present across the site, including Fuel Farm 216 tank area, Tank Nest 162, and the area beneath the concrete slab. In general, PAH concentrations decreased with increasing depth. The highest PAH compound values were 21 mg/kg for naphthalene, 31 mg/kg for 2-methylnaphthalene, and 18 mg/kg for 1-methylnaphthalene in the 8 to 10 foot interval at boring RW01.

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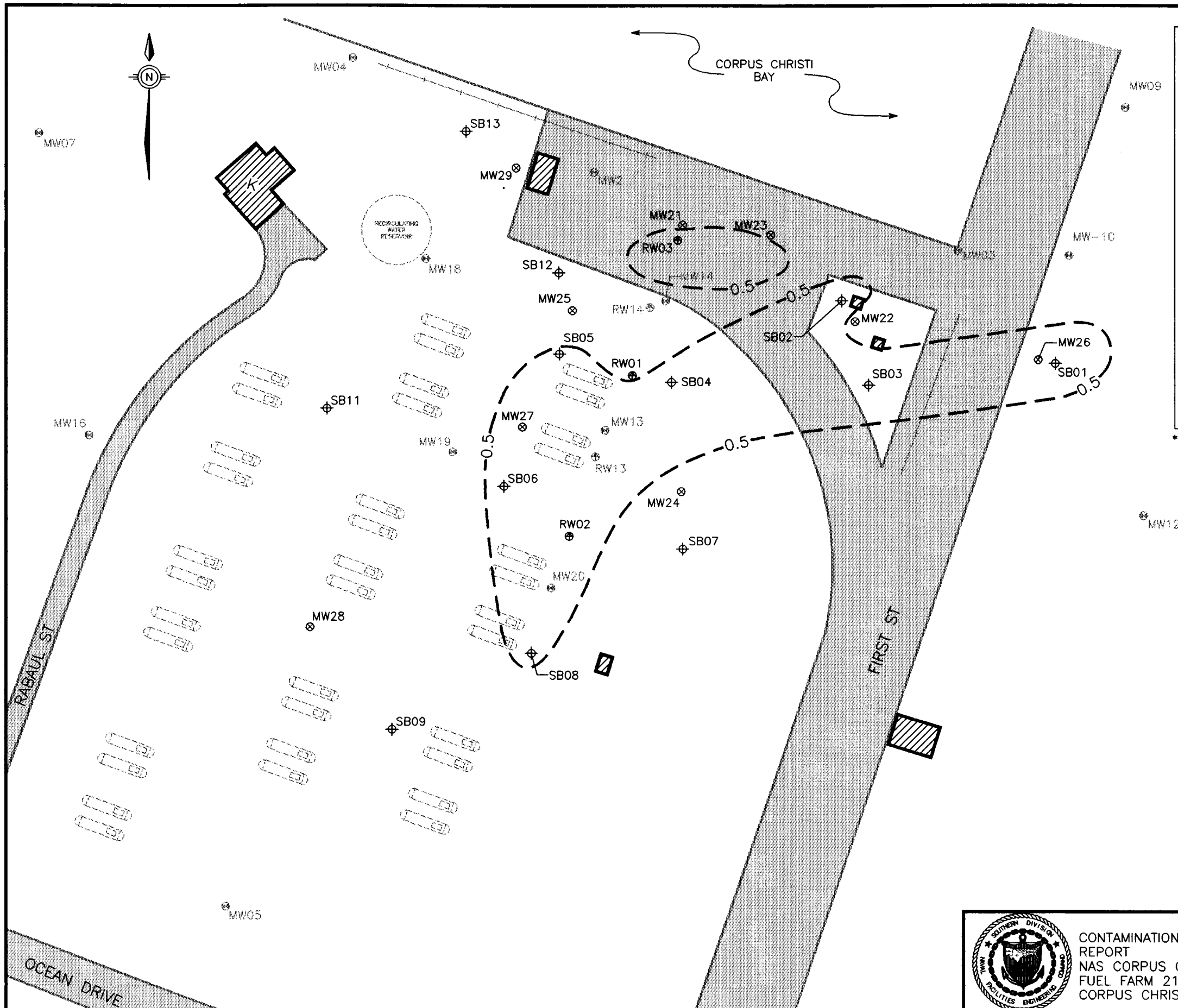

Concentrations of Benzene in Soil Above the Action Level of 0.5 mg/kg* Depth Interval: 0–20 feet						
Location	Benzene Concentration (mg/kg)					
Depth (ft)	2–4	4–6	6–8	8–10	11–13	13–15
SB01			15.0			
SB02			6.4	10.0		
SB03			16.0	6.1		
SB04			70.0	4.0		
SB04D				5.2		
SB05				0.53		
SB06				4.7		
SB08				2.2		
SB12		<0.58				
SB13		<2.4				
MW23	<0.625					
MW26				2.5		
MW29		<1.1				
RW01		<2.2				
RW02				5.1		
RW03					16.0	8.8

*In some cases, soil samples were obtained from other intervals at each location, with the results indicating benzene concentrations below 0.5 mg/kg. See table 3–2 for complete soil analytical data.

LEGEND

- MW02 — MONITORING WELL LOCATION
- RW13 — RECOVERY WELL LOCATION
- MW21 — NEW 2–INCH DIAMETER WELL LOCATION
- RW02 — NEW 4–INCH DIAMETER WELL LOCATION
- SB01 — SOIL BORING LOCATION
- RAILROAD
- CONCRETE/ASPHALT
- BUILDING
- UNDERGROUND STORAGE TANK
- BENZENE ISOPLETH (mg/kg) DEPTH INTERVAL 0–10 FEET
- BENZENE ISOPLETH (mg/kg) DEPTH INTERVAL 10–20 FEET

100 0 100
SCALE FEET

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3–12
EXTENT OF BENZENE CONTAMINATION IN SOIL

DWG DATE:5/24/95 | DWG NAME:CTO1021K

3.4 Groundwater Assessment

The groundwater assessment was separated into two distinct activities. Prior to installation of any soil borings or additional monitoring wells, the 15 existing wells were sampled to assess groundwater quality. Secondly, to further evaluate the extent of free-product floating above the groundwater, 12 additional monitoring wells were installed. After installation of the new wells, the amount of free-product present in all site wells was measured. No groundwater samples were collected from the 12 wells installed as it was not within the scope of this investigation. The following sections describe groundwater assessment activities. Free-product assessment activities are discussed in Section 3.5.

3.4.1 Groundwater Sampling Procedures

Initially, groundwater samples were collected from 11 of the 15 original site wells. Two of the four wells (MW14 and MW20) were not sampled as they contained a measurable thickness of hydrocarbons (free-product). Two other wells (MW02 and MW13) exhibited a pronounced hydrocarbon sheen and thus, were not sampled. Groundwater samples were collected in accordance with NEESA 20.2-031A, Chapter 7—Groundwater Sampling, in order to obtain groundwater samples representative of the groundwater conditions in the undisturbed formation.

At each of the 15 wells, a water level measurement was recorded using an electronic oil/water interface probe (see Table 3-1). Where free-product was encountered, the well was not sampled. After the water level was measured, each well was purged of groundwater using a dedicated, disposable Teflon bailer. Monitoring wells MW05, MW16, and MW18 were purged using a peristaltic pump and dedicated tubing due to the inability of passing a 1.5-inch diameter bailer through the length of the well casing.

At least three casing volumes were extracted from each well as part of the purging process. Field parameters consisting of pH, specific conductance, and temperature were measured after collection of each well casing volume. If the difference in field parameter measurements for pH,

specific conductance, or temperature was greater than 0.1 units, 10%, or 0.1°F, respectively, purging continued until the measurements met these limits of variation.

Following purging at each well, a groundwater sample was collected using a dedicated, disposable Teflon bailer (except for MW05 and MW16, which were sampled using the peristaltic pump). Groundwater was transferred directly from the bailer into laboratory-prepared glass containers, properly labeled, and immediately placed on ice, pending delivery to the analytical laboratory. Each monitoring well was sampled for USEPA SW-846 Methods 8020/5030 (BTEX), 418.1 (TPH), 8270 (semivolatiles), and 160.1 (TDS). An MS/MSD, field blank, rinsate blank, and duplicate groundwater sample were collected in the field and a trip blank accompanied each volatile sample kit during the 3-day sampling event. Groundwater samples collected for laboratory analysis were placed on ice and shipped using an overnight courier and strict chain-of-custody procedures to Savannah Laboratories.

3.4.2 Groundwater Analytical Results

Groundwater analytical results are summarized in Table 3-3 and shown on Figure 3-13. Data sheets from the analytical laboratory are included in Appendix D. Groundwater cleanup goals for this site have not been established at this time.

Three wells, MW03, MW18, and MW19 contained BTEX and/or TPH constituents. Two of these wells also contained several PAH compounds including 2-Methylnaphthalene (MW19), N-Nitrosodi-N-Propylamine (MW19) and Naphthalene (MW18 and MW19). Phenol was detected in wells MW05, MW16 and MW18. Although not a common constituent of AVGAS or jet fuel, it is associated with petroleum products.

Table 3-3
March 1995 Groundwater Sampling Results

					Volatiles				Semivolatiles			
Well No.	Well ID.	Date	TDS	TPH	Benzene	Toluene	Ethyl-benzene	Xylenes	2-Methyl-naphthalene	Phenol	N-Nitrosodi-N-Propylamine	Naphthalene
MW3	216GMW0301	3-14-95	1,300	8.0	5.4	2.2	<1.0	<1.0	<10	<10	<10	<10
MW4	216GMW0401	3-14-95	10,000	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW5	216GMW0501	3-15-95	1,000	<1.0	<1.0	<1.0	<1.0	<1.0	<10	57	<10	<10
MW7	216GMW0701	3-14-95	2,900	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW8	216GMW0801	3-13-95	2,100	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW9	216GMW0901	3-14-95	24,000	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW9D	216GMW09D01	3-14-95	22,000	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW10	216GMW1001	3-13-95	350	<1.0	<1.0	<1.0	<1.0	1.5	<10	<10	<10	<10
MW12	216GMW1201	3-13-95	970	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<10	<10	<10
MW16	216GMW1601	3-15-95	5,000	<1.0	<1.0	<1.0	<1.0	<1.0	<10	17	<10	<10
MW18	216GMW1801	3-15-95	1,000	<1.0	130	<2.0	130	3.1	<10	16	<10	27
MW19	216GMW1901	3-15-95	3,600	8.8	2,400	<50	80	<50	69	<20	66	160

Notes:
TPH = Total Petroleum Hydrocarbon
TDS = Total Dissolved Solids
Volatiles and semivolatiles reported in micrograms per liter (μg/L).
TPH and TDS reported in milligrams per liter (mg/L).

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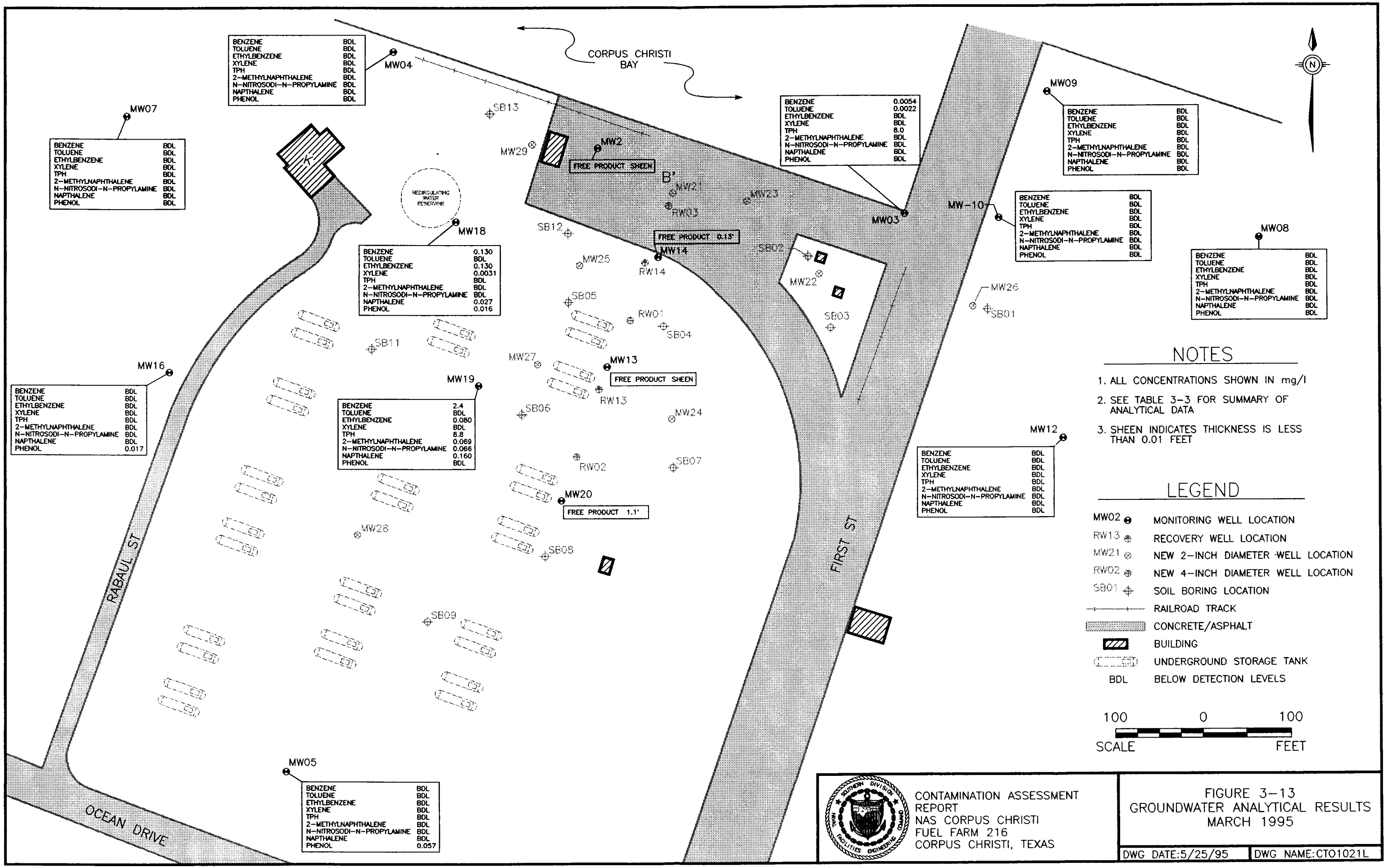

NOTES

1. ALL CONCENTRATIONS SHOWN IN mg/l
2. SEE TABLE 3-3 FOR SUMMARY OF ANALYTICAL DATA
3. SHEEN INDICATES THICKNESS IS LESS THAN 0.01 FEET

LEGEND

MW02	MONITORING WELL LOCATION
RW13	RECOVERY WELL LOCATION
MW21	NEW 2-INCH DIAMETER WELL LOCATION
RW02	NEW 4-INCH DIAMETER WELL LOCATION
SB01	SOIL BORING LOCATION
	RAILROAD TRACK
	CONCRETE/ASPHALT
	BUILDING
	UNDERGROUND STORAGE TANK
BDL	BELOW DETECTION LEVELS

100 0 100
SCALE FEET

CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 3-13
GROUNDWATER ANALYTICAL RESULTS
MARCH 1995

DWG DATE:5/25/95 | DWG NAME:CTO1021L

3.5 Free-Product Assessment

In all, 12 additional groundwater monitoring wells were installed as part of this investigation (Figure 3-4). These wells were installed to further estimate the extent of free-product at the site and thus were screened to intercept and straddle the water table and potential free-product. Several wells were installed in close proximity to the three existing wells which consistently display measurable thicknesses of free-product but are not screened to intercept and straddle the water table. Four wells installed (MW24, MW25, MW27, and MW29) were installed in areas considered beyond the free-product plume to verify the areal extent of the plume.

3.5.1 Well Construction

Well construction log diagrams for the 12 additional wells are included in Appendix E. Nine of the wells (MW21 through MW29) were constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) casing and 0.010 screen. These 2-inch wells were completed at depths between 15.5 and 19 feet bgs. Three wells (RW01, RW02, and RW03) were constructed of 4-inch diameter, Schedule 40 PVC casing and 0.010 screen and completed to depths between 14 and 17.5 feet bgs. Wells were constructed through the annulus of the hollow-stem augers. A screen length of 15 feet was used in all 2-inch monitoring wells except MW28, where a 10-foot screen was used. Screen lengths of 15 feet were used to construct 4-inch diameter wells RW01 and RW2, while the screen used for RW03 was 10 feet long.

The annular space surrounding the monitoring well pipe and the borehole was filled with a 20/40 silica sand pack from the bottom of the borehole to at least 1 foot above the screened interval. A bentonite seal, at least 1 foot thick, was placed above each sandpack. The seal consisted of 0.5-inch diameter bentonite pellets which were hydrated with approximately 2 gallons of potable water and allowed to hydrate a minimum of eight hours before the remaining borehole annulus was grouted to the surface. A cement-bentonite grout was emplaced in the annular space from the bentonite seal to the ground surface.

Watertight, locking expansion caps were placed over each well casing. All monitoring wells were completed with 2-foot steel protective casings. Monitoring well completion data are presented in Table 3-4 and well construction details are provided in Appendix E.

Table 3-4
Well Completion Data

Monitoring Well Identification	Total Depth (feet BTOC)	Well Diameter (inches)	Screened Interval (feet BTOC)	Measuring Point Elevation (feet above msl)
MW21	17.40	2	2.00 - 17.40	11.31
MW22	17.60	2	2.10 - 17.60	13.49
MW23	19.90	2	4.40 - 19.90	11.01
MW24	19.41	2	3.91 - 19.91	14.32
MW25	20.20	2	4.70 - 20.20	13.72
MW26	18.90	2	3.40 - 18.90	13.51
MW27	20.35	2	4.85 - 20.35	13.54
MW28	16.79	2	6.29 - 16.79	13.74
MW29	19.06	2	3.56 - 19.06	10.73
RW01	19.99	4	4.49 - 19.99	14.16
RW02	19.98	4	4.48 - 19.98	14.21
RW03	16.19	4	5.69 - 16.19	11.21

Notes:
BTOC - Below top of casing
Total depth measurement includes 0.5-foot PVC endcap.

The 12 newly installed monitoring wells (and the 12 soil borings) were surveyed to establish their locations and the elevations of the protective and inner well casings. Horizontal control was tied to the North American Datum of 1983 and elevations were measured above mean sea level (msl) according to National Geodesic Survey benchmarks and referenced to the North American Vertical Datum of 1988. Elevations were measured to the nearest 0.01 foot. Surveying was completed by Naismith Engineering, Inc., of Corpus Christi, Texas, a State of Texas Registered Land Surveyor (surveyor's map included in Appendix E).

3.5.2 Monitoring Well Development

After installation, the 12 wells were developed using a disposable polyethylene bailer to extract groundwater from each well until the purged water was clear. The well was repeatedly surged with the bailer during development by repeatedly forcing the bailer full of groundwater up and down across the screened interval. This surging action created alternating compression and vacuum in the well, loosening particles bridged in the sand pack and well screen until eventual evacuation produced by continued bailing. Purge water was placed in labeled 55-gallon drums and stored at a designated area onsite. During well development, a distinct hydrocarbon sheen was noted in MW21, MW26, and RW3.

3.5.3 Free-Product Survey

Depth to free-product and/or water was measured in each well by E/A&H personnel on May 5, 1995 using an electronic oil/water interface probe. Wells having the least potential to contain free-product were measured first with the survey proceeding to those wells with greater potential to contain free-product. Product thicknesses ranged from 0 feet (no detection or unmeasurable sheen) in most of the wells at the site to 1.2 feet in MW21. Table 3-5 lists the monitoring wells with a measurable thickness of free-product on May 5, 1995. The extent of free-product, based on the data in Table 3-5, is shown in Figure 3-14.

Table 3-5
Measured Hydrocarbon Thickness in Monitoring Wells

Monitoring Well Identification	Product Thickness (ft)
MW14	0.21
MW18	0.01
MW20	Sheen*
MW21	1.2
MW22	0.21
MW25	Sheen*
MW26	0.69
RW02	0.01
RW03	0.05

Notes:
Sheen* = Product thickness estimated to be less than 0.01 feet, based on instrument.

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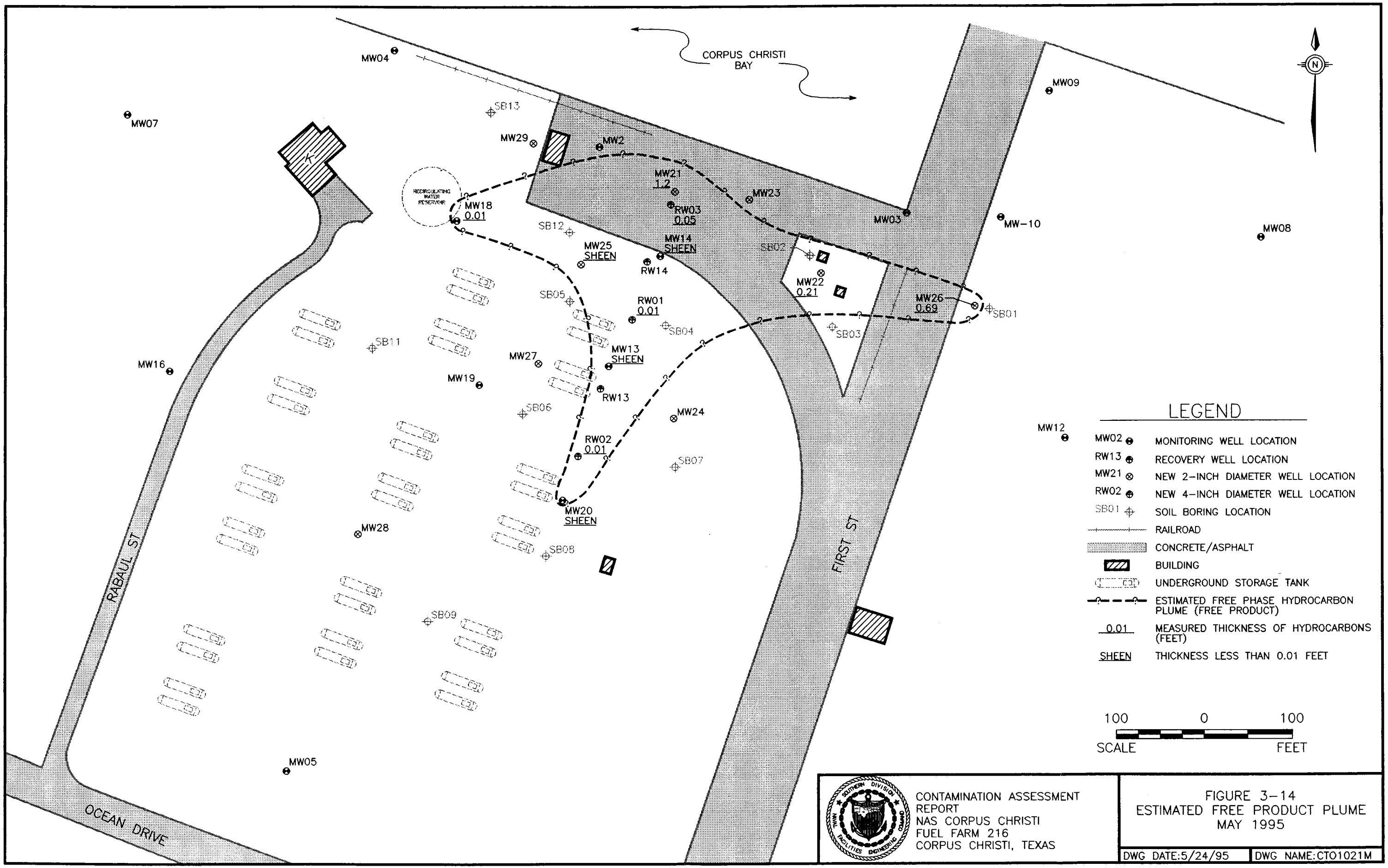
CORPUS CHRISTI BAY
N
MW04
MW07
MW09
MW08
MW-10
MW03
SB13
MW29
MW2
MW21
1.2
MW23
RW03
0.05
MW18
0.01
SB12
MW14
SHEEN
MW25
SHEEN
RW14
SB02
MW22
0.21
MW26
0.69
SB01
SB03
SB05
RW01
0.01
SB04
SB11
MW13
SHEEN
MW27
MW16
MW19
RW13
SB06
MW24
MW12
RW02
0.01
SB07
MW20
SHEEN
MW28
SB08
SB09
MW05
RABAUL ST
FIRST ST
OCEAN DRIVE
LEGEND
MW02 MONITORING WELL LOCATION
RW13 RECOVERY WELL LOCATION
MW21 NEW 2-INCH DIAMETER WELL LOCATION
RW02 NEW 4-INCH DIAMETER WELL LOCATION
SB01 SOIL BORING LOCATION
RAILROAD
CONCRETE/ASPHALT
BUILDING
UNDERGROUND STORAGE TANK
ESTIMATED FREE PHASE HYDROCARBON PLUME (FREE PRODUCT)
0.01 MEASURED THICKNESS OF HYDROCARBONS (FEET)
SHEEN THICKNESS LESS THAN 0.01 FEET
100 0 100
SCALE FEET
CONTAMINATION ASSESSMENT REPORT
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS
FIGURE 3-14
ESTIMATED FREE PRODUCT PLUME
MAY 1995
DWG DATE:5/24/95
DWG NAME:CTO1021M

Since at least 1994 NAS Corpus Christi environmental personnel have observed and recorded the presence and thickness of free-product in the monitoring wells across the site. Only monitoring wells MW13, MW14 and MW20 have exhibited free-product. Thickness of free-product in these wells has varied from zero to several feet.

Measurable amounts of free-product have been removed using a bailer or portable pump and collected at an accumulation point before removal offsite. In conjunction with this investigation, NAS Corpus Christi personnel have continued to monitor the presence of free-product in all site wells, including those recently installed. Wells MW14, MW21, MW22, MW26, and RW03 have exhibited quantities of free-product greater than those shown on Figure 3-14. In particular, MW21 and MW26 have contained free-product measuring more than 1 foot each. Measurable amounts of free-product continue to be removed from wells such as MW21 and MW26 weekly. The variations in product thickness at each well can be attributed to the recharge rate in the substrate (governed by porosity and permeability variations), and groundwater fluctuations.

NAS environmental personnel have observed that free-product in MW26 (and when present in MW20) is a dark gold color. Free-product in other wells across the site appears as light yellow. The color difference of the free-product is apparently related to the free-product plume being a mixture of different types of hydrocarbon fuels as discussed in Section 3.1.2.

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4.0 WASTE MANAGEMENT AND DISPOSITION

All waste generated onsite as a part of this investigation was containerized in 55-gallon drums with removable lids. Wastes generated include soil cuttings, purged groundwater, decontamination water, and used PPE. These drums were labeled according to type of waste, where it was generated, and the date of generation. All drums were stored onsite in a designated area in anticipation of offsite disposal.

Two composite soil samples and one composite water sample were collected from the waste drums at the conclusion of sampling activities. These samples were collected in laboratory prepared jars, labelled, packed on ice and sent to Savannah Laboratories for the following analyses: BTEX (8020), TPH (418.1), PAH (8270), TOX (9020), RCRA Metals (6010, 7060, 7421, 7740, 7470), Ignitability (ASTM D4982-89), cyanide (SW-846 Sec. 3), sulfide (SW846 Sec. 3), pH (150.1), and moisture content. Copies of the analytical data sheets for these composite samples are included in Appendix F.

Chemical Waste Management was contracted by NAS Corpus Christi to provide transportation and final disposal for the waste stored in drums. In all, the following were removed from the site through coordination with Chemical Waste Management's Baytown, Texas, facility: 20 drums of soil, 21 drums of water (purge and decontamination), 1 drum of soil sample jars not sent to the laboratory, and 6 drums of plastic and other contaminated equipment such as gloves, plastic sheeting, and plastic bags. A copy of the Uniform Hazardous Waste Manifest, signed by the Activity Environmental Coordinator, is included in Appendix F.

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5.0 CONCLUSIONS

The following conclusions are based upon field observations and analytical results from the assessment completed at the Fuel Farm 216 and Tank Nest 162 sites:

- Free-product appears to be localized to a T-shaped pattern, extending from south of the seawall to MW20, and then toward MW26. The product appears as two different colors, suggesting two types of fuel.

- Groundwater under the site appears to move westerly. The elevation and the groundwater mound at the intersection of the seawall and the pier indicate that groundwater beneath the site is apparently responding to a possible change of stratigraphy and/or the impervious nature of the seawall/pier interface.

- Soil contamination is present at the site. TPH concentrations greater than 100 mg/kg and benzene concentrations greater than 0.5 mg/kg were indicated in the general area where free-product was observed.

- Detectable amounts of BTEX, TPH, and several PAHs were present in the groundwater. This contamination is consistent with petroleum products and does not appear to be widespread in a dissolved-phase across broad areas of the site.

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6.0 RECOMMENDATIONS

E/A&H recommends:

- Prepare a remedial action plan (RAP) to address alternative methods for removing free-product from the subsurface. Subsequent to discussions with the TNRCC and possibly a risk assessment, if necessary, amend the RAP to include a plan for soil remediation activities.

- Monitor all wells not containing measurable thicknesses of free-product quarterly for one year to ascertain the full extent of the dissolved hydrocarbon plume. Following this evaluation, amend the RAP to include a plan for groundwater remediation activities, if necessary.

- Continue weekly free-product removal from monitoring wells containing measurable thicknesses of hydrocarbons. Continue to report monthly quantities of free-product and groundwater removed quarterly to the Texas Natural Resource Conservation Commission.

These recommendations are based upon:

- The presence of measurable thicknesses of free-product, up to 1.2 feet thick, in several wells at the site.

- Analytical results indicating soil TPH and benzene concentrations exceed applicable action level standards.

- Lack of historic groundwater monitoring results to determine the extent of the dissolved-phase hydrocarbon plume and fluctuations based upon seasonal variations in groundwater.

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7.0 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Savannah Laboratories was retained for the analytical work associated with this project. Sixty-three soil samples and 11 groundwater samples were collected and analyzed during the assessment for the following parameters in accordance with the Navy Energy and Environmental Support Activity (NEESA) Level B QC guidelines:

- TPH by *USEPA Methods for Chemical Analysis of Water and Wastes*, Method 418.1.
- BTEX in accordance with *USEPA Office of Solid Waste and Emergency Response, SW-846 Test Methods for Evaluating Solid Waste, 3rd Edition*, Method 8020.
- Semivolatile organic compounds by *USEPA SW-846*, Method 8270.

Nine soil samples were also analyzed for the following parameters using NEESA Level B QC guidelines:

- TPH in accordance with *USEPA Office of Solid Waste and Emergency Response, SW-846 Test Methods for Evaluating Solid Waste, 3rd Edition (USEPA SW-846)*, modified Method 8015.

In addition, 11 water samples were analyzed for TDS by *USEPA Methods for Chemical Analysis of Water and Wastes*, Method 160.1.

Data Quality and Validation

The analytical data were reviewed and validated independent of the analytical laboratory by the E/A&H project QA/QC manager. Data validation was conducted according to guidelines from *NEESA, Port Hueneme, California (June 1988), Sampling and Chemical Analysis Quality*

Assurance Requirements for the Navy Installation and Restoration Program (NEESA 20.2-047B), and The EPA National Functional Guidelines for Organic and Inorganic Data Review.

Samples were analyzed by the laboratory within the specified maximum holding times. Laboratory analytical performance and criteria were found to be acceptable. With minor exceptions, the data validation process found the data to be acceptable and usable for interpretation. Data validation procedures and conclusions regarding data usability are fully discussed in Appendix G.

Sampling Procedures and Laboratory Protocol

The site Quality Assurance Project Plan (QAPP) is also included in Appendix G.

8.0 SAFETY PLAN

All activities at Fuel Farm 216 were in accordance with the site-specific health and safety plan. This plan was designed to assure the safety and the health of the site workers during specific activities, including the invasive tank closure verification, soil boring advancement, installation of groundwater wells, and collection of soil and groundwater samples.

The health and safety plan addresses the potential physical and chemical hazards that might be encountered at the site. The types of equipment required to ensure safe work practices are discussed. This includes personal protective equipment (PPE), air monitoring devices, and decontamination equipment. Emergency contacts and routes are also documented.

Before beginning investigation activities, all workers were required to sign the plan acceptance form, indicating that they had read and agreed to perform all work in accordance with the plan.

A copy of the site-specific health and safety plan is included as Appendix H.

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9.0 REFERENCES

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APPENDIX A

TANK CLOSURE DOCUMENTATION

TANK NEST 162 TANK REMOVAL

DEPARTMENT OF THE NAVY
NAVAL AIR STATION
CORPUS CHRISTI, TEXAS 78419-5000

IN REPLY REFER TO
6280
Code 189
13 JAN 1992

Texas Water Commission
District 12 Field Office
Attn: Mr. David Harvey
4410 Dillon Lane, Suite 47
Corpus Christi, TX 78415-5326

Gentlemen:

This letter is in response to your letter of November 6, 1991, regarding a subsurface hydrocarbon release at Tank Nest 162, (LPST ID No. 100773), at the Naval Air Station, Corpus Christi.

As you know, we removed tanks 162-1 and 162-2 on October 12, 1991. In the removal process, soil contamination was noted around the excavated tank site. The tank site is located on the northeast edge of Fuel Farm 216, an abandoned facility which has had known releases in the past. At the time of the tank removal, it was impossible to determine if the tank site contamination was isolated to tanks 162-1 and 162-2 or if the contamination was associated with the known releases from the adjacent fuel farm. Because of the observed and measured contamination of the backfill and excavation, the TWC inspector gave our tank removal contractor a field directive to replace the backfill into the excavation. We are working with our Southern Division, Naval Facilities Engineering Command to assess the releases from Fuel Farm 216 and will include tanks 162-1 and 162-2 as part of that study. Enclosure (1) contains sampling, analysis, photographs and other documentation of the tank removal effort.

While some of the information you requested will be covered in a subsequent report addressing Fuel Farm 216, we offer the following in response to the requests made in your letter specifically concerning the release at Tank Nest 162:

a. Tanks 162-1 and 162-2 were 10,000 gallon, steel, diesel tanks installed in 1942, and have been out of service since January 1986. While no known leaks were detected from these tanks while they were in service, several tank holes have been noted on the photographs taken during the removal effort. As discussed above, contaminated soil was encountered during the tank excavation; however, it is impossible to determine exact information regarding specific leak incidents.

b. The vertical and horizontal extent of the subsurface contamination was not determined in the removal effort; however, this information will be addressed in the subsequent study. No groundwater contamination was observed at the site during the removal effort.

BOATMAN
3776
jordan
6 Jan 9:

c. Grab samples of soil were taken of the excavated material, bottom of each tank, and all four walls of the excavation. Analytical results of the samples are contained in enclosure (1) and include the applicable analytical procedure. No groundwater samples were collected during the removal effort; however, groundwater samples from other locations on the base indicated total dissolved solids (TDS) vary from 6,000 to 12,000 parts per million (ppm).

d. As previously stated, all excavated material was placed back into the excavation per field directive. Approximately 120 cubic yards of additional clean backfill material was required to replace the volume displaced by the tank. No product or groundwater was recovered. Both tank carcasses were scrapped and a certificate of tank abatement is included in enclosure (1).

e. Maps and drawings are included in enclosure (1) that depict the site location, including buried utilities, structures and roads.

f. Photographs of the excavation effort, stockpiled soils and removed tanks are included in enclosure (1).

g. No remedial activities have been conducted at the immediate site to date.

We will continue to be in telephone contact with you concerning this matter. If you have any questions regarding the information contained in this letter, please contact Ms. Irene Blackledge or Mr. James D. Boatman at (512) 939-3776.

Sincerely,

J. E. BITTLE
Commander, U.S. Navy
Public Works Officer
By direction of
the Commanding Officer

Enclosure:
(1) Tank 162-1 and 162-2 Removal Documentation

Copy to:
Texas Water Commission
Responsible Party Remediation Section
Attn: Mr. Ron Pedde
P.O. Box 13087, Capitol Station
Austin, TX 78711-3087

Blind copy to:
Commanding Officer
Southern Division
Naval Facilities Engineering Command
P.O. Box 10068
Charleston, SC 29417

Commanding Officer
Navy & Environmental Support Activity
(Code 1101/we)
Port Hueneme, CA 93043

NAVAL AIR STATION, CORPUS CHRISTI, TEXAS

CONTRACT N62467-90-C-0701

REMOVE UNDERGROUND STORAGE TANKS

PREPARED FOR:

DEPT. OF THE NAVY, SOUTH TEXAS
NAS CORPUS CHRISTI AND KINGSVILLE, TEXAS
ATTN: RESIDENT OFFICER IN CHARGE OF CONSTRUCTION
BLDG. 19, NAS
CORPUS CHRISTI, TEXAS 78419-5224

Site 162 -
Corpus Christi NAS.

PREPARED BY:

ENVIRONMENTAL RECOVERY, INC.
6912 S. 234TH EAST AVENUE
BROKEN ARROW, OKLAHOMA 74014
918-357-3500

TEXAS WATER COMMISSION
UNDERGROUND STORAGE TANK (UST) CONSTRUCTION NOTIFICATION FORM

This form is provided to assist UST owners in complying with the construction notification requirements of TWC Rules, 31 TAC Chapter 334. The completion and filing of this form within the prescribed time should satisfy these requirements.

1. TYPE OF CONSTRUCTION: (Indicate all that apply.)
   ___ Installation ___ Addition XX Removal ___ Other (Specify) ___
   ___ Replacement ___ Improvement ___ Abandonment

2. FACILITY LOCATION INFORMATION:
   Facility Name: Naval Air Station
   Address/Location:
   County: Nueces City: Corpus Christi
   UST Facility No. (If Known):
   Telephone: 512-939-3776

3. OWNER INFORMATION:
   Owner: Dept of the Navy
   Representative: J. M. Shrewsbury
   Title: LCDR CEC USN OIC of Construction
   Address: Bldg. 19, NAS
   City/State/Zip: Corpus Christi, Tex 78419-52
   Telephone: 713-939-2154

4. UST CONSULTANT INFORMATION:
   Company: Nelson, Nelson & Dean
   Representative: Boyce Bishop
   Address: P.O. Box 429
   City/State/Zip: Broken Arrow, Ok. 74013
   Telephone: 918-251-9848

5. UST CONTRACTOR INFORMATION:
   Company: E.R.I.
   Representative: Lee Newbrough
   Address: P.O. Box 125
   City/State/Zip: Broken Arrow, Ok. 740
   Telephone: 918-258-2004

6. GENERAL DESCRIPTION OF PROPOSED UST ACTIVITY: (Describe all new or replace tanks and other UST system components. Include closure procedures for UST abandonments or removals. Attach information as appropriate.)

   All closure proceedures will adhere to API Recommended Practice 1604 and Tank Closure Without Tears (see attached submittal)

7. SCHEDULE/DATES FOR PROPOSED CONSTRUCTION:
   Planned construction to begin 9-3-91 and conclude 12-3-91 or sooner.

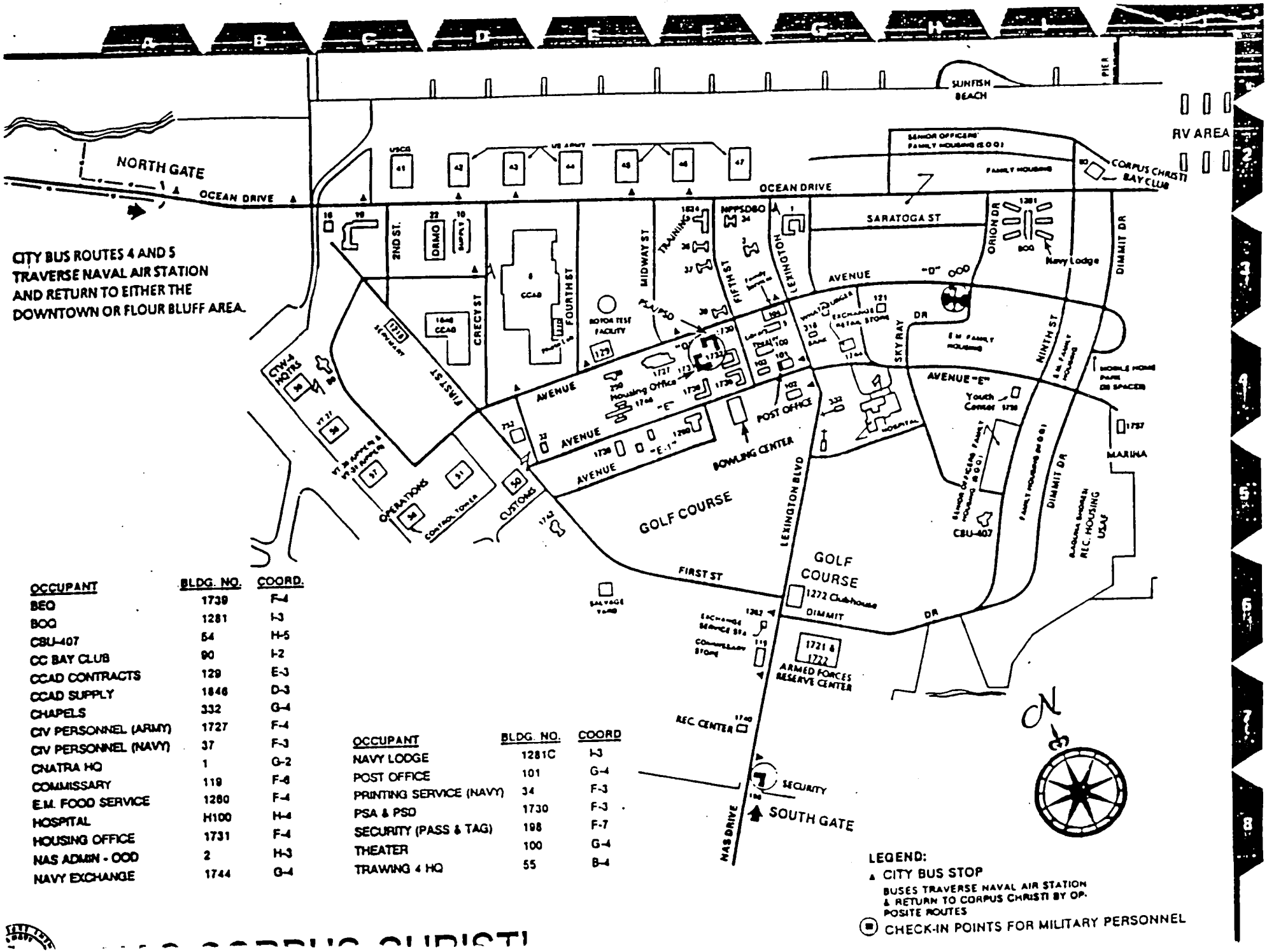
8. SUBMITTED BY: Boyce Bishop DATE: 8-30-91
   Title & Company: President, Nelson, Nelson & Dean

9. MAIL COMPLETED FORM TO:

   Texas Water Commission
   Underground Storage Tank Section
   P.O. Box 13087, Capitol Station
   Austin, Texas 78711-3087

FOR TWC STAFF USE ONLY

Date Rec'd ___ Type Notice: ___
District ___ Dist. Rep. ___
Remarks ___



CITY BUS ROUTES 4 AND 5 TRAVERSE NAVAL AIR STATION AND RETURN TO EITHER THE DOWNTOWN OR FLOUR BLUFF AREA.

OCCUPANT	BLDG. NO.	COORD.
BEQ	1739	F-4
BOQ	1281	I-3
CBU-407	54	H-5
CC BAY CLUB	90	I-2
CCAD CONTRACTS	129	E-3
CCAD SUPPLY	1846	D-3
CHAPELS	332	G-4
CIV PERSONNEL (ARMY)	1727	F-4
CIV PERSONNEL (NAVY)	37	F-3
CNATRA HQ	1	G-2
COMMISSARY	119	F-6
E.M. FOOD SERVICE	1260	F-4
HOSPITAL	H100	H-4
HOUSING OFFICE	1731	F-4
NAS ADMIN - OOD	2	H-3
NAVY EXCHANGE	1744	G-4

OCCUPANT	BLDG. NO.	COORD
NAVY LODGE	1281C	I-3
POST OFFICE	101	G-4
PRINTING SERVICE (NAVY)	34	F-3
PSA & PSD	1730	F-3
SECURITY (PASS & TAG)	198	F-7
THEATER	100	G-4
TRAWING 4 HQ	55	B-4

LEGEND:

▲ CITY BUS STOP

BUSES TRAVERSE NAVAL AIR STATION & RETURN TO CORPUS CHRISTI BY OPPOSITE ROUTES

(■) CHECK-IN POINTS FOR MILITARY PERSONNEL

OK

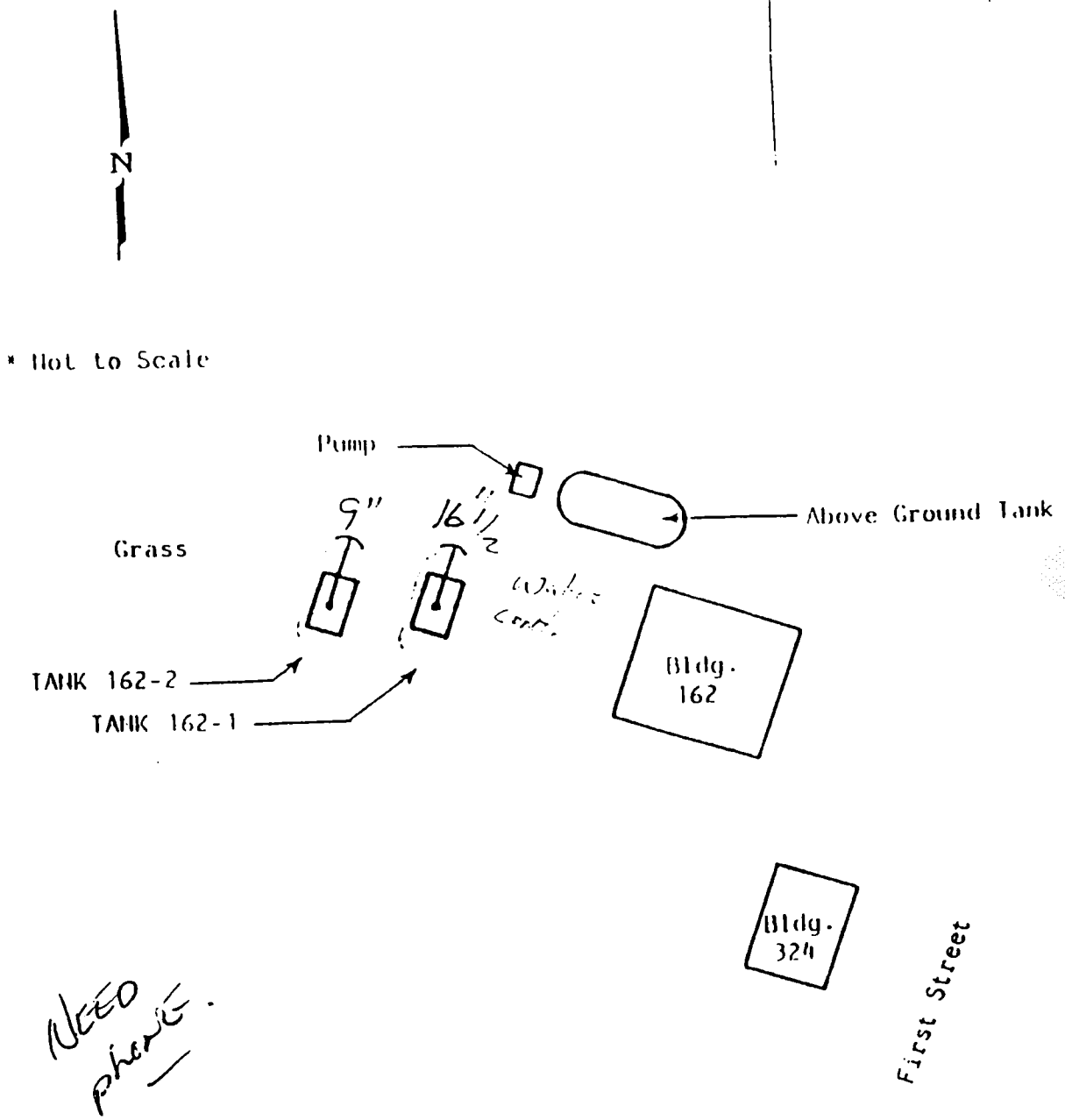
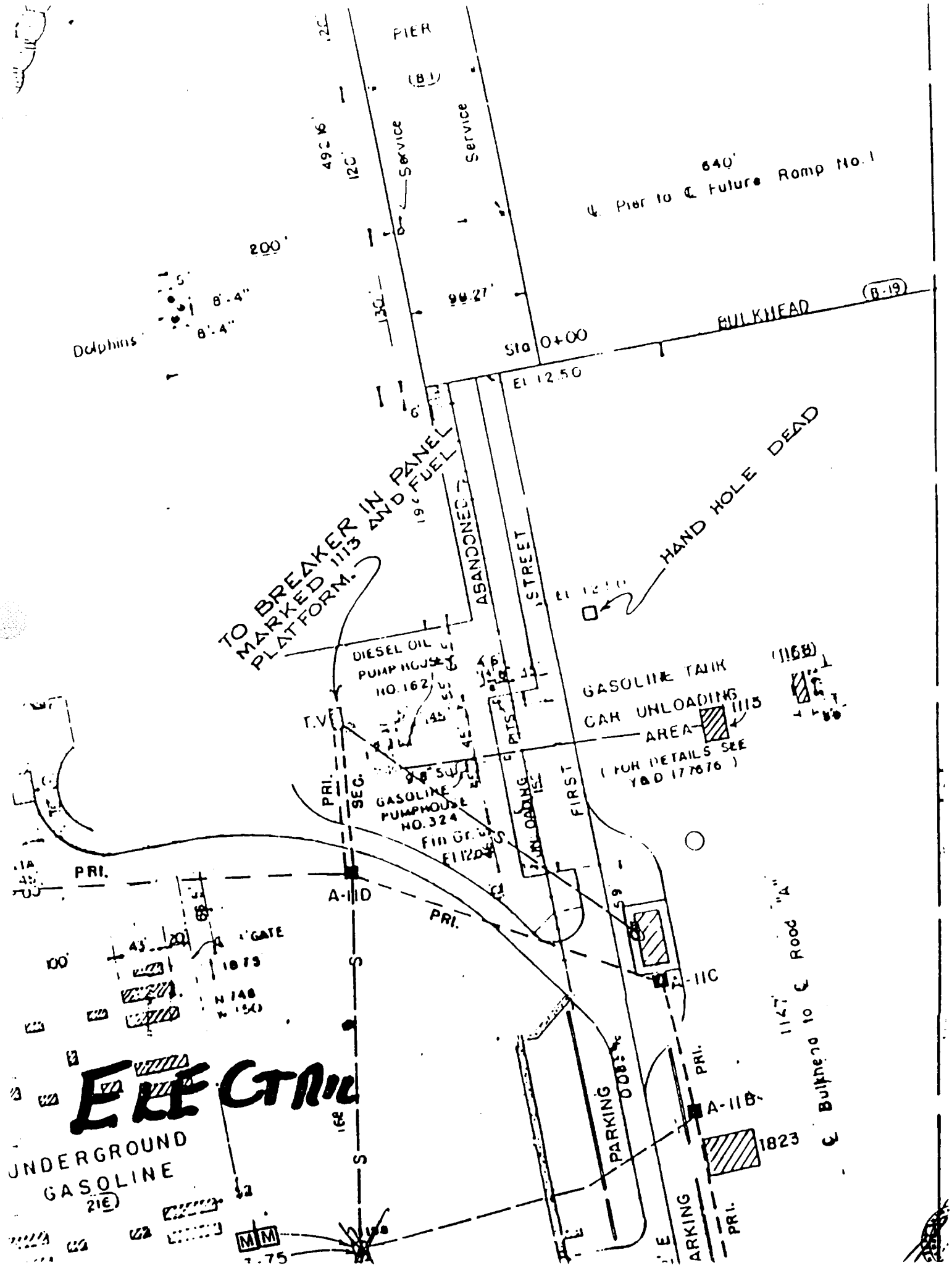
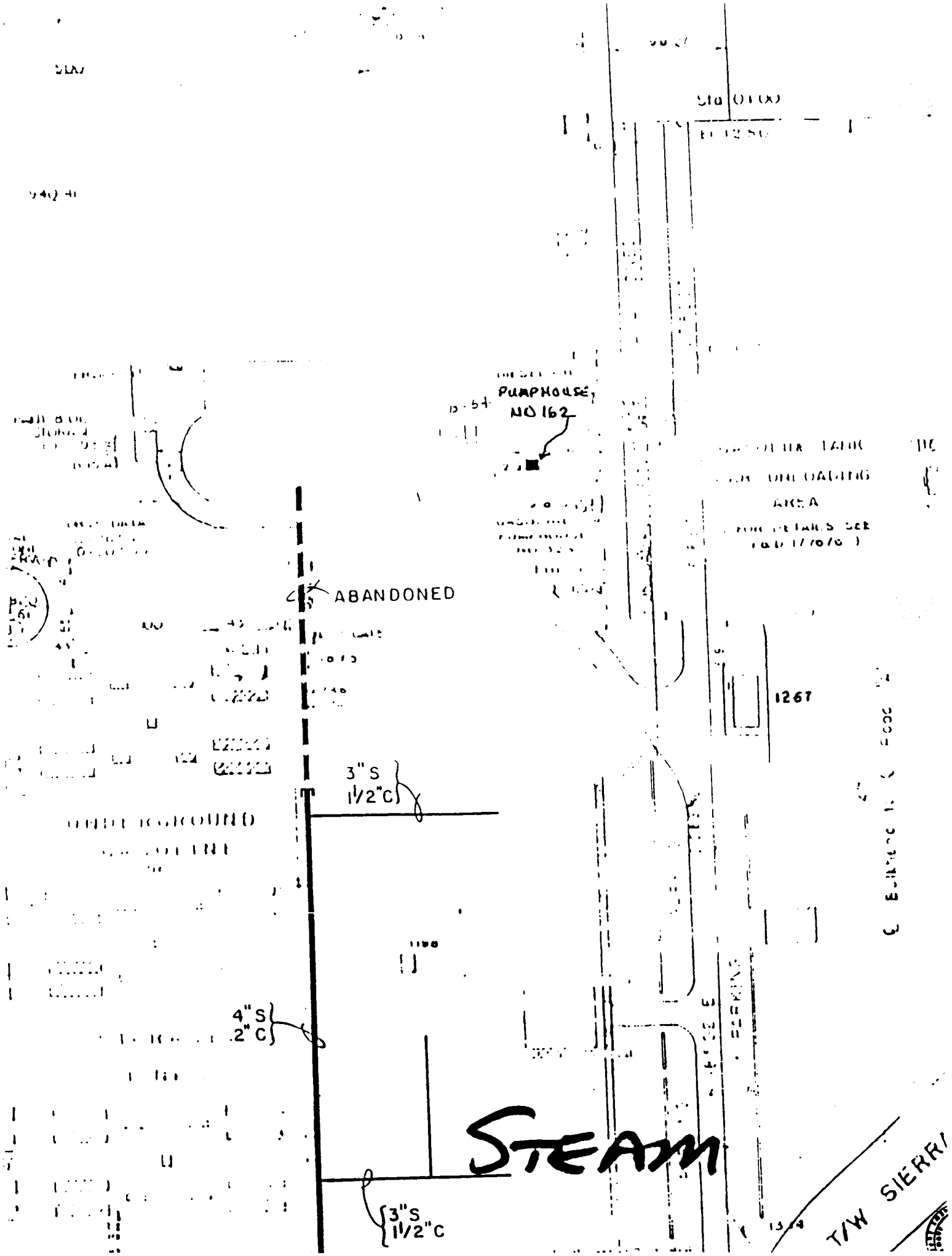
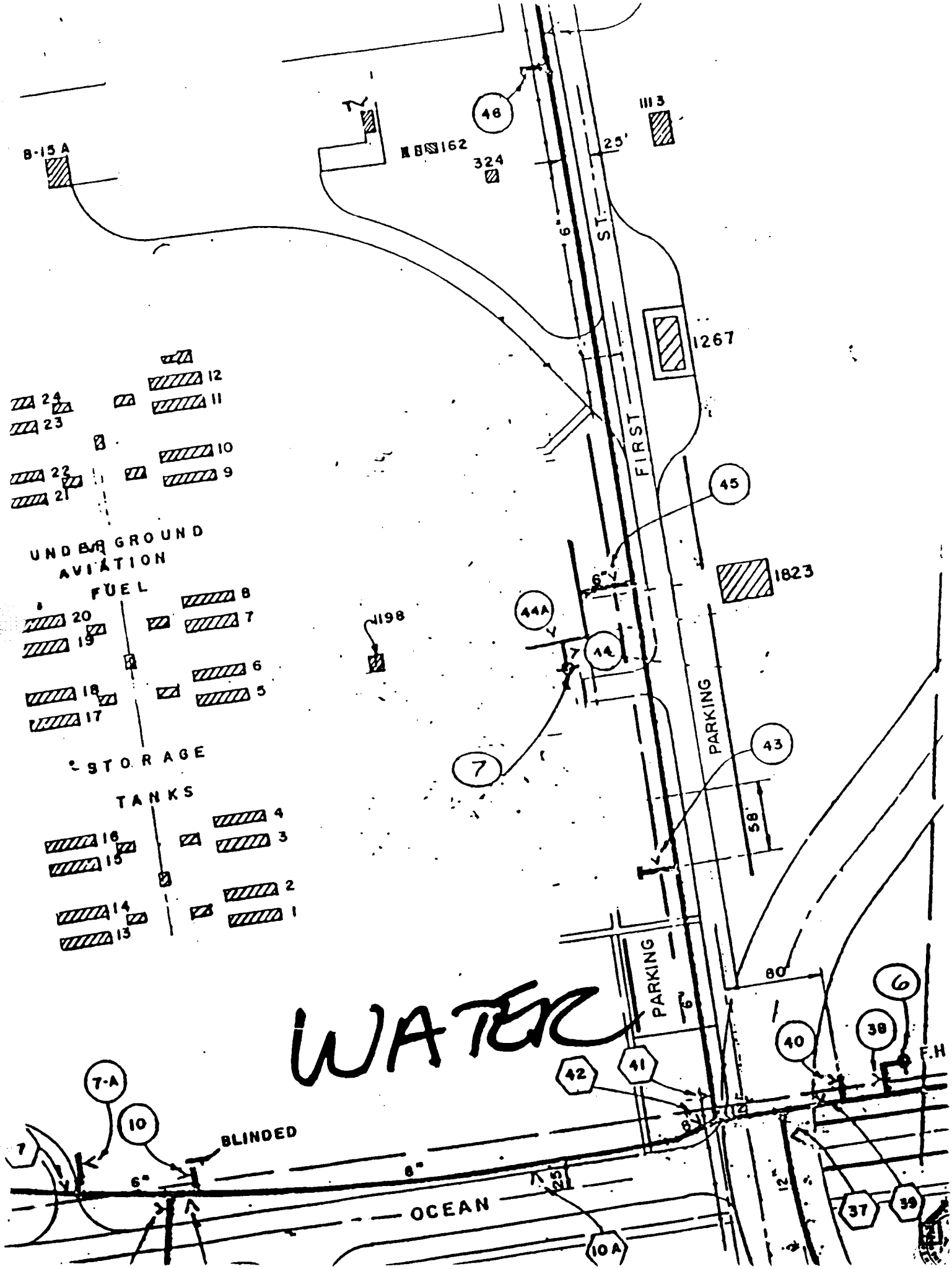


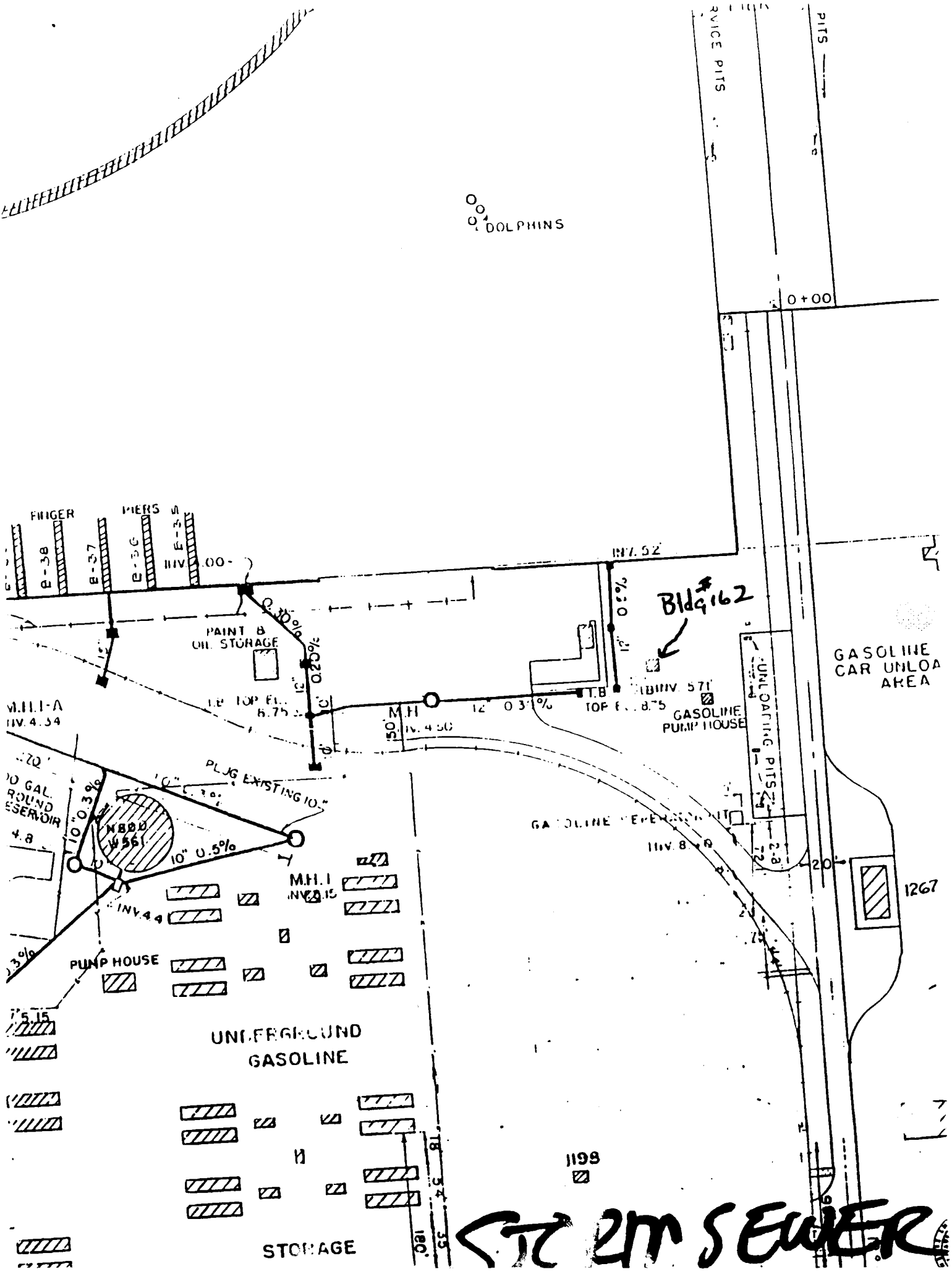
FIGURE 4.1-24. NAS CORPUS CHRISTI — FACILITY 162

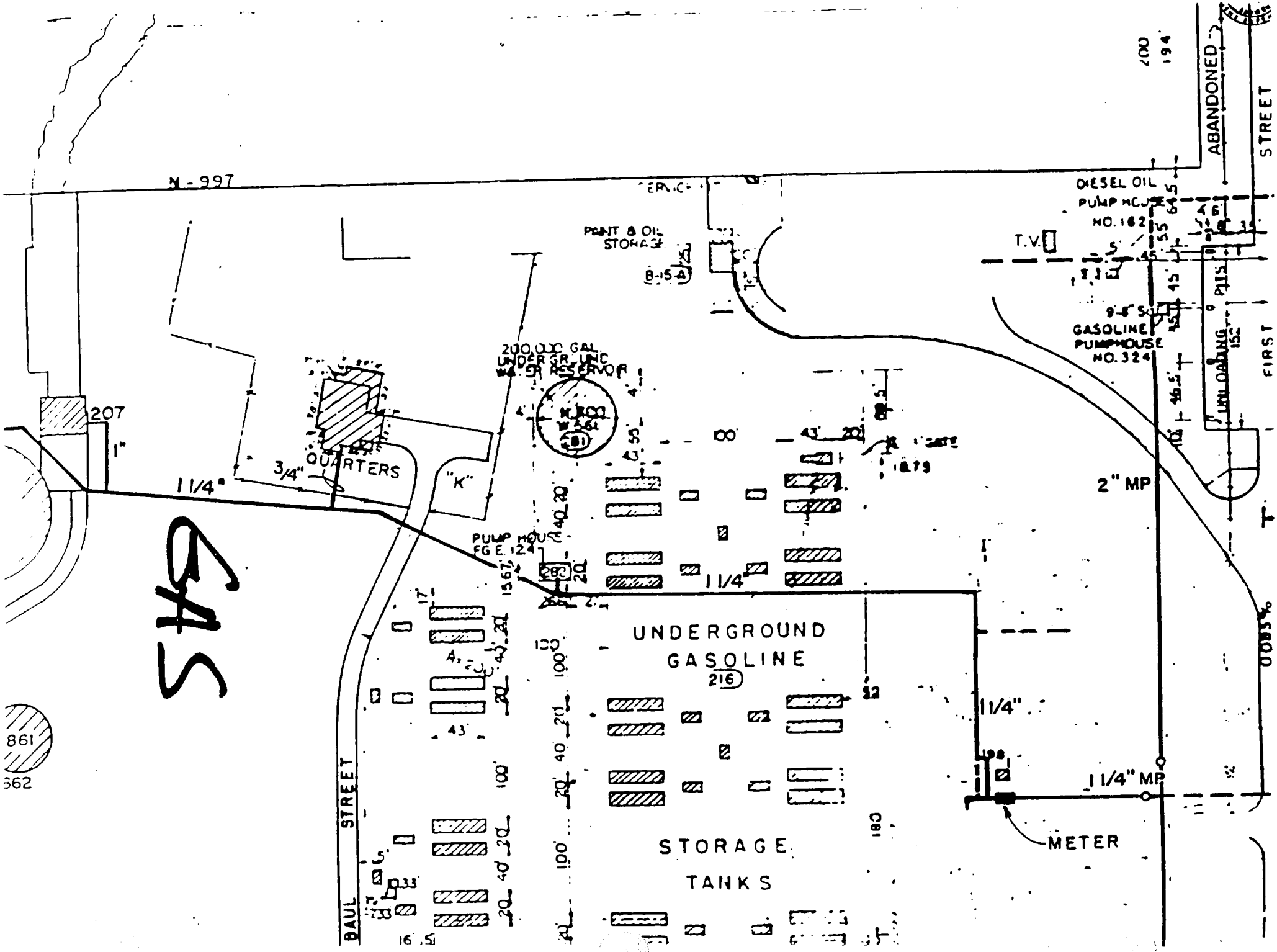

PIER
(B1)
Service
Service
640'
℄ Pier to ℄ Future Ramp No. 1
200'
8'-4"
8'-4"
Dolphins
98.27'
BULKHEAD
(B-19)
Sta 0+00
El 12.50
TO BREAKER IN PANEL MARKED 1113 AND FUEL PLATFORM.
ABANDONED
STREET
HAND HOLE DEAD
DIESEL OIL PUMP HOUSE NO. 162
GASOLINE TANK
(1168)
CAR UNLOADING AREA
1115
(FOR DETAILS SEE Y&D 177676)
T.V.
PRI.
SEC.
GASOLINE PUMPHOUSE NO. 324
FIRST
PRI.
A-11D
PRI.
A-11C
GATE
1875
N 748
PARKING
PRI.
A-11B
1823
℄ Bulkhead to ℄ Road "A"
1147
ELECTRIC
UNDERGROUND GASOLINE
21E
PARKING
PRI.
MM
7.75


PUMPHOUSE
NO 162
ABANDONED
1267
3" S
1½" C
4" S
2" C
3" S
1½" C
STEAM
T/W SIERRA



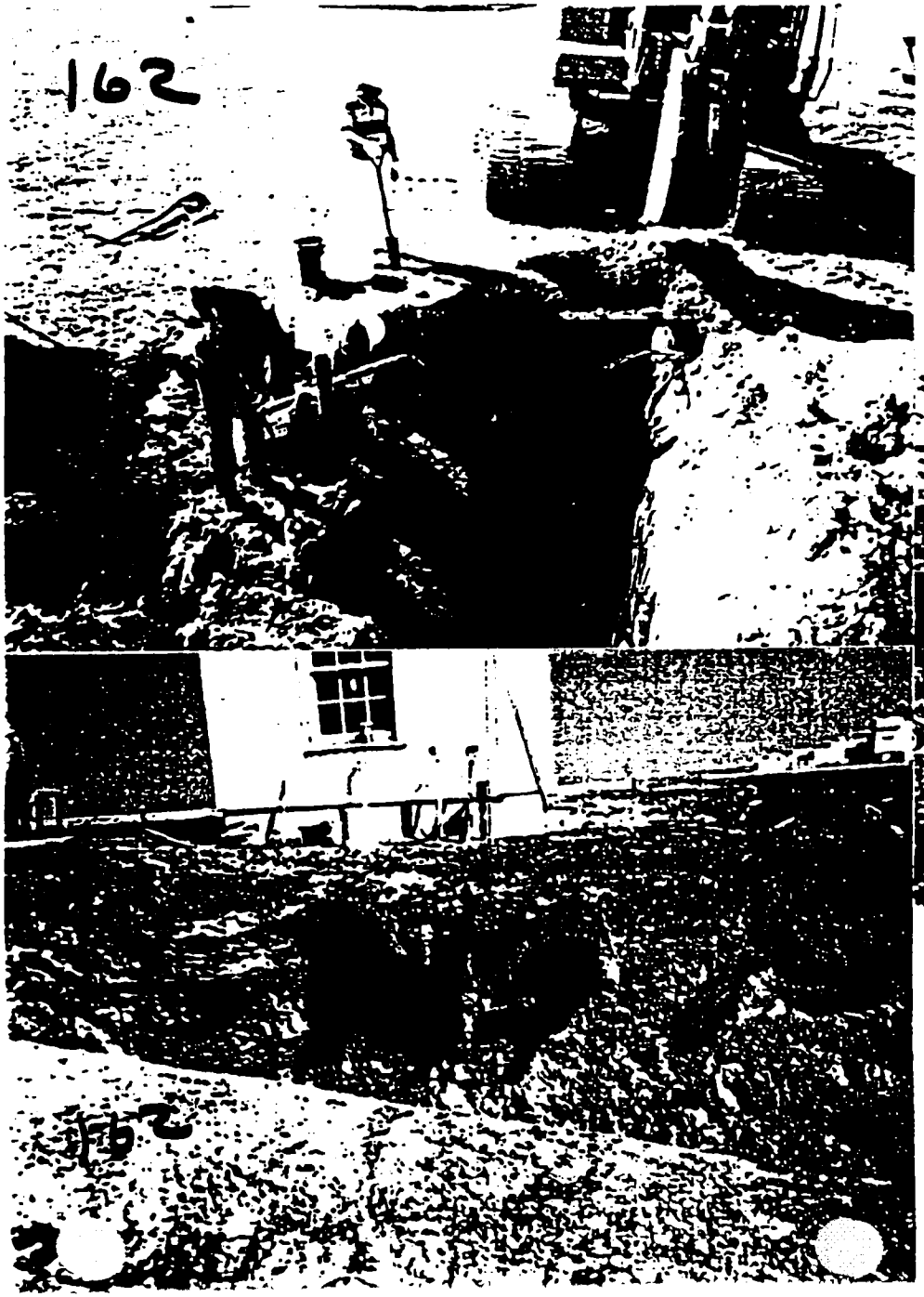
WATER
UNDERGROUND AVIATION FUEL
STORAGE TANKS
FIRST ST.
PARKING
PARKING
OCEAN
BLINDED
F.H
8-15 A
162
324
1113
1267
1823
1198
46
45
44A
44
43
7
7-A
10
10A
6
38
40
41
42
37
39
25'
6"
8"
12"
58'
80'

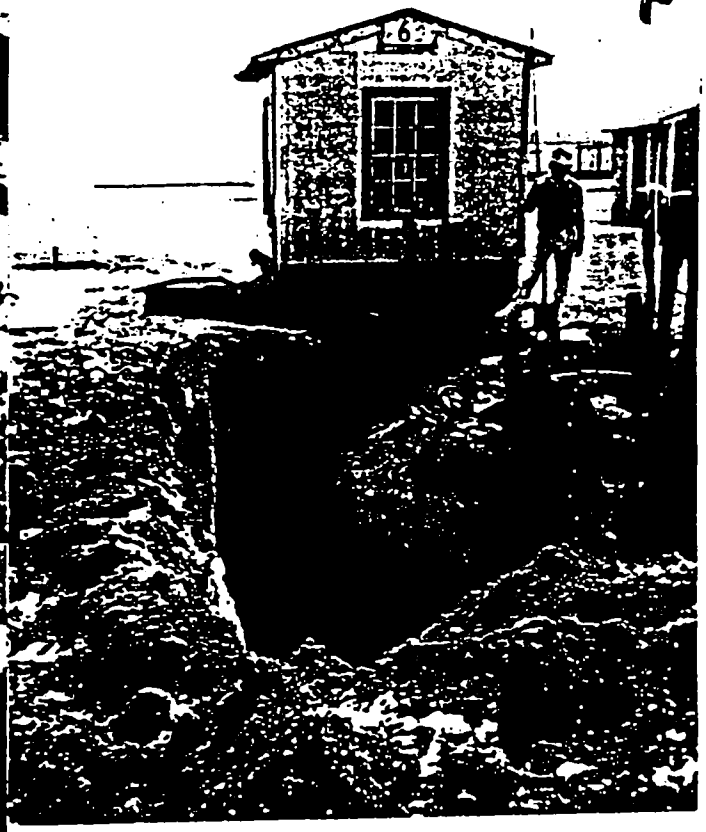

DOLPHINS
0+00
FINGER
PIERS
E-38
E-37
E-36
E-35
PAINT & OIL STORAGE
Bldg 162
GASOLINE CAR UNLOADING AREA
GASOLINE PUMP HOUSE
UNLOADING PITS
PLUG EXISTING 10"
10" 0.5%
PUMP HOUSE
UNDERGROUND GASOLINE
STORAGE
1267
1198
SEWER


N-997
207
1"
1 1/4"
3/4"
QUARTERS
"K"
PAINT & OIL STORAGE
B-15-A
200,000 GAL. UNDER GROUND WATER RESERVOIR
PUMP HOUSE FGE 124
1 1/4"
UNDERGROUND GASOLINE
216
STORAGE TANKS
BAUL STREET
861
362
DIESEL OIL PUMP HOUSE NO. 162
T.V.
GASOLINE PUMPHOUSE NO. 324
ABANDONED
STREET
FIRST
UNLOADING
2" MP
1 1/4"
1 1/4" MP
METER
545

SITE 162

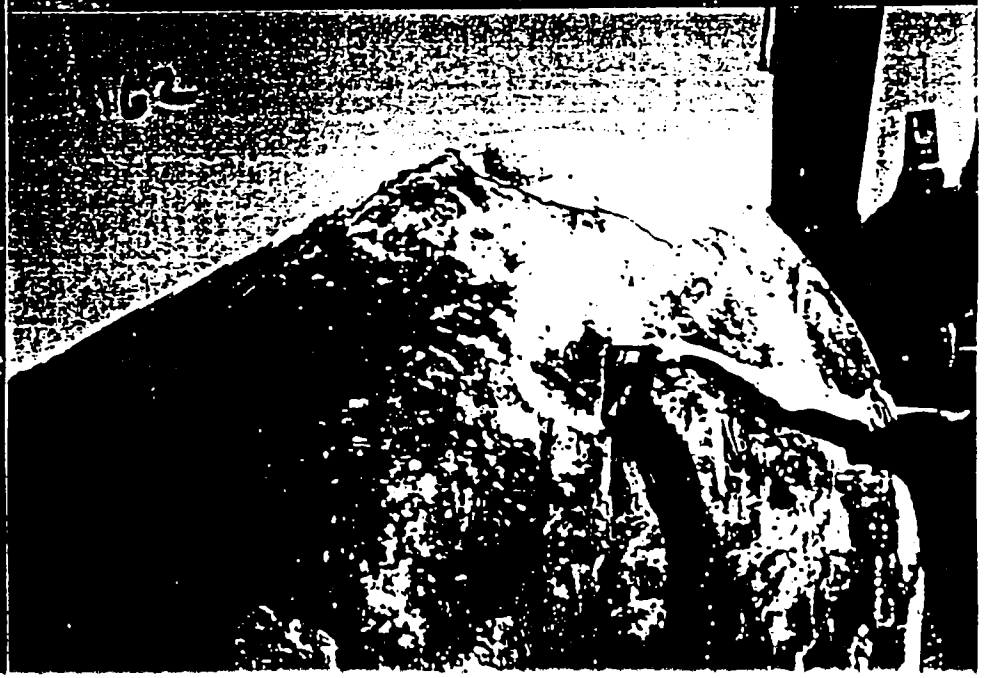
10-12-91 GARY TEAGUE





SITE 162

10-12-91 GARY TEAGUE



rucks • Dragline • Cherrypickers
• Dragline Mats & • Equipment Rental

Hale Boys Trucking Co.
R.R.C. Permit 5178

CORPUS CHRISTI, TX 78469
3 AGNES ST.
BOX 4262

PHONE
(512) 289-1710

CERTIFICATE OF TANK ABATEMENT

DATE ISSUED: 11-13-91

THIS IS TO CERTIFY THAT THE TANKS DESCRIBED BELOW HAVE BEEN PROPERLY PURGED AND DESTROYED AND ARE NOW IN THE FORM OF SCRAP METAL.

PREVIOUS OWNER: N.A.S. Corpus Christi Texas
162 - site.

DATE OF DESTRUCTION: 11-13-91

DESCRIPTION OF TANK: 2 - 12,000 gallon - steel

LOCATION OF DESTRUCTION. 5153 Agnes st

WE CERTIFY THAT THE ABOVE NAMED TANKS HAVE BEEN DESTROYED ACCORDING TO LOCAL, STATE AND FEDERAL LAWS, CODES AND GUIDELINES.

O. R. HALE

Quit Claim Deed for
Underground Petroleum Storage Tanks

KNOW ALL MEN BY THESE PRESENTS:

That E. R. I., a O. K. CO. having an office at P.O. BOX 125 BROKEN ARROW O.K. (hereinafter called " Transferor"), and HALE BOYS TRUCKING CO. a TEXAS CO. (hereinafter called " Transferee"), agree as follows:

Transferor hereby sells, assigns and quit claims to Transferee, his (its) heirs, successors and assigns, all of the right, title and interest of Transferor in and to the following described property AS IS, WITHOUT ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF ANY KIND:

P.U.S.T. AT SITE 162 N.A.S. Corpus Christi, Tex.
2 - 12,000 gallon Steel

TO HAVE AND TO HOLD said property unto Transferee, his (its) heirs, successors and assigns forever.

The property conveyed hereunder is presently located on the premises at

5153 AGNES CORPUS CHRISTI TEXAS

In consideration of said sale, Transferee agrees to defend, indemnify and hold Transgeror, and Transferor's parent, subsidiaries and affiliates, harmless against all claims, losses and liability of every kind arising from the date hereof and arising from or related to the existence, removal, location, use of condition of said property.

Transferee further acknowledges that property is transferred for destruction purposed only and that all local, state and federal laws, codes and guidelines will be followed for its safe destruction. Transferee further recognizes that said equipment may contain harmful and explosive fumes and that extreme caution should be used when disposing of said equipment.

This instrument contains the entire agreement between the parties covering the subject matter.

Executed and delivered this 13 day of NOV., 19 91.

ATTEST:
By _____

By E. R. I. (BOYCE BISHOP)
As Its PROJECT MANAGER
(Transferor)

O R Hale

ATTEST:
By _____

By HALE BOYS TRUCKING CO. (O. R. HALE)
As Its OWNER OPERATOR
(Transferee)

CORE LABORATORIES

Western Atlas International

1733 NORTH PADRE ISLAND DR.
CORPUS CHRISTI, TX 78408 (512) 289-2673

Analysis Request and Chain of Custody Record

Project no.: 10-C-0701

Client/Project Name: ERI P.U.S.T. REMOVAL

Project Location: NAS CORPUS CHRISTI

Lab ID No.	Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
	BACKFILL 162	10-12-91 10:30 PM		✓	QT GLASS	Soil		DIESEL TRPH 418.1, BTEX SW 846-8020 SW 846-8020 TCLP BENZENE, SW 846-7421 LEAD	
	BOTTOM 162-1	10-2-91 4:00	✓						
	BOTTOM 162-2	10-12-91 4:05	✓						
	NORTH WALL 162	10-12-91 4:15	✓						
	SOUTH WALL 162	10-12-91 4:25	✓						
	EAST WALL 162	10-12-91 4:30	✓						
	WEST WALL 162	10-12-91 4:45	✓						

Samplers: (Signature)	Relinquished by: (Signature)	Date: 10-14-91 Time: 9:25 AM	Received by: (Signature)	Date: Time:	COC Seal No.
	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by Laboratory: (Signature) Sandra Wisdom	Date: 10-14-91 Time: 0925	Intact:
			Data Results To: (Name/Address) 1. 2.		Laboratory No.

REMARKS:

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

CORE LABORATORIES
A N A L Y T I C A L R E P O R T

Job Number: 912204
Prepared For:

ENVIRONMENTAL RECOVERY INC.
LEE NEUBROUGH
P.O. BOX 125
BROKEN ARROW, OK 74013

Date: 10/28/91

Signature

Date: 10/30/91

Name: Chip Meador

CORE LABORATORIES
1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408

Title: Lab Manager

Western Atlas International
A Litton-Dresser Company

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

OB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

LIENT I.D.....: NAS CORPUS CHRISTI
ATE SAMPLED.....: 10/12/91
IME SAMPLED.....: 10:30
ORK DESCRIPTION...: BACKFILL 162

LABORATORY I.D...: 912204-0001
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
olatile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	22600	1250	ug/kg	SW-846 8020		
Toluene-Soil	27000	1250	ug/kg	SW-846 8020		
Ethylbenzene-Soil	23700	1250	ug/kg	SW-846 8020		
Xylenes-Soil	69400	3750	ug/kg	SW-846 8020		
Extraction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
Lead (Pb), total soil, waste	258	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEM
Benzene-TCLP	61	35	ug/l	SW-846 8020	10/25/91	S
Soil Total Petroleum Hydrocarbons	10100	300	mg/kg	EPA 418.1/3550	10/16/91	RAD
Metals Digest	Completed			SW-846 3050	10/17/91	RAD
Zero Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408
(512) 289-2673

Western Atlas International

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

JOB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

CLIENT I.D.....: NAS CORPUS CHRISTI
DATE SAMPLED.....: 10/12/91
TIME SAMPLED.....: 16:00
WORK DESCRIPTION...: BOTTOM 162-1

LABORATORY I.D...: 912204-0002
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
Volatile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	358	250	ug/kg	SW-846 8020		
Toluene-Soil	571	250	ug/kg	SW-846 8020		
Ethylbenzene-Soil	2900	250	ug/kg	SW-846 8020		
Xylenes-Soil	7180	750	ug/kg	SW-846 8020		
Extraction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
Lead (Pb), total soil, waste	25	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEH
Benzene-TCLP	62	35	ug/l	SW-846 8020	10/25/91	CRS
Soil Total Petroleum Hydrocarbons	2670	300	mg/kg	EPA 418.1/3550	10/16/91	RAD
Metals Digest	Completed			SW-846 3050	10/17/91	RAD
Zero Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408
(512) 289-2673

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

JB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

:IENT I.D.....: NAS CORPUS CHRISTI
ATE SAMPLED.....: 10/12/91
IME SAMPLED.....: 16:05
ORK DESCRIPTION...: BOTTOM 162-2

LABORATORY I.D...: 912204-0003
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
olatile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	159	35	ug/kg	SW-846 8020		
Toluene-Soil	115	35	ug/kg	SW-846 8020		
Ethylbenzene-Soil	<35	35	ug/kg	SW-846 8020		
Xylenes-Soil	457	105	ug/kg	SW-846 8020		
xtraction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
ead (Pb), total soil, waste	20	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEM
enzene-TCLP	<35	35	ug/l	SW-846 8020	10/25/91	
oil Total Petroleum Hydrocarbons	54	30	mg/kg	EPA 418.1/3550	10/16/91	RAD
etals Digest	Completed			SW-846 3050	10/17/91	RAD
ero Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408
(512) 289-2673

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

OB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

LIENT I.D.....: NAS CORPUS CHRISTI
ATE SAMPLED.....: 10/12/91
IME SAMPLED.....: 16:15
ORK DESCRIPTION...: NORTH WALL 162

LABORATORY I.D...: 912204-0004
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
olatile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	87	35	ug/kg	SW-846 8020		
Toluene-Soil	<35	35	ug/kg	SW-846 8020		
Ethylbenzene-Soil	<35	35	ug/kg	SW-846 8020		
Xylenes-Soil	208	105	ug/kg	SW-846 8020		
Extraction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
Lead (Pb), total soil, waste	62	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEM
enzene-TCLP	<35	35	ug/l	SW-846 8020	10/25/91	CRS
Soil Total Petroleum Hydrocarbons	228	30	mg/kg	EPA 418.1/3550	10/16/91	RAD
Metals Digest	Completed			SW-846 3050	10/17/91	RAD
Zero Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEI

1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408
(512) 289-2673

Western Atlas International
A Litton/Dresser Company

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

IOB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

LIENT I.D.....: NAS CORPUS CHRISTI
ATE SAMPLED.....: 10/12/91
IME SAMPLED.....: 16:25
ORK DESCRIPTION...: SOUTH WALL 162

LABORATORY I.D...: 912204-0005
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

EST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECH
olatile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	5400	250	ug/kg	SW-846 8020		
Toluene-Soil	5000	250	ug/kg	SW-846 8020		
Ethylbenzene-Soil	6500	250	ug/kg	SW-846 8020		
Xylenes-Soil	20200	750	ug/kg	SW-846 8020		
xtraction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
ead (Pb), total soil, waste	392	5	mg/Kg	200.7/6010 (1,2)	10/18/91	[illegible]M
enzene-TCLP	<35	35	ug/l	SW-846 8020	10/25/91	[illegible]
oil Total Petroleum Hydrocarbons	4900	300	mg/kg	EPA 418.1/3550	10/16/91	RAD
etals Digest	Completed			SW-846 3050	10/17/91	RAD
ero Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

1733 NORTH PADRE ISLAND DRIVE
CORPUS CHRISTI, TX 78408
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LABORATORY TESTS RESULTS
10/28/91

NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

ENT I.D.....: NAS CORPUS CHRISTI
E SAMPLED.....: 10/12/91
E SAMPLED.....: 16:30
K DESCRIPTION...: EAST WALL 162

LABORATORY I.D...: 912204-0006
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

T DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
atile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	868	35	ug/kg	SW-846 8020		
Toluene-Soil	738	35	ug/kg	SW-846 8020		
Ethylbenzene-Soil	502	35	ug/kg	SW-846 8020		
Xylenes-Soil	1355	105	ug/kg	SW-846 8020		
:raction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
ıd (Pb), total soil, waste	23	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEM
;ene-TCLP	<35	35	ug/l	SW-846 8020	10/25/91	CRS
ıl Total Petroleum Hydrocarbons	908	30	mg/kg	EPA 418.1/3550	10/16/91	RAD
tals Digest	Completed			SW-846 3050	10/17/91	RAD
ro Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

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CORE LABORATORIES

LABORATORY TESTS RESULTS
10/28/91

B NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

IENT I.D.....: NAS CORPUS CHRISTI
TE SAMPLED.....: 10/12/91
ME SAMPLED.....: 16:45
RK DESCRIPTION...: WEST WALL 162

LABORATORY I.D...: 912204-0007
DATE RECEIVED....: 10/14/91
TIME RECEIVED....: 09:25
REMARKS.....:

ST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
latile Organic High level		*1		SW-846 8020	10/22/91	CRS
Benzene-Soil	1600	250	ug/kg	SW-846 8020		
Toluene-Soil	1540	250	ug/kg	SW-846 8020		
Ethylbenzene-Soil	2560	250	ug/kg	SW-846 8020		
Xylenes-Soil	17200	750	ug/kg	SW-846 8020		
traction - BTEX (Soil/Solids)	Complete			SW-846 5030	10/18/91	DEH
ad (Pb), total soil, waste	10	5	mg/Kg	200.7/6010 (1,2)	10/18/91	JEM
nzene-TCLP	<35	35	ug/l	SW-846 8020	10/25/91	
il Total Petroleum Hydrocarbons	6120	300	mg/kg	EPA 418.1/3550	10/16/91	RAD
tals Digest	Completed			SW-846 3050	10/17/91	RAD
ro Headspace Extraction-Volatile	Complete			SW-846 1311	10/15/91	DEH

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CORE LABORATORIES

QUALITY ASSURANCE REPORT
10/28/91

: NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
LYSIS YPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
AMETER:Zero Headspace Extraction-Volatile				DATE/TIME ANALYZED:10/15/91 15:55					QC BATCH NUMBER:917491	
ORTING LIMIT/DF:		UNITS:		METHOD REFERENCE :SW-846 1311					TECHNICIAN:DEH	
AMETER:Soil Total Petroleum Hydrocarbons				DATE/TIME ANALYZED:10/16/91 16:21					QC BATCH NUMBER:917525	
ORTING LIMIT/DF: 30		UNITS:mg/kg		METHOD REFERENCE :EPA 418.1/3550					TECHNICIAN:RAD	
NK	Reagent	Freon	<30							
NDARD	Reference	B161,51,17	144			140	103			
KE	Analytical	912207-1	312					74	279	85
IKE	Analytical	912207-5	861					662	279	71
LICATE	Analytical	912204-5	4900	4890	0					
LICATE	Analytical	912207-1	74	79	5					
LICATE	Analytical	912207-5	662	663	0					
AMETER:Extraction - BTEX (Soil/Solids)				DATE/TIME ANALYZED:10/18/91 11:11					QC BATCH NUMBER:917578	
ORTING LIMIT/DF:		UNITS:		METHOD REFERENCE :SW-846 5030					TECHNICIAN:DEH	
AMETER:Lead (Pb), total soil, waste				DATE/TIME ANALYZED:10/18/91 15:00					QC BATCH NUMBER:917606	
ORTING LIMIT/DF: 0.05		UNITS:mg/L		METHOD REFERENCE :200.7/6010 (1,2)					TECHNICIAN:JEM	
NK	MB	3050	<0.05							
NDARD	CCV	B6074	5.06			5.00	101			
NDARD	ICV	QC19N	1.04			1.00	104			
IKE	PDS	912204-002	2.19					0.25	2.00	97
PLICATE	PDD	912204-002	0.25	0.24	0.01					
RAMETER:Benzene-TCLP				DATE/TIME ANALYZED:10/25/91 10:19					QC BATCH NUMBER:917902	
PORTING LIMIT/DF: 35		UNITS:ug/l		METHOD REFERENCE :SW-846 8020					TECHNICIAN:CRS	
ANK	Reagent	ZHE	<35							
ANDARD	Reference	Bk156.48.3	983			1000	98			
IKE	Analytical	912204-2	1059					62	1000	100
IKE	Analytical	912256-3	904					<35	1000	90

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SEPA SW-846 3rd. Edition, Test Methods for the Evaluation of Solid Waste
PA-600/4-79-020, Methods for the Analysis of Water and Wastes, March 1983
ederal Register, Friday, October 26, 1984 (40 CFR Part 136).
PA-600 2-78-054, Field and Laboratory Methods Applicable to Overburdens and Minesoils.

uality Control Acceptance Criteria:

Blanks.....: Analyzed Value < The Detection Limit
Reference Standards: 100 plus or minus 10%
Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

CMS tuning criteria meet EPA CLP Statement of Work OLM01.0.
C = Not Calculated due to value at or below detection limit.
ll data reported on sample "as received" unless noted.

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CORE LABORATORIES

QUALITY ASSURANCE REPORT
10/28/91

NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
LYSIS YPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
AMETER:Benzene-TCLP ORTING LIMIT/DF: 35 UNITS:ug/l				DATE/TIME ANALYZED:10/25/91 10:19 METHOD REFERENCE :SW-846 8020					QC BATCH NUMBER:917902 TECHNICIAN:CRS	
KE	Analytical	912224-1	1146					<35	1000	115
LICATE	Analytical	912204-2	62	56	6					

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Spikes.....: 100 plus or minus 25%

CHS tuning criteria meet EPA CLP Statement of Work OLM01.0.
C = Not Calculated due to value at or below detection limit.
ll data reported on sample "as received" unless noted.

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CORE LABORATORIES

QUALITY ASSURANCE REPORT
10/28/91

JB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

TEX (Soil) DATE ANALYZED: 10/22/91 TIME ANALYZED: 10:54 METHOD: SW-846 8020 QC NUMBER:917692

BLANKS

EST DESCRIPTION	ANALY SUB-TYPE	ANALYSIS I.D.	DILUTION FACTOR	ANALYZED VALUE	DETECTION LIMIT	UNITS OF MEASUR
enzene-Soil	Reagent	MeOH	1	<35	35	ug/kg
oluene-Soil	Reagent	MeOH	1	<35	35	ug/kg
thylbenzene-Soil	Reagent	MeOH	1	<35	35	ug/kg
ylenes-Soil	Reagent	MeOH	1	<105	105	ug/kg

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Blanks.....: Analyzed Value < The Detection Limit
Reference Standards: 100 plus or minus 10%
Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

GCMS tuning criteria meet EPA CLP Statement of Work OLM01.0.
NC = Not Calculated due to value at or below detection limit.
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QUALITY ASSURANCE REPORT
10/28/91

B NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

EX (Soil) DATE ANALYZED: 10/22/91 TIME ANALYZED: 10:54 METHOD: SW-846 8020 QC NUMBER:917692

REFERENCE STANDARDS

ST SCRIPTION	ANALYSIS SUB-TYPE	ANALYSIS I. D.	DILUTION FACTOR	ANALYZED VALUE	TRUE VALUE	PERCENT RECOVERY	DETECTION LIMITS	UNITS OF MEASURE
nzene-Soil	Reference	Bk156.46.2	1	1285	1250	103	35	ug/kg
luene-Soil	Reference	Bk156.46.2	1	1160	1250	93	35	ug/kg
hylbenzene-Soil	Reference	Bk156.46.2	1	1235	1250	99	35	ug/kg
lenes-Soil	Reference	Bk156.46.2	1	3933	3750	105	105	ug/kg
Bromofluorobenzene	Reference	Bk156.32.5	1	23	20	115	10	ug/kg

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Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

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QUALITY ASSURANCE REPORT
10/28/91

B NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

EX (Soil) DATE ANALYZED: 10/22/91 TIME ANALYZED: 10:54 METHOD: SW-846 8020 QC NUMBER:917692

MATRIX SPIKES

ST SCRIPTION	ANALYSIS SUB-TYPE	ANALYSIS I. D.	DILUTION FACTOR	ANALYZED VALUE	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY	DETECTION LIMITS	UNITS OF MEASURE
nzene-Soil	Analytical	912227-1	1	1229	0	1250	98	35	ug/kg
	Analytical	912227-4	1	1389	0	1250	111	35	ug/kg
luene-Soil	Analytical	912227-1	1	1251	55	1250	96	35	ug/kg
	Analytical	912227-4	1	1425	0	1250	114	35	ug/kg
hylbenzene-Soil	Analytical	912227-1	1	1192	0	1250	95	35	ug/kg
	Analytical	912227-4	1	1250	89	1250	93	35	ug/kg
'lenes-Soil	Analytical	912227-1	1	3743	0	3750	100	105	ug/kg
	Analytical	912227-4	1	3808	0	3750	102	105	ug/kg
Bromofluorobenzene	Analytical	912227-1	1	19.1	0	20	96	10	ug/kg
	Analytical	912204-1	1	19.8	0	20	99	10	ug/kg
	Analytical	912204-2	1	18.8	0	20	94	10	ug/kg
	Analytical	912204-3	1	16.1	0	20	81	10	ug/kg
	Analytical	912204-4	1	17.4	0	20	87	10	ug/kg
	Analytical	912204-5	1	22.2	0	20	111	10	ug/kg
	Analytical	912204-6	1	18.1	0	20	91	10	ug/kg
	Analytical	912204-7	1	23.6	0	20	118	10	ug/kg
	Analytical	912168-1	1	15.8	0	20	79	10	ug/kg
	Analytical	912218-1	1	19.3	0	20	97	10	ug/kg
	Analytical	912227-2	1	19.6	0	20	98	10	ug/kg
	Analytical	912227-3	1	18.7	0	20	94	10	ug/kg
	Analytical	912227-4	1	18.7	0	20	94	10	ug/kg
	Analytical	912214-1	1	16.6	0	20	83	10	ug/kg
	Analytical	912214-4	1	19.8	0	20	99	10	ug/kg
	Analytical	912214-5	1	18.2	0	20	91	10	ug/kg
	Analytical	912214-6	1	19.5	0	20	98	10	ug/kg
	Analytical	912214-7	1	17	0	20	85	10	ug/kg
	Extraction	912235-1	1	17	0	20	85	10	ug/kg
	Extraction	912235-2	1	17.2	0	20	86	10	ug/kg
	Extraction	912235-3	1	17.8	0	20	89	10	ug/kg
	Extraction	912235-4	1	17.3	0	20	87	10	ug/kg
	Extraction	912235-6	1	17	0	20	85	10	ug/kg

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Quality Control Acceptance Criteria:
Blanks.....: Analyzed Value < The Detection Limit
Reference Standards: 100 plus or minus 10%
Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

GCMS tuning criteria meet EPA CLP Statement of Work OLM01.0.
NC = Not Calculated due to value at or below detection limit.
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Western Atlas International

CORE LABORATORIES

QUALITY ASSURANCE REPORT
10/28/91

JOB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

TEX (Soil) DATE ANALYZED: 10/22/91 TIME ANALYZED: 10:54 METHOD: SW-846 8020 QC NUMBER:917692

MATRIX SPIKES

TEST DESCRIPTION	ANALYSIS SUB-TYPE	ANALYSIS I. D.	DILUTION FACTOR	ANALYZED VALUE	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY	DETECTION LIMITS	UNITS OF MEASURE
	Extraction	912235-7	1	15.9	0	20	80	10	ug/kg
	Analytical	912237-1	1	22.5	0	20	113	10	ug/kg
	Analytical	912214-2	1	20	0	20	100	10	ug/kg

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Quality Control Acceptance Criteria:
Blanks.....: Analyzed Value < The Detection Limit
Reference Standards: 100 plus or minus 10%
Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

GCMS tuning criteria meet EPA CLP Statement of Work OLM01.0.
NC = Not Calculated due to value at or below detection limit.
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CORE LABORATORIES

QUALITY ASSURANCE REPORT
10/28/91

OB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

TEX (Soil) DATE ANALYZED: 10/22/91 TIME ANALYZED: 10:54 METHOD: SW-846 8020 QC NUMBER:917692

DUPLICATES

EST ESCRIPTION	ANALYSIS SUB-TYPE	ANALYSIS I. D.	DILUTION FACTOR	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	DETECTION LIMITS	UNITS OF MEASURE
enzene-Soil	Analytical	912227-1	1	<35	<35	NC	35	ug/kg
	Analytical	912227-4	1	<35	<35	NC	35	ug/kg
oluene-Soil	Analytical	912227-1	1	55	50	5	35	ug/kg
	Analytical	912227-4	1	<35	<35	NC	35	ug/kg
thylbenzene-Soil	Analytical	912227-1	1	<35	<35	NC	35	ug/kg
	Analytical	912227-4	1	89	83	6	35	ug/kg
ylenes-Soil	Analytical	912227-1	1	<105	<105	NC	105	ug/kg
	Analytical	912227-4	1	<105	<105	NC	105	ug/kg

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Reference Standards: 100 plus or minus 10%
Duplicates.....: 20% RPD, or plus or minus the detection limit
Spikes.....: 100 plus or minus 25%

GCMS tuning criteria meet EPA CLP Statement of Work OLM01.0.
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LABORATORY TESTS RESULTS

10/18/91

OB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

AMPLE NUMBER: 1 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 10:30

ROJECT: NAS CORPUS CHRISTI SAMPLE: BACKFILL 162 REM:

AMPLE NUMBER: 2 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16:00

ROJECT: NAS CORPUS CHRISTI SAMPLE: BOTTOM 162-1 REM:

AMPLE NUMBER: 3 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16:05

ROJECT: NAS CORPUS CHRISTI SAMPLE: BOTTOM 162-2 REM:

AMPLE NUMBER: 4 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16:15

ROJECT: NAS CORPUS CHRISTI SAMPLE: NORTH WALL 162 REM:

AMPLE NUMBER: 5 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16

ROJECT: NAS CORPUS CHRISTI SAMPLE: SOUTH WALL 162 REM:

AMPLE NUMBER: 6 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16:30

ROJECT: NAS CORPUS CHRISTI SAMPLE: EAST WALL 162 REM:

TEST DESCRIPTION	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5	SAMPLE 6	UNITS OF MEASURE
Extraction - BTEX (Soil/Solids)	Complete	Complete	Complete	Complete	Complete	Complete	
Benzene-TCLP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	ug/l
Soil Total Petroleum Hydrocarbons	10100	2670	54	228	4900	908	mg/kg
Lead (Pb), total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	mg/kg
Metals Digest	Completed	Completed	Completed	Completed	Completed	Completed	
Zero Headspace Extraction-Volatile	Complete	Complete	Complete	Complete	Complete	Complete	

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APPROVED BY: _____

LABORATORY TESTS RESULTS
10/18/91

OB NUMBER: 912204 CUSTOMER: ENVIRONMENTAL RECOVERY INC. ATTN: LEE NEUBROUGH

AMPLE NUMBER: 7 DATE RECEIVED: 10/14/91 TIME RECEIVED: 09:25 SAMPLE DATE: 10/12/91 SAMPLE TIME: 16:45

ROJECT: NAS CORPUS CHRISTI SAMPLE: WEST WALL 162 REM:

AMPLE NUMBER: 8

AMPLE NUMBER: 9

EST DESCRIPTION	SAMPLE 7	SAMPLE 8	SAMPLE 9				UNITS OF MEASURE
xtraction - BTEX (Soil/Solids)	Complete						
Benzene-TCLP	[redacted]						ug/l
Soil Total Petroleum Hydrocarbons	6120						mg/kg
Lead (Pb), total	[redacted]						mg/kg
Metals Digest	Completed						
Zero Headspace Extraction-Volatile	Complete						

APPROVED BY: _____

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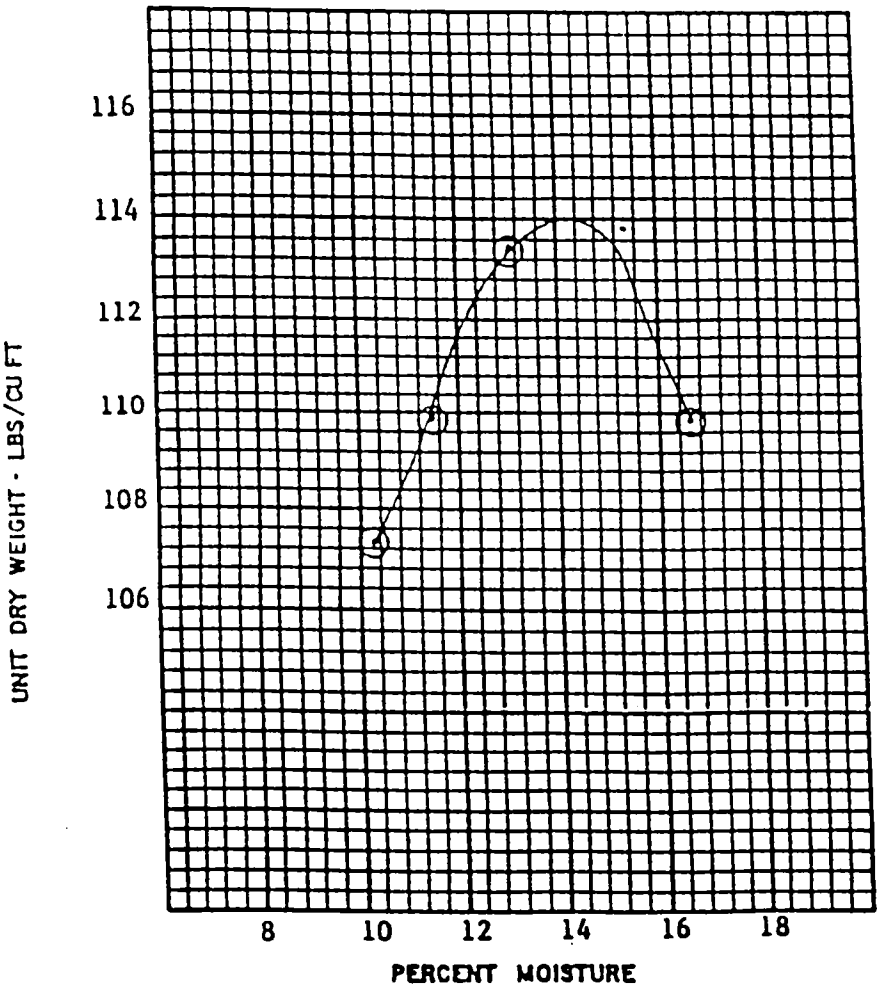
MOISTURE - DENSITY CURVE

TO: ERI
P.O. Bqx 125
Broken Arrow, OK 74013

Attn: Lee Neubrough

PROJECT: Removal of USTS
NAS-Corpus Christi, Tx
N62467-90-B-0701

DATE: 10-28-91
REPORT NO: 911318
SAMPLE NO.: 178



MATERIAL DESCRIPTION:

Tan Select

SAMPLED BY: Jack Hall on 10-2[illegible]1

TEST PERFORMED BY: Jack Hall

TEST METHOD: ASTM D-698-78
METHOD "A"

TRIAL NO.	PERCENT MOISTURE	UNIT DRY WEIGHT LBS/CU FT
1	10.3	107.3
2	11.5	109.9
3	13.1	113.4
4	16.6	109.9

OPTIMUM MOISTURE, PERCENT: 14.2

MAXIMUM DENSITY, LBS/CU FT: 114.0

COPIES TO: 2 - Above

TRINITY ENGINEERING TESTING CORPORATION

TETCO

COMPACTION TESTS

TRINITY ENGINEERING TESTING CORPORATION

Corpus Christi, TEXAS

TO: ERI
P.O. Box 125
Broken Arrow, OK. 74013

Attn: Lee Neubrough

PROJECT: Removal of USTS
NAS-CC & NAS-Kingsville

DATE: 11-15-91
REPORT NO: 911473

TECH.: Jack Hall

TYPE OF SOIL	LOCATION	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	PERCENT COMPACTION
Tan Select Fill	Underground Storage Tank Backfill - Tank C			
	Building #13, 2' Below Grade	16.1	110.4	96.8
	Site 1-61-4-Final Grade	8.2	112.4	98.6
	Hanger #51-Final Grade	15.3	105.4	92.3
	Building 16-Final Grade	14.6	114.8	100.7
	Site 12-25-Final Grade	13.0	107.3	94.1
	Cabiness Field-2' Below Grade	18.3	109.4	96.0

MAXIMUM DENSITY DETERMINED IN ACCORDANCE WITH: ASTM D-698-78 METHOD "A" (Report #911318)

MAXIMUM DENSITY: 114.0 OPTIMUM MOISTURE: 14.2

COPIES TO: 2 - Above

TRINITY ENGINEERING TESTING CORPORATION

SITE 162-1 #2

1. TANK 161-3 (10,000 GALLON – AV LUBE, EMPTY – JUNE 1990) IS LOCATED IN A GRASSY AREA NEAR BUILDING 161 AND ADJACENT TO TANKS 161-1 AND 161-2. A 6" THICK REINFORCED CONCRETE VALVE PIT (7' x 5' x 3'-6" DEEP) IS LOCATED ABOVE THE TANK AND WILL BE REMOVED. THE REINFORCEMENT TYPE IS NOT KNOWN. A SECTION OF A REINFORCED CONCRETE SIDEWALK (12' x 3' x 6" THICK) WILL BE SAW-CUT AND REMOVED. THE REINFORCEMENT TYPE IS NOT KNOWN. THE SIDEWALK SECTION WILL BE REPLACED AS DESCRIBED IN SECTION 03302 OF THE SPECIFICATIONS.
2. A GAS LINE WAS IDENTIFIED CLOSE TO THE EXCAVATION LIMITS AS DESCRIBED BY DIMENSION E ON SHEET 5 OF 9.
3. TANK WILL BE EMPTIED AND PURGED BEFORE REMOVAL AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
4. ALL EXCAVATED SOIL AND DEBRIS WILL BE DISPOSED OFF-SITE AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS AND WILL NOT BE REUSEABLE AS FILL MATERIAL.
5. CLEAN BACKFILL WILL BE PLACED AND COMPACTED IN LIFTS AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.
6. SURFACE AREA OF THE EXCAVATED ZONES WILL BE REVEGETATED AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.

TANK 216A-3

1. TANK 216A-3 (13,000 GALLON – JP-4, REPORTED EMPTY – JANUARY 1975) IS LOCATED IN A FUEL FARM FACILTY AND IS SURROUNDED BY SEVERAL ACTIVE TANKS. SURFACE PAVEMENT OVER THE TANK CONSISTS OF A 4" THICK GRAVEL BASE. A 6" THICK REINFORCED CONCRETE VALVE PIT (6' x 4'-6" x 4'-6" DEEP) IS ABOVE THE TANK AND WILL BE REMOVED. THE REINFORCEMENT CONSISTS OF 3/8" DIAMETER BARS AT 6" CENTER TO CENTER. THE TANK IS ANCHORED TO A CONCRETE FOUNDATION SYSTEM BY FOUR 3" x 3/8" STRAPS. THE CONCRETE FOUNDATIONS, WHICH ARE SEMI-CIRCULAR IN SHAPE, WILL REMAIN IN PLACE.
2. PARKWAY CABLE, AND ONE JUNCTION BOX; 12 L.F. OF 4" WATER DRAIN LINE TO STORM SEWER; 12 L.F. OF 2" LUBE OIL LIN UTILITIES WHICH ARE WITHIN THE EXCAVATION LIMITS WILL BE REMOVED AND REPLACED AS FOLLOW: 12 L.F. OF 2-2/C #8 AND 18 L.F. OF 3" OIL FILL LINE. PIPE MATERIAL TO MATCH EXISTING AVAILABLE INFORMATION INDICATE PIPE MATERIAL IS 316 STAINLESS STEEL. OTHER TANK PIPING ENCOUNTERED WITHIN EXCAVATION LIMITS WILL BE REMOVED AND PLUGGED AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
3. TANK WILL BE EMPTIED AND PURGED BEFORE REMOVAL AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
4. ALL EXCAVATED SOIL AND DEBRIS WILL BE DISPOSED OFF-SITE AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS AND WILL NOT BE REUSEABLE AS FILL MATERIAL.
5. CLEAN BACKFILL WILL BE PLACED AND COMPACTED IN LIFTS AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.
6. A FINAL 4-INCH THICK GRAVEL LIFT TO MATCH EXISTING GRADE WILL BE PLACED IN THE SURFACE AREA OF THE EXCAVATED ZONES AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.

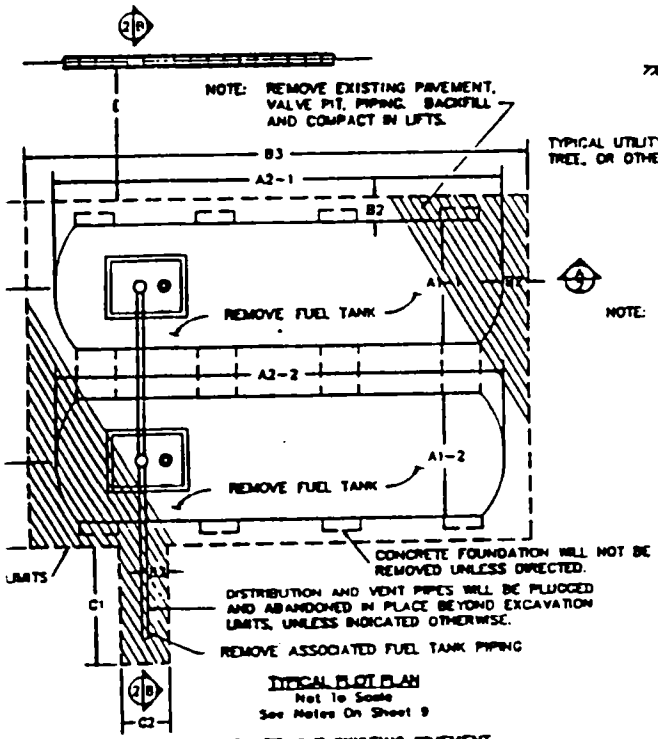
TANK 216A-5

1. TANK 216A-5 (13,000 GALLON – GASOLINE, REPORTED EMPTY – JANUARY 1975) IS LOCATED IN A TANK FUEL FARM FACILITY AND SEVERAL OTHER UNDERGROUND TANKS ARE CLOSE-BY. A 6" THICK REINFORCED CONCRETE VALVE PIT (6' x 4'-6" x 4'-6" DEEP) IS LOCATED ABOVE THE TANK AND WILL BE REMOVED. THE CONCRETE REINFORCEMENT FOR THE VALVE PIT CONSISTS OF 3/8" DIAMETER BARS AT 6" CENTER TO CENTER. THE TANK IS LIKELY ANCHORED TO A CONCRETE FOUNDATION SYSTEM AS THAT OF TANK 216A-3 BY A SERIES OF STRAPS. RECORDS OF THE FOUNDATION WERE NOT AVAILABLE. HOWEVER, DUE TO SIMILAR TYPE TANKS, THE CONCRETE FOUNDATION IS ANTICIPATED. THE CONCRETE FOUNDATION, IF PRESENT, WILL REMAIN IN PLACE UNLESS DIRECTED OTHERWISE.
2. THE ONLY UTILITY ANTICIPATED WITHIN THE EXCAVATION LIMITS, WHICH WILL NEED TO BE PLUGGED AT ITS TEE JUNCTION, CONSISTS OF A 4" DRAIN WATER LINE FROM THE TANK TO THE STORM SEWER. OTHER UTILITIES ARE AS INDICATED BY DIMENSION E ON SHEET 5 OF 9. TANK PIPING ASSOCIATED WITH THE SYSTEM WILL BE REMOVED AND PLUGGED AT THE EXCAVATION BOUNDARIES AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
3. TANK WILL BE EMPTIED AND PURGED BEFORE REMOVAL AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
4. ALL EXCAVATED SOIL AND DEBRIS WILL BE DISPOSED OFF-SITE AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS AND WILL NOT BE REUSEABLE AS FILL MATERIAL.
5. CLEAN BACKFILL WILL BE PLACED AND COMPACTED IN LIFTS AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.
6. A FINAL 4-INCH THICK GRAVEL LIFT TO MATCH EXISTING GRADE WILL BE PLACED IN THE SURFACE AREA OF THE EXCAVATED ZONES AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.

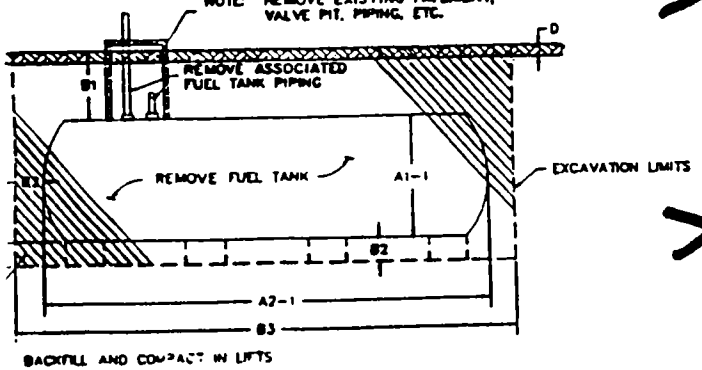
TANKS 162-1 AND 162-2

1. TANKS 162-1 AND 162-2 (10,000 GALLON – DIESEL, EMPTY – JUNE 1990) ARE LOCATED IN A GRASSY AREA ADJACENT TO BUILDING 162. A 7" THICK REINFORCED CONCRETE VALVE PIT (9' x 5' x 5' DEEP) IS PRESENT ABOVE EACH TANK AND WILL BE REMOVED. THE CONCRETE TYPE REINFORCEMENT IS NOT KNOWN. A PORTION OF A SLAB WITHIN THE EXCAVATION LIMITS WILL BE SAWCUT AND REMOVED. THE CONCRETE SLAB TO BE REMOVED IS 5' x 3' x 5' THICK WITH 6/6 40 LB. WIRE MESH REINFORCEMENT. THE REMOVED PORTION OF THE SLAB WILL NOT BE REPLACED.
2. A STORM SEWER IS THE CLOSEST UTILITY IDENTIFIED TO THE EXCAVATION BOUNDARIES AS DESCRIBED BY DIMENSION E ON SHEET 6 OF 9. DAMAGE TO THE STORM SEWER WILL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. TANK PIPING ASSOCIATED WITH THE SYSTEM WILL BE REMOVED AND PLUGGED AT THE EXCAVATION BOUNDARIES AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
3. TANKS WILL BE EMPTIED AND PURGED BEFORE REMOVAL AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS.
4. ALL EXCAVATED SOIL AND DEBRIS WILL BE DISPOSED OFF-SITE AS DESCRIBED IN SECTION 02052 OF THE SPECIFICATIONS AND WILL NOT BE REUSEABLE AS FILL MATERIAL.
5. CLEAN BACKFILL WILL BE PLACED AND COMPACTED IN LIFTS AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.
6. SURFACE AREA OF THE EXCAVATED ZONES WILL BE REVEGETATED AS DESCRIBED IN SECTION 02220 OF THE SPECIFICATIONS.

SITE 162-1+2

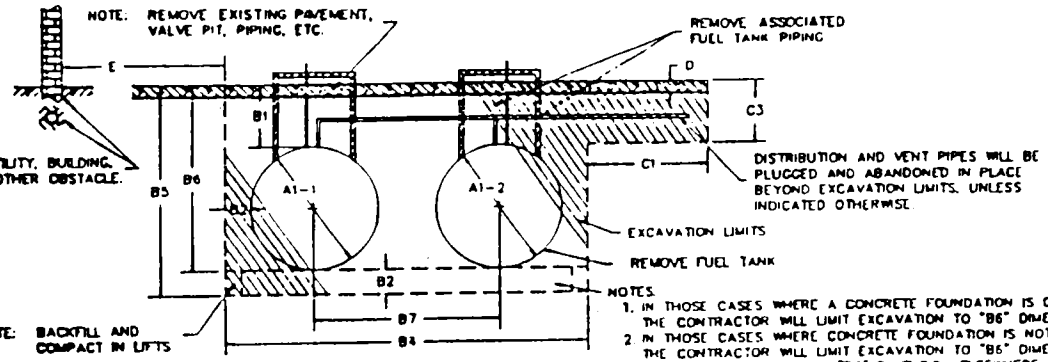


TYPICAL PLOT PLAN
Not To Scale
See Notes On Sheet 9



BACKFILL AND COMPACT IN LIFTS

SECTION AA
Not To Scale



NOTES:
1. IN THOSE CASES WHERE A CONCRETE FOUNDATION IS CONTINUOUS, THE CONTRACTOR WILL LIMIT EXCAVATION TO "B6" DIMENSION
2. IN THOSE CASES WHERE CONCRETE FOUNDATION IS NOT CONTINUOUS, THE CONTRACTOR WILL LIMIT EXCAVATION TO "B6" DIMENSION AT THE FOUNDATION AND TO "B5" DIMENSION ELSEWHERE
3. ALL CONCRETE FOUNDATIONS WILL REMAIN IN PLACE UNLESS DIRECTED

SECTION BB
Not To Scale

TANK NO.	TANK DIMENSIONS				TANK EXCAVATION DIMENSIONS							TANK PIPING EXCAVATION DIMENSIONS			PAVEMENT/STRUCTURE	
	A1-1	A1-2	A2-1	A2-2	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	TYPE	THICKNESS D
162-1 and 162-2	8'	8'	32'	32'	2'	2'	36'	24'	12'	10'	11'	0	0	0	REINFORCED CONCRETE	5" AND 7"
13-1 and 13-2	11'	11'	35'	35'	3'	2'	39'	30'	16'	14'	16'	0	0	0	REINFORCED CONCRETE	6"
161-1 and 161-2	8'	8'	29'	29'	3'	–	33'	22'	11'	11'	7'	0	0	0	REINFORCED CONCRETE	8"
216A-X and 216A-Y	4'-8"	4'-8"	8'-6"	8'-6"	3'-3"	–	14'	16'	8'	8'	6'-8"	0	0	0	GRAVEL BASE & REINFORCED CONCRETE	4" AND 6" TO 8"

TANK NO	DISTANCE TO UTILITIES (E)					
	BUILDINGS/ TREES	ELECTRICAL	WATER	GAS	STORM SEWER	SANITARY SEWER
162-1 and 162-2	7'	> 10'	> 15'	> 15'	1'	> 15'
13-1 and 13-2	2' FROM STREET	> 10'	> 10'	> 10'	> 10'	> 10'
161-1 and 161-2	OVER TANK EXCAVATION	> 15'	> 15'	1'	> 15'	> 15'
216A-X and 216A-Y	6' FROM CHAIN LINK FENCE	> 10'	> 10'	> 10'	> 10'	> 10'

TANK NO.	TANK EXCAVATION VOLUMES			TANK PIPING EXCAVATION VOLUMES	PAVEMENT/STRUCTURE DEMOLITION			ESTIMATED BORROW
	TANK PIT	TANKS	NET		TYPE	AREA	VOLUME	
162-1 and 162-2	384 CY	119 CY	265 CY	0 CY	CONCRETE VALVE PITS (9 x 5'x5'x7") 1 SLAB (5'x3'x5")	142 SF 15 SF	3.3 CY 0.28 CY	384 CY
13-1 and 13-2	694 CY	246 CY	447 CY	0 CY	CONCRETE VALVE PITS	144 SF	2.7 CY	694 CY
161-1 and 161-2	296 CY	108 CY	188 CY	0 CY	CONCRETE VALVE PITS and CONCRETE SIDEWALK	168 SF 66 SF	3.1 CY 1.2 CY	296 CY
216A-X and 216A-Y	66 CY	11 CY	55 CY	0 CY	CONCRETE VALVE PIT RETENTION BERM GRAVEL BASE	85 SF 48 SF 138 SF	1.75 CY 0.9 CY 1.2 CY	66 CY

NOTE: ALL DIMENSIONS BASED ON FIELD MEASUREMENTS AND DIMENSIONS [illegible] AND AVAILABLE CONSTRUCTION PLANS. TANK EXCAVATION DIMENSIONS BASED ON [illegible] CONDITIONS. REFER TO SECTION 02220 IF THE SITE [illegible] GROUNDWATER IS ENCOUNTERED DURING EXCAVATION.

SOUTHERN DIVISION
REMOVAL OF USTs
162-1 AND 162-2 (5) AND (5) 161 AND (5) 2 AND 216A-X AND 216A-Y
5

GENERAL TANK INFORMATION

CONTRACTOR NAME E.R.I Contractor Reg. # _____

Mailing Address P.O. 125 Phone # (918) 258-2004

City Broken Arrow State OK Zip Code 74013

Contact 90-C-0701 N.A.S. C.C. Title PUST Removal

ON SITE SUPERVISOR Boyce Bishop License # LP001055

Mailing Address 1305 S. 28th Phone # (918) 251-9448

City Broken Arrow State OK Zip Code 74014

Number of tanks involved : _____

	TANK ___	TANK ___	TANK ___	TANK ___	TANK ___
INSTALLATION DATE					
DATE LAST USED					
SUBSTANCE STORED					
CAPACITY					
MANUFACTURER					
MODEL NAME OR NUMBER					
UL #					
TANK MATERIAL					
SGL. OR DBL. WALL					
PRESSURIZED OR SUCTION					
TYPE CORROSION PROTECTION					
TYPE OF SPILL/OVERFILL					
STRIKER PLATE					
DIELECTRIC BUSHINGS					
LINE LEAK DETECTORS					
DROP TUBE					
CONDITION/APPEARANCE					

COMMENTS: _____

Tracking No. _____

REMOVAL FROM GROUND 334.55(b)

SECTION A - GENERAL INFORMATION

1. Were tanks purged of vapors to <20% LEL? ☑ YES ☐ NO
2. Method of purging vapors: ☐ Dry ice ☐ Air eductor ☐ N_2 ☑ N/A
   ☐ Air diffuser ☐ CO_2 ☐ Other - _____
3. Was purging system properly grounded and bonded? ☑ YES ☐ NO
4. Was all connected piping and ancillary equipment:
   A. Emptied ☑ YES ☐ NO
   B. Disconnected ☑ YES ☐ NO
   C. Properly plugged, capped, or removed? ☑ YES ☐ NO
5. Extent of excavation (WxLxD): _____
6. Is this site a LUST? ☐ NO ☐ YES
   If yes, complete the LUST IR checklist.

SECTION B - STORAGE OF REMOVED TANKS

1. Tank(s) transported from site within 24 hours of removal? ☑ YES ☐ NO
   According to: Stored in lay down Area at each site
   If no, was longer on-site storage approved by TWC District Office? ☑ YES ☐ NO
   If on-site less than 24 hours, were tanks in designated area, adequate distance from known ignition sources? ☑ YES ☐ NO
3. Was area clearly identified w/ appropriate barriers and warning signs to restrict access of unauthorized persons? ☑ YES ☐ NO
4. For on and off site storage greater than 24 hours, was it in a locked, securely fenced, or similarly restricted area? ☑ YES ☐ NO
5. Were removed tanks legibly and permanently labeled within 24 hours? ☑ YES ☐ NO
   If yes, did the label include:
   A. Letters at least 2 inches high? ☑ YES ☐ NO
   B. Name of former contents? ☑ YES ☐ NO
   C. Flammability warning (if applicable)? ☐ N/A ☑ YES ☐ NO
   D. Warning that tank unsuitable for storage of drinking water or human or animal food products? ☑ YES ☐ NO

COMMENTS: _____

location	Site & TANK #	Capacity Reported	Size	Material		
Kingsville	2744	6000	8x20 7500	Fiberglass	size Diff-Mudd	
	2745	4000	8x15 5642.	"	size Diff-Mudd	
	2767	2000	8x8 2000	"	size Diff-Mudd	
	3788	1000	1000	Concrete	material Diff-	
	704-2	5000	5000	Steel		
	704-3	5000	5000	"		
	3727-4	10,000	10,000	"		
	3727-5	1,000	10,000	"	size Diff-Mudd	46 14
Calaniss	CALF-1	500	500	"		550
C.C. NAS	51	1000	1000	"		
	1225	550	550	"		
	161-1	10,000	12,000	"	size Diff	
	161-2	10,000	12,000	"	size Diff	
	161-3	10,000	?	Concrete Steel		
	161-4	1,000	10,000	steel	size Diff	
	162-1	10,000	12,000	"	size Diff	
	162-3	10,000	12,000	"	size Diff	
	13-1	25,000	30,000	"	size Diff	
	13-2	25,000	30,000	"	size Diff	1295
	216-A-X	1000	?			1762
	216-A-Y	1000	?			
	216-A-10	1000	?			
	216-A-11	1000	?			
	216-A-3	13,000	?			
	216-A-5	13,000	?			

ITE	GAL.	CONTENTS		AS FOUND & CONTENTS
NGEVILLE 744-1	6,000	FUEL OIL-INERT MAT.		7520 GAL DRILLING MUD FIBERGLASS
745-1	4,000	FUEL OIL-WATER		5,642 GAL DRILLING MUD FIBER GLASS
767-1	2,000	FUEL OIL-WATER		FIBER GLASS
788-1	1,000	USED OIL-WATER		CONCRETE VAULT
704-2	5,000	DIESEL-?		
704-3	5,000	DIESEL-?		
727-4	10,000	USED OIL-?		
1727-5	1,000	DIESEL-?		19000 GAL DRILLING MUD
BANISS ALP-1	500/1000	USED OIL-WATER		FULL OF WATER
S CORPUS 51	1,000	TCE-INERT MAT.		22" WATER & PRODUCT
225	500	MO-GAS-EMPTY		
1-4	1,000	KEROSENE-EMPTY		CHANGE TO 10,000 8' WATER
1-3	10,000	AV LUBE-EMPTY		POSSIBLE 15,000 GAL 6 3/4" OIL
1-1	10,000	AV LUBE-EMPTY		2 3/4" OIL
61-2	10000	AV LUBE-EMPTY		1/2" OIL
16A-3	13,000	JP-4-EMPTY		EMPTY
16A-5	13,000	GAS-EMPTY		EMPTY
2-1	19000	DIESEL-EMPTY		UNKNOWN
62-2	19000	DIESEL-EMPTY		UNKNOWN
3-1	25,000	FUEL OIL-?		8' OIL 30,000 GAL
3-2	25,000	FUEL OIL-?		30,000 GAL 7' FUEL + WATER
16A-X	1,000	PRESERVATIVE OIL-WATER		2" OIL
16A-Y	1,000	PRESERVATIVE OIL-WATER		2" OIL
6A-10	1,000	TURBINE OIL-?		FULL OIL & WATER
6A-11	1,000	TURBINE OIL-?		FULL OIL & WATER

	Backfill	Bottom	North	South	East	West		
27 -4	575	191	474	82		526		
-5		33			49			
4 - 2 OK TO USE OLD BACKFILL TO FILL HOLE	3900	1090	4000	473	31	6740		
- 3	3900	5940	4000	473	31	6740		
44 -1	81	WATER	< 30	< 30	< 30	< 30		
45 -1	< 30	WATER	< 30	< 30	< 30	< 30		
67 - 1	(< 30) 122	WATER	< 30	< 30	< 30	< 30		
88 -1	5710	32 700		S.E. 5190				
ALF-1	< 30 1080	< 30	CONCRETE ON NORTH WALL	6830	63	< 30		
er clay	< 30	< 30		< 30				
- 1	78		36		73	67		
- 2	78			78	88	93		
1								
1 -1	(232)		232	631		43		
1 - 2	< 30		< 30	135				
1 - 3	< 30		178	43	113			
1 -4	43		< 30	< 30	48	58		
2 - 1	10,100	2670	228	4900	908	6120		
- 2	< 30	54						
5	38	< 30	38		48			
16								
10-16								
3-5								

	Backfill	Bottom	North	South	East	West		
27 -4	575	191	474	82		526		
-5		33			49			
4 - 2 (OK TO USE OLD BACKFILL TO FILL HOLE)	3900	1090	4000	473	31	6740		
- 3	3900	5940	4000	473	31	6740		
4 - 1	81	WATER	< 30	< 30	< 30	< 30		
245 - 1	< 30	WATER	< 30	< 30	< 30	< 30		
267 - 1	(< 30) / 122	WATER	< 30	< 30	< 30	< 30		
288 - 1	5710	33,700		S.E. 5190				
ALF-1	< 30 / 1080	< 30	CONCRETE ON NORTH WALL	6830	63	< 30		
ver clay	< 30	< 30		< 30				
3 - 1	78		36		73	67		
- 2	78			78	88	93		
1								
1 -1	(232)		232	631		43		
- 2	< 30		< 30	135				
1 - 3	< 30		178	43	113			
1 -4	43		< 30	< 30	48	58		
2 - 1	10,100	2670	228	4900	908	6120		
- 2	< 30	54						
25	38	< 30	38		48			
16								
6 10-16								
16 3-5								

TWC LPST SITE DIRECTIVE DOCUMENTATION

SITE NAME Naval Air Station - Tanks 162-1 & 162-2 UST ID NO. 28854

SITE ADDRESS Corpus Christi, TX LPST ID NO.

TRACKING NO. 920904067

INSPECTION DATE INSPECTOR David Harvey

The purpose of this form is to document field communications made between the TWC and PST owners/operators/representatives.

SITE DIAGRAM: Scale - North

Show location(s) of original (replacement) tank(s), line(s), excavation, overexcavation, boring(s), monitor/observation well(s), etc.

Since the soil contamination at this site appears to be very extensive, I granted permission to the contractor to backfill the excavation with the removed backfill. A remedial action plan (RAP) should be developed by the owner to address the contamination at this site.

This site documentation is intended to identify the release response activities. Site-specific Corrective Action Directive (CAD) letters will be issued by the TWC following the reporting of a release. Regulatory guidance will be supplied by the TWC throughout the course of the project.

This document reflects the assessment of site conditions by the TWC and is not intended to limit the scope of remediation necessary. In order to be reimbursed by TWC, an owner or operator must be eligible under TWC rules and the items performed must be allowable and reasonable under the TWC rules. This document alone does not mean a person is eligible or that any costs incurred are allowable or reasonable.

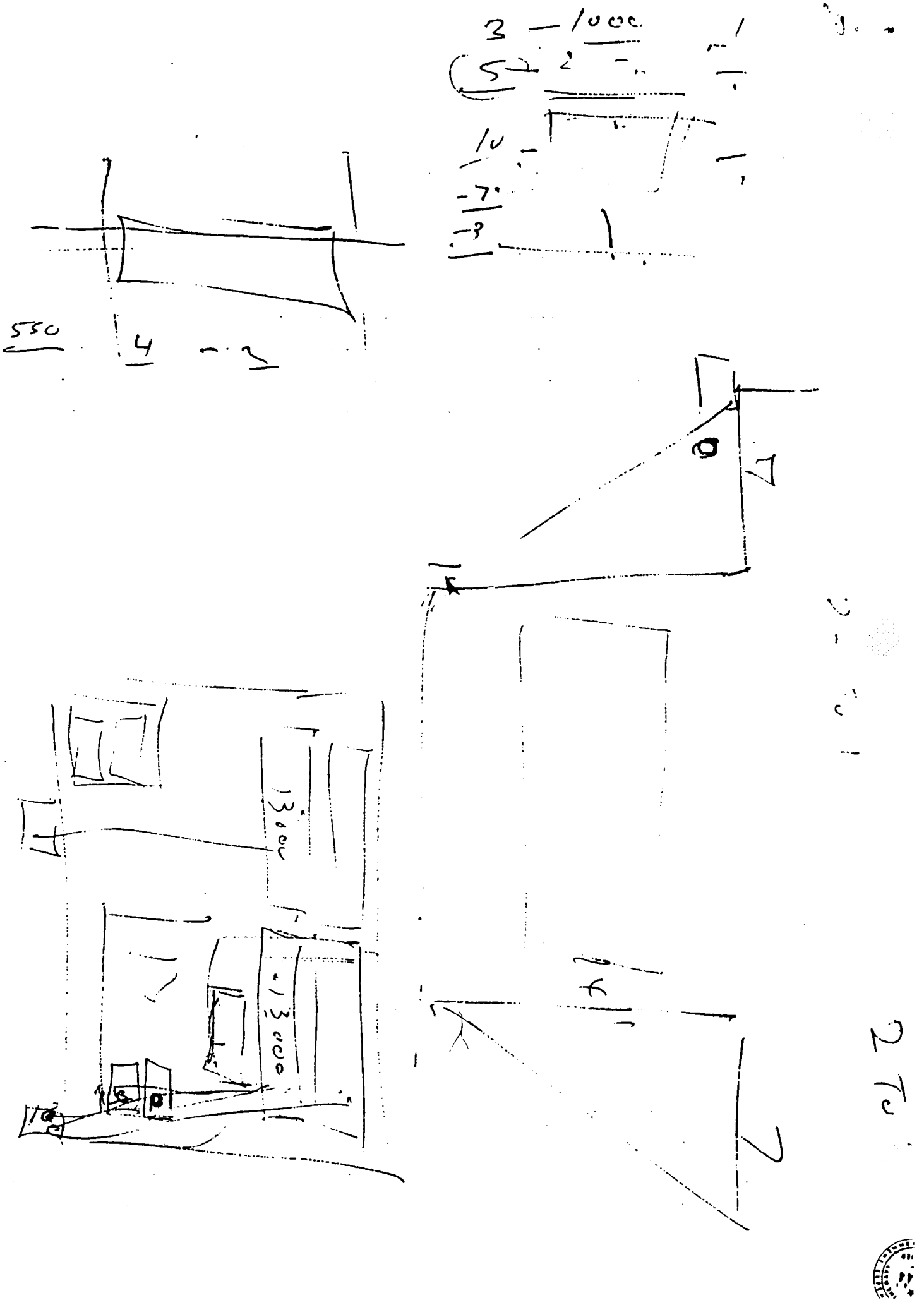
David Harvey
TWC Field Inspector

Received by Owner/Operator/Representative

10/21/91
Date

10-21-91
Date

TWC-0091 (10-10-90)


3 — 1000
550
4 — 3
13000
13000
2 To

FUEL FARM 216 TANK CLOSURE VERIFICATION

TANK CLOSURE VERIFICATION
NAS CORPUS CHRISTI — FUEL FARM 216

As a part of the site assessment activities, an attempt was made to verify that the tanks at Fuel Farm 216 had been closed according to reported procedures and specifications. As confirmation, during site assessment activities, one tank adjacent to MW20 was located and exposed using a backhoe on March 29, 1995.

Tank Closure Plans

According to NAS Corpus Christi Public Works records, each tank at the fuel farm was closed in place. The tanks were emptied, cleaned and filled with a cement and sand slurry mix. All underground pipes were cut, plugged as necessary, and left in place. All aboveground piping removed. Valve boxes, aqua drive boxes, and other partially exposed control devices were scavenged for salvage items and then destroyed to two feet below ground surface (bgs).

Tank Exposure Findings

To confirm the closure scenario, one of the tanks near the present location of MW20 was located. The edge of the tank was exposed. All soils temporarily removed were placed on visqueen sheeting until they were returned to the excavated area. Due to time constraints and the nature of the subsurface material (sloughing), the tank length was not precisely determined. The tank appeared to be about 8 to 10 feet in diameter, and was buried approximately 6 feet bgs. The backhoe was unable to reach below the bottom of the tank due to sloughing of unstable soils.

The tank was painted black (asphaltic coating) and the coating appeared to be in good condition. There was no indication of rust or integrity failure in the portion of the tank exposed. Soils beneath piping once connected to the tank displayed rust and black stained areas.

The tank's valve box was still attached to the tank. The approximate 8 foot by 4 foot box was constructed of cinder block, rebar and concrete/cement. The box, including rebar, was cut approximately 2 feet below ground surface, with debris removed. Inside the valve box, all piping had been cut with some of the piping capped. The approximate 1 foot diameter tank

opening (with flange fittings) had no cover. Visual inspection of this opening indicated that the tank was filled with a cement/sand slurry mix. When tapped, the tank appeared to be full because no hollow ringing was noted.

Excavation Closure

All excavated soils were placed upon visqueen sheeting during tank exposure activities. Soils were segregated by physical character (ie. topsoil, Sand "Fill" soils, gray-green sandy silts). When the activities were complete, all soils were returned to the excavated area. Care was taken to return soils in inverse order of their removal such that soils removed last were placed back into the excavated area first, restoring the original order of the soils within the excavated area. The excavated area was ultimately smoothed flat. The visqueen sheeting used was rolled up and contained within three 55-gallon steel drums. These drums were treated as investigative-derived waste (IDW) and properly disposed of with other IDW materials generated during site assessment activities.

Conclusions

It appears that this tank was closed according to the tank closure plan. There is no evidence indicating that the tanks were closed using different methods and it is therefore assumed that all 36 tanks were closed in the manner described above.

APPENDIX B

GROUNDWATER QUALITY DATA

LABORATORY ANALYTICAL DATA

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
Total Dissolved Solids (160.1)				
Total Dissolved Solids (160.1), mg/l	350	2100	<5.0	970
Date Analyzed	03.16.95	03.16.95	03.16.95	03.16.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-1	216GMW0301	03-14-95/1205
51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Purgeable Aromatics (8020)					
Benzene, ug/l	5.4	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	2.2	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	27.1	25.3	23.6	25.1	25.4
Surrogate - Expected Value, ug/l	30	30	30	30	30
Surrogate - % Actual Recovery	90 %	84 %	79 %	84 %	85 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	03.22.95	03.22.95	03.22.95	03.22.95	03.22.95
Total Dissolved Solids (160.1)					
Total Dissolved Solids (160.1), mg/l	1300	10000	2900	24000	22000
Date Analyzed	03.16.95	03.16.95	03.16.95	03.16.95	03.16.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	24.8
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	83 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.22.95
Total Dissolved Solids (160.1)	
Total Dissolved Solids (160.1), mg/l	<5.0
Date Analyzed	03.16.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51461

Received: 16 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
Total Dissolved Solids (160.1)				
Total Dissolved Solids (160.1), mg/l	5000	1000	1000	3600
Date Analyzed	03.17.95	03.17.95	03.17.95	03.17.95

CHAIN-OF-CUSTODY DOCUMENTATION

EnSafe

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO - 102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTANNERS	~~VOA 8240~~	PAH 8270	TPH 418.1	TDS				REMARKS
216HMW0901	3-14-95	1025	water	500 ml Amber		HCl	2			X					
↓	↓	↓	↓	1 litre Amber		–	2		X						
				500 ml plastic		–	1				X				
216GMW0901	3-14-95	1020	water	500 ml Amber		HCl	2			X					
↓	↓	↓	↓	1 litre Amber		–	2		X						
				500 ml plastic		–	1				X				

RELINQUISHED BY:	DATE / TIME	~~RELINQUISHED~~ Receive BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/13/95	SIGNATURE L. Bonds	3-15-95	SIGNATURE		SIGNATURE	
PRINTED JP George		PRINTED L. Bonds		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SS-51421		COMPANY		COMPANY	
REASON Ship to Lab	1830	REASON	9:26 am	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 4

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO - 102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) Shanna Aulen

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTANNERS	BTEX	TPH	8270	TDS				REMARKS
216FE00100	3-14-95	1615	H_2O	Amber 1L Amber 500ml Plastic	4°C		5		X	X	X				
216GMW0401	↓	1445	↓	↓	↓		5		X	X	X				
~~216GMW~~ Sac															

RELINQUISHED BY:	DATE / TIME	~~RELINQUISHED~~ Received BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE: [signature]	3/14/95	SIGNATURE: L. Bonds	3-15-95	SIGNATURE:		SIGNATURE:	
PRINTED: JP George		PRINTED: L. Bonds B		PRINTED:		PRINTED:	
COMPANY: EnSafe	16:50	COMPANY: S5-51421	9:26 am	COMPANY:		COMPANY:	
REASON: Ship to Lab		REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

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CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi
ADDRESS 216 Fuel Farm
PROJECT NAME/NUMBER CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER Larry Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE)

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	TDS					REMARKS
216KMW0901	3-14-95	1030	water	500 ml Amber		HCl	2	X							Matrix Spike
↓	↓	↓	↓	1 litre Amber		-	2		X						
				500 ml Plastic		-	1			X					
216XMW0901	3-14-95	1035	water	500 ml Amber		HCl	2	X							matrix Spike Duplicate
↓	↓	↓	↓	1 litre Amber		-	2		X						
				500 ml plastic		-	1			X					

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE [signature]	3/14/95	SIGNATURE [signature]	3/15/95	SIGNATURE		SIGNATURE	
PRINTED J.P. George	TIME	PRINTED L. Bonds D	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe		COMPANY SS-51421		COMPANY		COMPANY	
REASON Ship to lab	1830	REASON	9:24	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS: * NOTE: THESE ARE MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

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CHAIN OF CUSTODY RECORD

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311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: 216 Fuel Farm
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) Water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	TDS					REMARKS
216GMW0701	3-14-95	1540	water	500 ml Amber	4°C	HCl	2	X							
↓	↓	↓	↓	1 litre Amber	4°C	–	2		X						
				500 ml plastic	4°C	–	1			X					
216GMW0301	3-14-95	1205	water	500 ml Amber	4°C	HCl	2	X							
↓	↓	↓	↓	1 litre Amber	↓	–	2		X						
				500 ml plastic	↓	–	1			X					

RELINQUISHED BY:	DATE / TIME	Received BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/14/95	SIGNATURE L. Bonds	3-15-95	SIGNATURE		SIGNATURE	
PRINTED JP George Jr		PRINTED L. Bonds A		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SS-51421		COMPANY		COMPANY	
REASON Ship to Lab	1830	REASON	9:26 am	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

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CHAIN OF CUSTODY RECORD

PAGE 1 OF ____

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) ____

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH	8270	BTEX	TDS				REMARKS
216GMW1001	3-13-95	1505	W	3-40ml VOA; 2-1/2 liter Amber 2-1 Liter Amber; 1 1/2 liter poly	4°C	On Jars	8	X	X	X	X				
216GMW0801	3-13-95	1420	↓	↓			8	X	X	X	X				
~~216GMW1201~~	~~3-13-95~~	~~1340~~					~~8~~	~~X~~	~~X~~	~~X~~	~~X~~				
216RE00100	3-13-95	1330	↓	3-40 ml VOA			3			X					
216TE0001	3-13-95	1330	↓	3-40 ml VOAs			3			X					
216GMW1201	3-13-95	1340	W	3-40ml			3			X					

RELINQUISHED BY:	DATE / TIME	~~RELINQUISHED~~ Received VAS BY: B	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE: [signature]		SIGNATURE: L Baker	3/14/95	SIGNATURE:		SIGNATURE:	
PRINTED: JP George		PRINTED: L Baker		PRINTED:		PRINTED:	
COMPANY: EnSafe		COMPANY: SLES		COMPANY:		COMPANY:	
REASON: Ship to Lab		REASON: SS-51386	9:48	REASON:		REASON:	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.: ____
SPECIAL INSTRUCTION: ____

COMMENTS: ____

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

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CHAIN OF CUSTODY RECORD

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311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) Alanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8270	TDS	TPH					REMARKS
216 RE00100	3-13-95	1330	W	2-1 liter Amber 1-½ liter poly; 2-½ liter ambers	4°C	on Jars	5	X	X	X					
216 GMW1201	3-13-95	1340	W	↓	↓	↓	5	X	X	X					

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY: Received by	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE: [signature]		SIGNATURE: L Baker A	3/14/95	SIGNATURE:		SIGNATURE:	
PRINTED: LP George		PRINTED: L Baker		PRINTED:		PRINTED:	
COMPANY: EnSafe		COMPANY: SLES		COMPANY:		COMPANY:	
REASON: Ship to Lab		REASON: S5-51386	9:48	REASON:		REASON:	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) Water

PROJECT MANAGER: Larry R. Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	PAH 8270	TPH 418.1	TDS						REMARKS
216GMW1601	3-15-95	820	H_2O	500 ml Amber	4°C	HCL	2		X							
	↓	↓	↓	1 liter Amber	↓	—	2	X								
				500 ml plastic		—	1			X						
216GMW1801	3/15/95	8900	H_2O	500 ml Amber	4°C	HCl	2		X							
				1 liter Amber	↓	—	2	X								
				500 ml plastic	↓	—	1			X						

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE: S. Curley		SIGNATURE: L. Bonds	3/16/95	SIGNATURE:		SIGNATURE:	
PRINTED: S. Curley		PRINTED: L. Bonds A		PRINTED:		PRINTED:	
COMPANY: EnSafe	TIME	COMPANY: 51461	TIME 10:09 am	COMPANY:	TIME	COMPANY:	TIME
REASON: Ship to Lab		REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry R Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	TDS				REMARKS
216GMW05D1	3-15-95	1015	water	40 ml vial	4°C	HCl	3	✓							
↓	↓	↓	↓	500 ml Amber	↓	HCl	2		✓						
				1 litre Amber		—	2			✓					
				500 ml Plastic		—	1				✓				
216GMW19D1	3-15-95	1000	water	40 ml vial	4°C	HCl	3	✓							
↓	↓	↓	↓	500 ml Amber	↓	HCl	2		✓						
				1 litre Amber		—	2			✓					
				500 ml plastic		—	1				✓				

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY: (Received)	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/16/95	SIGNATURE L. Bonds	3-16-95	SIGNATURE		SIGNATURE	
PRINTED JP George Jr		PRINTED L. Bonds B		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SH61		COMPANY		COMPANY	
REASON Ship to Lab	1800	REASON	10:09 am	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

POTABLE WATER SUPPLY WELL SURVEY

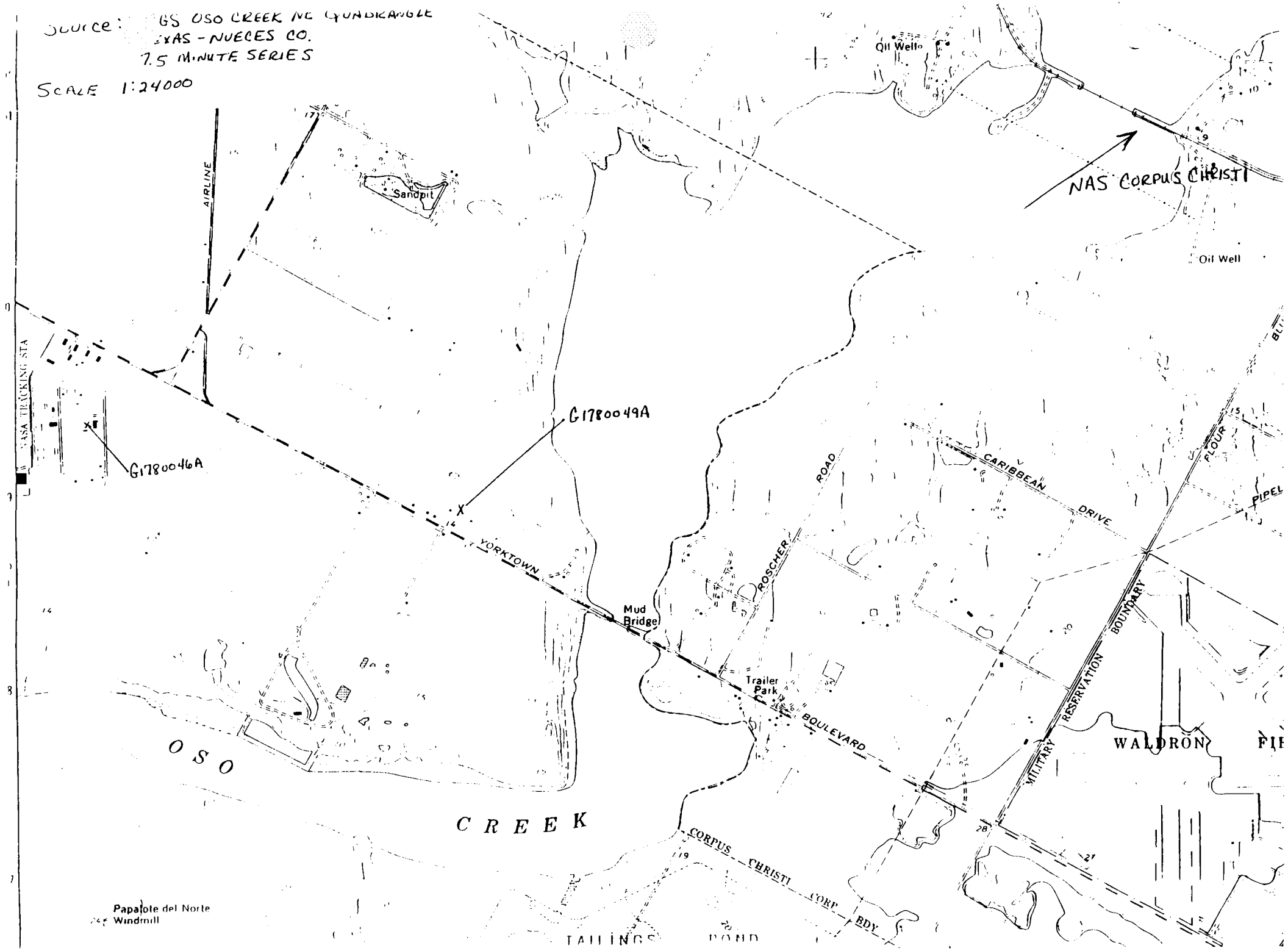
5/16/95 Public Water Supply Wells near CC NAS [redacted]

A1name: BRUTON APARTMENTS
A1adrsa: C/O WATER UTILITIES OFFICIAL
A1adrsb: P O BOX 8794
A1city: CORPUS CHRISTI
A1state: TX
A1zcode: 78412
A3name: MS JERRY GREATHOUSE
Title: MANAGER
A1tnum: 512/991-9400
A2aflg: I — Inactive
Sdate: 4/17/91
PWS ID: 1780046 - public Water Supply I D #
WATER SOURCE: G1780046A
STATE WELL NUMBER: 83227
LATITUDE: 273900
LONGITUDE: 972217
QUADRANGLE NUMBER: 2797-424
WELL DEPTH: 240

A1name: COUNTRY LIVING MOBILE HOME PARK
A1adrsa: C/O CHARLES P CONNALLY
A1adrsb: 7922 YORKSTOWN ROAD
A1city: CORPUS CHRISTI
A1state: TX
A1zcode: 78414
A3name: CHARLES P CONNALLY
Title: OWNER
A1tnum: 512/991-2026
A2aflg: A - Active
Sdate: 12/13/94 — last surveyed
PWS ID: 1780049
WATER SOURCE: G1780049A
STATE WELL NUMBER: 83227
LATITUDE: 273844
LONGITUDE: 972106
QUADRANGLE NUMBER: 2797-424 — USGS Map #
WELL DEPTH: 248

Source: USGS OSO CREEK NE QUADRANGLE
TEXAS - NUECES CO.
7.5 MINUTE SERIES

SCALE 1:24000



5/16/95 Texas Water Development Board Wells near CC NAS

1 = ± 1 Second
5 = centeroid of 2.5' quad

STATE WELL NUMBER	LATITUDE	LONGITUDE	OWNER-1	OWNER-2	LOCMETHOD	DRILLED	WELLDEPTH
8322502	274115	971845	Oso State well 1		5	1950	8543
8322601	274115	971615	Flour Bluff State well	G-1	5	1948	1196
8322701	273845	972115	King Ranch		5		146
8322702	273845	972115			5		
8322801	273853	971745	Flour Bluff School		1	1953	181
8322802	273845	971845	Flour Bluff School		5	1953	172
8322901	273845	971615	East Flour Bluff State	well AA-1	5	1951	2511
8322902	273845	971615	East Flour Bluff State	well L-2	5	1951	6800
8322903	273845	971615	East Flour Bluff State	well AA-1	5	1951	6907

APPENDIX C

SOIL ASSESSMENT

SOIL ANALYTICAL DATA

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51709

Received: 28 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-1	216SB00108	03-27-95/1130	ENC01
51709-2	216SB00210	03-27-95/1350	ENC01

PARAMETER	51709-1	51709-2
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	60	360
Date Analyzed	04.03.95	04.03.95
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	15000	10000
Toluene, ug/kg dw	1800	880
Ethylbenzene, ug/kg dw	2300	<625
Total Xylenes, ug/kg dw	11000	1500
Surrogate - a,a,a-Trifluorotoluene	29.4	13720
Surrogate - Expected Value, ug/kg dw	30	12000
Surrogate - % Actual Recovery	98 %	114 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.05.95	04.05.95

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REPORT OF RESULTS

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51709-1	216SB00108	03-27-95/1130	ENC01
51709-2	216SB00210	03-27-95/1350	ENC01

PARAMETER	51709-1	51709-2
Semivolatile Organics (8270)		
Naphthalene, ug/kg dw	1300	890
Acenaphthylene, ug/kg dw	<390	<410
Acenaphthene, ug/kg dw	<390	<410
Fluorene, ug/kg dw	<390	<410
Phenanthrene, ug/kg dw	<390	570
Anthracene, ug/kg dw	<390	<410
Fluoranthene, ug/kg dw	<390	<410
Pyrene, ug/kg dw	<390	<410
Chrysene, ug/kg dw	<390	<410
Benzo(a)anthracene, ug/kg dw	<390	<410
Benzo(b)fluoranthene, ug/kg dw	<390	<410
Benzo(k)fluoranthene, ug/kg dw	<390	<410
Benzo(a)pyrene, ug/kg dw	<390	<410
Indeno(1,2,3-cd)pyrene, ug/kg dw	<390	<410
Dibenz(a,h)anthracene, ug/kg dw	<390	<410
Benzo(g,h,i)perylene, ug/kg dw	<390	<410
2-Methylnaphthalene, ug/kg dw	3600	2500
1-Methylnaphthalene, ug/kg dw	2400	2000
Surrogate-NBZ	57 %	54 %
Surrogate-2FBP	68 %	69 %
Surrogate-TPH	72 %	62 %
Date Extracted	03.30.95	03.30.95
Date Analyzed	04.12.95	04.12.95

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51709-1	216SB00108	03-27-95/1130	ENC01
51709-2	216SB00210	03-27-95/1350	ENC01

PARAMETER	51709-1	51709-2
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline, mg/kg dw	870	260
Date Analyzed	04.05.95	04.05.95
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Kerosene, mg/kg dw	580	450X
Hydrocarbons as Diesel Fuel, mg/kg dw	<240	<250
Hydrocarbons as Heavy Oils, mg/kg dw	<780	<820
Hydrocarbons as Mineral Spirits, mg/kg dw	<240	<250
Hydrocarbons as Naphtha, mg/kg dw	<240	<250
Hydrocarbons as Varsol, mg/kg dw	<240	<250
Hydrocarbons as Fuel Oil, mg/kg dw	<780	<820
Date Extracted	03.31.95	03.31.95
Date Analyzed	04.05.95	04.05.95
Percent Solids (160.3), %	85	80

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-3	219SB00208	03-27-95/1345	ENC01
51709-4	216SB00310	03-27-95/1450	ENC01
51709-5	216SB00112	03-27-95/1145	ENC01
51709-6	216SB00308	03-27-95/1440	ENC01
51709-7	216SB00408	03-27-95/1610	ENC01

PARAMETER	51709-3	51709-4	51709-5	51709-6	51709-7
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	260	70	<13	100	1600
Date Analyzed	04.03.95	04.03.95	04.03.95	04.04.95	04.04.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	6400	6100	130	16000	70000
Toluene, ug/kg dw	<625	3800	<6.3	1400	38000
Ethylbenzene, ug/kg dw	<625	3400	52	1400	22000
Total Xylenes, ug/kg dw	3300	14000	91	6400	160000
Surrogate - a,a,a-Trifluorotoluene	12000	24682	164	13568	57236
Surrogate - Expected Value, ug/kg dw	12000	25800	150	12150	24600
Surrogate - % Actual Recovery	100 %	96 %	109 %	112 %	233 %*F36
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.05.95	04.05.95	04.03.95	04.05.95	04.05.95

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
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51709-4	216SB00310	03-27-95/1450	ENC01
51709-5	216SB00112	03-27-95/1145	ENC01
51709-6	216SB00308	03-27-95/1440	ENC01
51709-7	216SB00408	03-27-95/1610	ENC01

PARAMETER	51709-3	51709-4	51709-5	51709-6	51709-7
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<410	<380	<420	<410	5000
Acenaphthylene, ug/kg dw	<410	<380	<420	<410	<400
Acenaphthene, ug/kg dw	<410	<380	<420	<410	<400
Fluorene, ug/kg dw	<410	<380	<420	<410	<400
Phenanthrene, ug/kg dw	<410	<380	<420	<410	<400
Anthracene, ug/kg dw	<410	<380	<420	<410	<400
Fluoranthene, ug/kg dw	<410	<380	<420	<410	<400
Pyrene, ug/kg dw	<410	<380	<420	<410	<400
Chrysene, ug/kg dw	<410	<380	<420	<410	<400
Benzo(a)anthracene, ug/kg dw	<410	<380	<420	<410	<400
Benzo(b)fluoranthene, ug/kg dw	470	<380	<420	<410	<400
Benzo(k)fluoranthene, ug/kg dw	<410	<380	<420	<410	<400
Benzo(a)pyrene, ug/kg dw	550	<380	<420	<410	<400
Indeno(1,2,3-cd)pyrene, ug/kg dw	<410	<380	<420	<410	<400
Dibenz(a,h)anthracene, ug/kg dw	<410	<380	<420	<410	<400
Benzo(g,h,i)perylene, ug/kg dw	<410	<380	<420	<410	<400
2-Methylnaphthalene, ug/kg dw	<410	820	<420	500	6600
1-Methylnaphthalene, ug/kg dw	<410	610	<420	<410	4200
Surrogate-NBZ	57 %	44 %	41 %	40 %	47 %
Surrogate-2FBP	75 %	58 %	51 %	53 %	55 %
Surrogate-TPH	55 %	69 %	66 %	62 %	61 %
Date Extracted	03.30.95	03.30.95	03.30.95	03.30.95	03.30.95
Date Analyzed	04.12.95	04.12.95	04.12.95	04.12.95	04.12.95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-3	219SB00208	03-27-95/1345	ENC01
51709-4	216SB00310	03-27-95/1450	ENC01
51709-5	216SB00112	03-27-95/1145	ENC01
51709-6	216SB00308	03-27-95/1440	ENC01
51709-7	216SB00408	03-27-95/1610	ENC01

PARAMETER	51709-3	51709-4	51709-5	51709-6	51709-7
Percent Solids (160.3), %	80	86	79	81	82

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-8	216HB00410	03-27-95/1615	ENC01
51709-9	216SB00410	03-27-95/1615	ENC01
51709-10	216SB00404	03-27-95/1600	ENC01

PARAMETER	51709-8	51709-9	51709-10
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	920	110	<11
Date Analyzed	04.04.95	04.04.95	04.04.95
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	5200	4000	<5.7
Toluene, ug/kg dw	30000	<580	<5.7
Ethylbenzene, ug/kg dw	18000	13000	<5.7
Total Xylenes, ug/kg dw	120000	47000	16
Surrogate - a,a,a-Trifluorotoluene	34640	14190	133
Surrogate - Expected Value, ug/kg dw	12000	12900	150
Surrogate - % Actual Recovery	289 %*F36	110 %	89 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.05.95	04.05.95	04.03.95

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-8	216HB00410	03-27-95/1615	ENC01
51709-9	216SB00410	03-27-95/1615	ENC01
51709-10	216SB00404	03-27-95/1600	ENC01

PARAMETER	51709-8	51709-9	51709-10
Semivolatile Organics (8270)			
Naphthalene, ug/kg dw	<410	1700	<370
Acenaphthylene, ug/kg dw	<410	<380	<370
Acenaphthene, ug/kg dw	<410	<380	<370
Fluorene, ug/kg dw	<410	<380	<370
Phenanthrene, ug/kg dw	<410	<380	<370
Anthracene, ug/kg dw	<410	<380	<370
Fluoranthene, ug/kg dw	<410	<380	<370
Pyrene, ug/kg dw	<410	<380	<370
Chrysene, ug/kg dw	<410	<380	<370
Benzo(a)anthracene, ug/kg dw	<410	<380	<370
Benzo(b)fluoranthene, ug/kg dw	<410	<380	<370
Benzo(k)fluoranthene, ug/kg dw	<410	<380	<370
Benzo(a)pyrene, ug/kg dw	<410	<380	<370
Indeno(1,2,3-cd)pyrene, ug/kg dw	<410	<380	<370
Dibenz(a,h)anthracene, ug/kg dw	<410	<380	<370
Benzo(g,h,i)perylene, ug/kg dw	<410	<380	<370
2-Methylnaphthalene, ug/kg dw	600	2600	<370
1-Methylnaphthalene, ug/kg dw	<410	1700	<370
Surrogate-NBZ	38 %	56 %	47 %
Surrogate-2FBP	47 %	58 %	66 %
Surrogate-TPH	67 %	66 %	64 %
Date Extracted	03.30.95	03.30.95	03.30.95
Date Analyzed	04.12.95	04.12.95	04.12.95

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51709-8	216HB00410	03-27-95/1615	ENC01
51709-9	216SB00410	03-27-95/1615	ENC01
51709-10	216SB00404	03-27-95/1600	ENC01

PARAMETER	51709-8	51709-9	51709-10
Percent Solids (160.3), %	80	86	88

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LOG NO: S5-51737

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311 Plus Park Blvd.
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Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-1	216SB00812	03-28-95/1120	ENC01
51737-2	216SB00510	03-28-95/0845	ENC01

PARAMETER	51737-1	51737-2
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	22	29
Date Analyzed	04.05.95	04.05.95
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	2200	530
Toluene, ug/kg dw	240	<240
Ethylbenzene, ug/kg dw	<120	<240
Total Xylenes, ug/kg dw	580	760
Surrogate - a,a,a-Trifluorotoluene	2590	4738
Surrogate - Expected Value, ug/kg dw	2490	5040
Surrogate - % Actual Recovery	104 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.06.95	04.08.95

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-1	216SB00812	03-28-95/1120	ENC01
51737-2	216SB00510	03-28-95/0845	ENC01

PARAMETER	51737-1	51737-2
Semivolatile Organics (8270)		
Naphthalene, ug/kg dw	<400	890
Acenaphthylene, ug/kg dw	<400	<390
Acenaphthene, ug/kg dw	<400	<390
Fluorene, ug/kg dw	<400	<390
Phenanthrene, ug/kg dw	<400	<390
Anthracene, ug/kg dw	<400	<390
Fluoranthene, ug/kg dw	<400	<390
Pyrene, ug/kg dw	<400	<390
Chrysene, ug/kg dw	<400	<390
Benzo(a)anthracene, ug/kg dw	<400	<390
Benzo(b)fluoranthene, ug/kg dw	<400	<390
Benzo(k)fluoranthene, ug/kg dw	<400	<390
Benzo(a)pyrene, ug/kg dw	<400	<390
Indeno(1,2,3-cd)pyrene, ug/kg dw	<400	<390
Dibenz(a,h)anthracene, ug/kg dw	<400	<390
Benzo(g,h,i)perylene, ug/kg dw	<400	<390
2-Methylnaphthalene, ug/kg dw	<400	1700
1-Methylnaphthalene, ug/kg dw	<400	1300
Surrogate-NBZ	53 %	54 %
Surrogate-2FBP	73 %	64 %
Surrogate-TPH	72 %	66 %
Date Extracted	03.30.95	03.30.95
Date Analyzed	04.12.95	04.12.95

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-1	216SB00812	03-28-95/1120	ENC01
51737-2	216SB00510	03-28-95/0845	ENC01

PARAMETER	51737-1	51737-2
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline, mg/kg dw	62	<12*F43
Date Analyzed	04.06.95	04.08.95
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Kerosene, mg/kg dw	23X	290X
Hydrocarbons as Diesel Fuel, mg/kg dw	<12	<240
Hydrocarbons as Heavy Oils, mg/kg dw	<40	<780
Hydrocarbons as Mineral Spirits, mg/kg dw	<12	<240
Hydrocarbons as Naphtha, mg/kg dw	<12	<240
Hydrocarbons as Varsol, mg/kg dw	<12	<240
Hydrocarbons as Fuel Oil, mg/kg dw	<40	<780
Date Extracted	03.31.95	03.31.95
Date Analyzed	04.05.95	04.05.95
Percent Solids (160.3), %	83	84

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-13	216SB00710	03-28-95/1000	ENC02
51737-14	216SB00804	03-28-95/1100	ENC02
51737-15	216SB00806	03-28-95/1110	ENC02

PARAMETER	51737-13	51737-14	51737-15
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<12	<11	<12
Date Analyzed	04.07.95	04.07.95	04.10.95
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<5.9	<5.7	<5.8
Toluene, ug/kg dw	<5.9	<5.7	<5.8
Ethylbenzene, ug/kg dw	42	<5.7	<5.8
Total Xylenes, ug/kg dw	56	<5.7	<5.8
Surrogate - a,a,a-Trifluorotoluene	145	139	142
Surrogate - Expected Value, ug/kg dw	150	150	150
Surrogate - % Actual Recovery	97 %	93 %	95 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.03.95	04.04.95	04.04.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-13	216SB00710	03-28-95/1000	ENC02
51737-14	216SB00804	03-28-95/1100	ENC02
51737-15	216SB00806	03-28-95/1110	ENC02

PARAMETER	51737-13	51737-14	51737-15
Semivolatile Organics (8270)			
Naphthalene, ug/kg dw	<390	<380	<380
Acenaphthylene, ug/kg dw	<390	<380	<380
Acenaphthene, ug/kg dw	<390	<380	<380
Fluorene, ug/kg dw	<390	<380	<380
Phenanthrene, ug/kg dw	<390	<380	<380
Anthracene, ug/kg dw	<390	<380	<380
Fluoranthene, ug/kg dw	<390	<380	<380
Pyrene, ug/kg dw	<390	<380	<380
Chrysene, ug/kg dw	<390	<380	<380
Benzo(a)anthracene, ug/kg dw	<390	<380	<380
Benzo(b)fluoranthene, ug/kg dw	<390	<380	<380
Benzo(k)fluoranthene, ug/kg dw	<390	<380	<380
Benzo(a)pyrene, ug/kg dw	<390	<380	<380
Indeno(1,2,3-cd)pyrene, ug/kg dw	<390	<380	<380
Dibenz(a,h)anthracene, ug/kg dw	<390	<380	<380
Benzo(g,h,i)perylene, ug/kg dw	<390	<380	<380
2-Methylnaphthalene, ug/kg dw	<390	<380	<380
1-Methylnaphthalene, ug/kg dw	<390	<380	<380
Surrogate-NBZ	60 %	75 %	61 %
Surrogate-2FBP	69 %	85 %	71 %
Surrogate-TPH	87 %	92 %	92 %
Date Extracted	03.30.95	03.30.95	03.30.95
Date Analyzed	04.15.95	04.15.95	04.15.95

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LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-13	216SB00710	03-28-95/1000	ENC02
51737-14	216SB00804	03-28-95/1100	ENC02
51737-15	216SB00806	03-28-95/1110	ENC02

PARAMETER	51737-13	51737-14	51737-15
Percent Solids (160.3), %	85	87	86

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-8	216SB01002	03-28-95/1545	ENC01
51737-9	216SB00506	03-28-95/0830	ENC02
51737-10	216SB00606	03-28-95/0910	ENC02
51737-11	216SB00610	03-28-95/0920	ENC02
51737-12	216SB00706	03-28-95/0955	ENC02

PARAMETER	51737-8	51737-9	51737-10	51737-11	51737-12
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	26	<12	22	29	<11
Date Analyzed	04.05.95	04.07.95	04.07.95	04.07.95	04.07.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	<110	<6.0	<5.6	4700	<5.7
Toluene, ug/kg dw	<110	<6.0	<5.6	480	<5.7
Ethylbenzene, ug/kg dw	<110	<6.0	<5.6	630	<5.7
Total Xylenes, ug/kg dw	<110	<6.0	<5.6	1700	<5.7
Surrogate - a,a,a-Trifluorotoluene	2526	142	144	2941	141
Surrogate - Expected Value, ug/kg dw	2640	150	150	2580	150
Surrogate - % Actual Recovery	96 %	95 %	96 %	114 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.09.95	04.03.95	04.03.95	04.06.95	04.03.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-8	216SB01002	03-28-95/1545	ENC01
51737-9	216SB00506	03-28-95/0830	ENC02
51737-10	216SB00606	03-28-95/0910	ENC02
51737-11	216SB00610	03-28-95/0920	ENC02
51737-12	216SB00706	03-28-95/0955	ENC02

PARAMETER	51737-8	51737-9	51737-10	51737-11	51737-12
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	1900	<390	<370	<380	<380
Acenaphthylene, ug/kg dw	<370	<390	<370	<380	<380
Acenaphthene, ug/kg dw	<370	<390	<370	<380	<380
Fluorene, ug/kg dw	<370	<390	<370	<380	<380
Phenanthrene, ug/kg dw	<370	<390	<370	430	<380
Anthracene, ug/kg dw	<370	<390	<370	<380	<380
Fluoranthene, ug/kg dw	<370	<390	<370	480	<380
Pyrene, ug/kg dw	<370	<390	<370	630	<380
Chrysene, ug/kg dw	<370	<390	<370	<380	<380
Benzo(a)anthracene, ug/kg dw	<370	<390	<370	<380	<380
Benzo(b)fluoranthene, ug/kg dw	<370	<390	<370	<380	<380
Benzo(k)fluoranthene, ug/kg dw	<370	<390	<370	<380	<380
Benzo(a)pyrene, ug/kg dw	<370	<390	<370	<380	<380
Indeno(1,2,3-cd)pyrene, ug/kg dw	<370	<390	<370	<380	<380
Dibenz(a,h)anthracene, ug/kg dw	<370	<390	<370	<380	<380
Benzo(g,h,i)perylene, ug/kg dw	<370	<390	<370	<380	<380
2-Methylnaphthalene, ug/kg dw	3700	<390	<370	480	<380
1-Methylnaphthalene, ug/kg dw	2600	<390	<370	<380	<380
Surrogate-NBZ	80 %	68 %	68 %	78 %	58 %
Surrogate-2FBP	80 %	77 %	79 %	84 %	70 %
Surrogate-TPH	96 %	95 %	96 %	96 %	100 %
Date Extracted	03.30.95	03.30.95	03.30.95	03.30.95	03.30.95
Date Analyzed	04.14.95	04.14.95	04.15.95	04.15.95	04.15.95

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LOG NO: S5-51737

Received: 29 MAR 95

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Nashville, TN 37217

Purchase Order: 0225/95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-8	216SB01002	03-28-95/1545	ENC01
51737-9	216SB00506	03-28-95/0830	ENC02
51737-10	216SB00606	03-28-95/0910	ENC02
51737-11	216SB00610	03-28-95/0920	ENC02
51737-12	216SB00706	03-28-95/0955	ENC02

PARAMETER	51737-8	51737-9	51737-10	51737-11	51737-12
Percent Solids (160.3), %	88	84	89	86	87

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-3	216SB00910	03-28-95/1350	ENC01
51737-4	216SB00814	03-28-95/1130	ENC01
51737-5	216SB00908	03-28-95/1340	ENC01
51737-6	216SB01008	03-28-95/1600	ENC01
51737-7	216SB01016	03-28-95/1615	ENC01

PARAMETER	51737-3	51737-4	51737-5	51737-6	51737-7
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<12	<13	13	91	25
Date Analyzed	04.07.95	04.05.95	04.05.95	04.05.95	04.05.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	17	<6.7	<5.9	280	<240
Toluene, ug/kg dw	<5.8	<6.7	<5.9	<120	1000
Ethylbenzene, ug/kg dw	<5.8	<6.7	<5.9	<120	<240
Total Xylenes, ug/kg dw	<5.8	<6.7	<5.9	830	1200
Surrogate - a,a,a-Trifluorotoluene	139	143	141	2406	4754
Surrogate - Expected Value, ug/kg dw	150	150	150	2550	5040
Surrogate - % Actual Recovery	93 %	95 %	94 %	94 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.03.95	04.03.95	04.03.95	04.06.95	04.06.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-3	216SB00910	03-28-95/1350	ENC01
51737-4	216SB00814	03-28-95/1130	ENC01
51737-5	216SB00908	03-28-95/1340	ENC01
51737-6	216SB01008	03-28-95/1600	ENC01
51737-7	216SB01016	03-28-95/1615	ENC01

PARAMETER	51737-3	51737-4	51737-5	51737-6	51737-7
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<380	<440	<390	<390	<390
Acenaphthylene, ug/kg dw	<380	<440	<390	<390	<390
Acenaphthene, ug/kg dw	<380	<440	<390	<390	<390
Fluorene, ug/kg dw	<380	<440	<390	<390	<390
Phenanthrene, ug/kg dw	<380	<440	<390	<390	<390
Anthracene, ug/kg dw	<380	<440	<390	<390	<390
Fluoranthene, ug/kg dw	<380	<440	<390	<390	<390
Pyrene, ug/kg dw	<380	<440	<390	<390	<390
Chrysene, ug/kg dw	<380	<440	<390	<390	<390
Benzo(a)anthracene, ug/kg dw	<380	<440	<390	<390	<390
Benzo(b)fluoranthene, ug/kg dw	<380	<440	<390	<390	<390
Benzo(k)fluoranthene, ug/kg dw	<380	<440	<390	<390	<390
Benzo(a)pyrene, ug/kg dw	<380	<440	<390	<390	<390
Indeno(1,2,3-cd)pyrene, ug/kg dw	<380	<440	<390	<390	<390
Dibenz(a,h)anthracene, ug/kg dw	<380	<440	<390	<390	<390
Benzo(g,h,i)perylene, ug/kg dw	<380	<440	<390	<390	<390
2-Methylnaphthalene, ug/kg dw	<380	<440	<390	800	<390
1-Methylnaphthalene, ug/kg dw	<380	<440	<390	530	<390
Surrogate-NBZ	46 %	62 %	66 %	68 %	67 %
Surrogate-2FBP	65 %	73 %	78 %	77 %	79 %
Surrogate-TPH	63 %	92 %	96 %	96 %	99 %
Date Extracted	03.30.95	03.30.95	03.30.95	03.30.95	03.30.95
Date Analyzed	04.12.95	04.14.95	04.14.95	04.14.95	04.14.95

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LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51737-3	216SB00910	03-28-95/1350	ENC01
51737-4	216SB00814	03-28-95/1130	ENC01
51737-5	216SB00908	03-28-95/1340	ENC01
51737-6	216SB01008	03-28-95/1600	ENC01
51737-7	216SB01016	03-28-95/1615	ENC01

PARAMETER	51737-3	51737-4	51737-5	51737-6	51737-7
Percent Solids (160.3), %	86	75	85	85	84

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LOG NO: S5-51762

Received: 30 MAR 95

Purchase Order: 0225/95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: 010208420 NAS Corpus Christi (ENC02/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-2	216SB01104	03-29-95/1342	ENC02
51762-3	216SB01206	03-29-95/1500	ENC02
51762-4	216SB01210	03-29-95/1515	ENC02
51762-5	216SB01302	03-29-95/1545	ENC02
51762-6	216SB01306	03-29-95/1600	ENC02

PARAMETER	51762-2	51762-3	51762-4	51762-5	51762-6
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<11	5600	<12	120	24
Date Analyzed	04.10.95	04.06.95	04.06.95	04.06.95	04.06.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	<5.7	<580	<6.2	<5.5	<2400
Toluene, ug/kg dw	<5.7	3400	<6.2	<5.5	<2400
Ethylbenzene, ug/kg dw	<5.7	20000	<6.2	<5.5	25000
Total Xylenes, ug/kg dw	<5.7	51000	<6.2	7.5	26000
Surrogate - a,a,a-Trifluorotoluene	125	15480	149	143	55760
Surrogate - Expected Value, ug/kg dw	150	12900	150	150	49200
Surrogate - % Actual Recovery	83 %	120 %	99 %	95 %	113 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.10.95	04.12.95	04.11.95	04.10.95	04.11.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-2	216SB01104	03-29-95/1342	ENC02
51762-3	216SB01206	03-29-95/1500	ENC02
51762-4	216SB01210	03-29-95/1515	ENC02
51762-5	216SB01302	03-29-95/1545	ENC02
51762-6	216SB01306	03-29-95/1600	ENC02

PARAMETER	51762-2	51762-3	51762-4	51762-5	51762-6
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<380	1600	<410	<460	1200
Acenaphthylene, ug/kg dw	<380	<380	<410	<460	<400
Acenaphthene, ug/kg dw	<380	<380	<410	<460	<400
Fluorene, ug/kg dw	<380	<380	<410	<460	<400
Phenanthrene, ug/kg dw	<380	<380	<410	<460	710
Anthracene, ug/kg dw	<380	<380	<410	<460	<400
Fluoranthene, ug/kg dw	<380	<380	<410	<460	550
Pyrene, ug/kg dw	<380	<380	<410	<460	<400
Chrysene, ug/kg dw	<380	<380	<410	<460	<400
Benzo(a)anthracene, ug/kg dw	<380	<380	<410	<460	<400
Benzo(b)fluoranthene, ug/kg dw	<380	<380	<410	<460	<400
Benzo(k)fluoranthene, ug/kg dw	<380	<380	<410	<460	<400
Benzo(a)pyrene, ug/kg dw	<380	<380	<410	<460	<400
Indeno(1,2,3-cd)pyrene, ug/kg dw	<380	<380	<410	<460	<400
Dibenz(a,h)anthracene, ug/kg dw	<380	<380	<410	<460	<400
Benzo(g,h,i)perylene, ug/kg dw	<380	<380	<410	<460	<400
2-Methylnaphthalene, ug/kg dw	<380	5400	<410	<460	4100
1-Methylnaphthalene, ug/kg dw	<380	4300	<410	<460	3100
Surrogate-NBZ	45 %	73 %	42 %	56 %	79 %
Surrogate-2FBP	69 %	64 %	62 %	82 %	76 %
Surrogate-TPH	71 %	68 %	71 %	80 %	78 %
Date Extracted	04.03.95	04.03.95	04.03.95	04.03.95	04.03.95
Date Analyzed	04.14.95	04.15.95	04.15.95	04.15.95	04.15.95

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LOG NO: S5-51762

Received: 30 MAR 95

Purchase Order: 0225/95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: 010208420 NAS Corpus Christi (ENC02/01)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-2	216SB01104	03-29-95/1342	ENC02
51762-3	216SB01206	03-29-95/1500	ENC02
51762-4	216SB01210	03-29-95/1515	ENC02
51762-5	216SB01302	03-29-95/1545	ENC02
51762-6	216SB01306	03-29-95/1600	ENC02

PARAMETER	51762-2	51762-3	51762-4	51762-5	51762-6
Percent Solids (160.3), %	88	86	81	91	82

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Project: 010208420 NAS Corpus Christi (ENC02/01)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-1	216SB01112	03-29-95/1410	ENC02/1

PARAMETER	51762-1
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<13
Date Analyzed	04.06.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	340
Toluene, ug/kg dw	64
Ethylbenzene, ug/kg dw	93
Total Xylenes, ug/kg dw	95
Surrogate - a,a,a-Trifluorotoluene	154
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	103 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.10.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-1	216SB01112	03-29-95/1410	ENC02/1

PARAMETER	51762-1
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	<430
Acenaphthylene, ug/kg dw	<430
Acenaphthene, ug/kg dw	<430
Fluorene, ug/kg dw	<430
Phenanthrene, ug/kg dw	<430
Anthracene, ug/kg dw	<430
Fluoranthene, ug/kg dw	<430
Pyrene, ug/kg dw	<430
Chrysene, ug/kg dw	<430
Benzo(a)anthracene, ug/kg dw	<430
Benzo(b)fluoranthene, ug/kg dw	<430
Benzo(k)fluoranthene, ug/kg dw	<430
Benzo(a)pyrene, ug/kg dw	<430
Indeno(1,2,3-cd)pyrene, ug/kg dw	<430
Dibenz(a,h)anthracene, ug/kg dw	<430
Benzo(g,h,i)perylene, ug/kg dw	<430
2-Methylnaphthalene, ug/kg dw	<430
1-Methylnaphthalene, ug/kg dw	<430
Surrogate-NBZ	48 %
Surrogate-2FBP	70 %
Surrogate-TPH	74 %
Date Extracted	04.03.95
Date Analyzed	04.14.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-1	216SB01112	03-29-95/1410	ENC02/1

PARAMETER	51762-1
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<5.7*F43
Date Analyzed	04.10.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<13
Hydrocarbons as Diesel Fuel, mg/kg dw	<13
Hydrocarbons as Heavy Oils, mg/kg dw	<43
Hydrocarbons as Mineral Spirits, mg/kg dw	<13
Hydrocarbons as Naphtha, mg/kg dw	<13
Hydrocarbons as Varsol, mg/kg dw	<13
Hydrocarbons as Fuel Oil, mg/kg dw	<43
Date Extracted	04.03.95
Date Analyzed	04.06.95
Percent Solids (160.3), %	77

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LOG NO: S5-51762

Received: 30 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 010208420 NAS Corpus Christi (ENC02/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-7	216SB01310	03-29-95/1610	ENC02

PARAMETER	51762-7
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	750
Date Analyzed	04.06.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	320
Toluene, ug/kg dw	120
Ethylbenzene, ug/kg dw	600
Total Xylenes, ug/kg dw	290
Surrogate - a,a,a-Trifluorotoluene	172
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	115 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.10.95

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LOG NO: S5-51762

Received: 30 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
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Nashville, TN 37217

Project: 010208420 NAS Corpus Christi (ENC02/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51762-7	216SB01310	03-29-95/1610	ENC02

PARAMETER	51762-7
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	1900
Acenaphthylene, ug/kg dw	<400
Acenaphthene, ug/kg dw	<400
Fluorene, ug/kg dw	<400
Phenanthrene, ug/kg dw	440
Anthracene, ug/kg dw	<400
Fluoranthene, ug/kg dw	<400
Pyrene, ug/kg dw	<400
Chrysene, ug/kg dw	<400
Benzo(a)anthracene, ug/kg dw	<400
Benzo(b)fluoranthene, ug/kg dw	<400
Benzo(k)fluoranthene, ug/kg dw	<400
Benzo(a)pyrene, ug/kg dw	<400
Indeno(1,2,3-cd)pyrene, ug/kg dw	<400
Dibenz(a,h)anthracene, ug/kg dw	<400
Benzo(g,h,i)perylene, ug/kg dw	<400
2-Methylnaphthalene, ug/kg dw	5400
1-Methylnaphthalene, ug/kg dw	4100
Surrogate-NBZ	84 %
Surrogate-2FBP	70 %
Surrogate-TPH	73 %
Date Extracted	04.03.95
Date Analyzed	04.15.95
Percent Solids (160.3), %	82

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-2	216SMW2208	03-30-95/0850	ENC02
51793-3	216SMW2214	03-30-95/0915	ENC02
51793-4	216SMW2217	03-30-95/0930	ENC02
51793-5	216SMW2312	03-30-95/1350	ENC03
51793-6	216HMW2418	03-30-95/1650	ENC03

PARAMETER	51793-2	51793-3	51793-4	51793-5	51793-6
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	180	190	97	180	3
Date Analyzed	04.17.95	04.10.95	04.17.95	04.19.95	04.10.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	<240	36	15	<250	<12*F34
Toluene, ug/kg dw	870	<6.3	13	<250	<12
Ethylbenzene, ug/kg dw	5300	56	52	1100	<12
Total Xylenes, ug/kg dw	9600	56	58	2000	<12
Surrogate - a,a,a-Trifluorotoluene	6800	158	139	5167	137
Surrogate - Expected Value, ug/kg dw	5100	150	150	4740	150
Surrogate - % Actual Recovery	133 %	105 %	93 %	109 %	91 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.12.95	04.10.95	04.10.95	04.12.95	04.12.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-2	216SMW2208	03-30-95/0850	ENC02
51793-3	216SMW2214	03-30-95/0915	ENC02
51793-4	216SMW2217	03-30-95/0930	ENC02
51793-5	216SMW2312	03-30-95/1350	ENC03
51793-6	216HMW2418	03-30-95/1650	ENC03

PARAMETER	51793-2	51793-3	51793-4	51793-5	51793-6
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<380	560	<390	<420	<390
Acenaphthylene, ug/kg dw	<380	<420	<390	<420	<390
Acenaphthene, ug/kg dw	<380	<420	<390	<420	<390
Fluorene, ug/kg dw	<380	<420	<390	<420	<390
Phenanthrene, ug/kg dw	470	<420	<390	<420	<390
Anthracene, ug/kg dw	<380	<420	<390	<420	<390
Fluoranthene, ug/kg dw	460	<420	<390	<420	<390
Pyrene, ug/kg dw	<380	<420	<390	<420	<390
Chrysene, ug/kg dw	<380	<420	<390	<420	<390
Benzo(a)anthracene, ug/kg dw	<380	<420	<390	<420	<390
Benzo(b)fluoranthene, ug/kg dw	<380	<420	<390	<420	<390
Benzo(k)fluoranthene, ug/kg dw	<380	<420	<390	<420	<390
Benzo(a)pyrene, ug/kg dw	<380	<420	<390	<420	<390
Indeno(1,2,3-cd)pyrene, ug/kg dw	<380	<420	<390	<420	<390
Dibenz(a,h)anthracene, ug/kg dw	<380	<420	<390	<420	<390
Benzo(g,h,i)perylene, ug/kg dw	<380	<420	<390	<420	<390
2-Methylnaphthalene, ug/kg dw	1600	2100	<390	450	<390
1-Methylnaphthalene, ug/kg dw	1300	1600	<390	<420	<390
Surrogate-NBZ	62 %	50 %	51 %	54 %	62 %
Surrogate-2FBP	75 %	64 %	69 %	71 %	78 %
Surrogate-TPH	62 %	65 %	59 %	63 %	62 %
Date Extracted	04.05.95	04.05.95	04.05.95	04.05.95	04.05.95
Date Analyzed	04.21.95	04.21.95	04.21.95	04.21.95	04.22.95

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-2	216SMW2208	03-30-95/0850	ENC02
51793-3	216SMW2214	03-30-95/0915	ENC02
51793-4	216SMW2217	03-30-95/0930	ENC02
51793-5	216SMW2312	03-30-95/1350	ENC03
51793-6	216HMW2418	03-30-95/1650	ENC03

PARAMETER	51793-2	51793-3	51793-4	51793-5	51793-6
Percent Solids (160.3), %	85	79	84	79	87

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-1	216SMW2304	03-30-95/1108	ENC02/1

PARAMETER	51793-1
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	400
Date Analyzed	04.17.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<625
Toluene, ug/kg dw	4700
Ethylbenzene, ug/kg dw	4300
Total Xylenes, ug/kg dw	9400
Surrogate - a,a,a-Trifluorotoluene	16800
Surrogate - Expected Value, ug/kg dw	12000
Surrogate - % Actual Recovery	140 %*F36
Surrogate - Control Limit	67-137 %
Date Analyzed	04.12.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-1	216SMW2304	03-30-95/1108	ENC02/1

PARAMETER	51793-1
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	2900
Acenaphthylene, ug/kg dw	<410
Acenaphthene, ug/kg dw	<410
Fluorene, ug/kg dw	<410
Phenanthrene, ug/kg dw	<410
Anthracene, ug/kg dw	<410
Fluoranthene, ug/kg dw	430
Pyrene, ug/kg dw	<410
Chrysene, ug/kg dw	<410
Benzo(a)anthracene, ug/kg dw	<410
Benzo(b)fluoranthene, ug/kg dw	<410
Benzo(k)fluoranthene, ug/kg dw	<410
Benzo(a)pyrene, ug/kg dw	<410
Indeno(1,2,3-cd)pyrene, ug/kg dw	<410
Dibenz(a,h)anthracene, ug/kg dw	<410
Benzo(g,h,i)perylene, ug/kg dw	<410
2-Methylnaphthalene, ug/kg dw	5200
1-Methylnaphthalene, ug/kg dw	4300
Surrogate-NBZ	65 %
Surrogate-2FBP	56 %
Surrogate-TPH	58 %
Date Extracted	04.05.95
Date Analyzed	04.21.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-1	216SMW2304	03-30-95/1108	ENC02/1

PARAMETER	51793-1
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<31
Date Analyzed	04.12.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	1300
Hydrocarbons as Diesel Fuel, mg/kg dw	<250
Hydrocarbons as Heavy Oils, mg/kg dw	<820
Hydrocarbons as Mineral Spirits, mg/kg dw	<250
Hydrocarbons as Naphtha, mg/kg dw	<250
Hydrocarbons as Varsol, mg/kg dw	<250
Hydrocarbons as Fuel Oil, mg/kg dw	<820
Date Extracted	04.04.95
Date Analyzed	04.11.95
Percent Solids (160.3), %	80

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Purchase Order: 0225/95

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Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-7	216SMW2418	03-30-95/1650	ENC03
51793-8	216SMW2404	03-30-95/1540	ENC03
51793-9	216SMW2408	03-30-95/1600	ENC03

PARAMETER	51793-7	51793-8	51793-9
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	73	17	170
Date Analyzed	04.10.95	04.17.95	04.17.95
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	18	<5.7	55
Toluene, ug/kg dw	<5.6	<5.7	<29
Ethylbenzene, ug/kg dw	41	<5.7	46
Total Xylenes, ug/kg dw	100	<5.7	240
Surrogate - a,a,a-Trifluorotoluene	168	151	141
Surrogate - Expected Value, ug/kg dw	150	150	150
Surrogate - % Actual Recovery	112 %	101 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.12.95	04.12.95	04.12.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-7	216SMW2418	03-30-95/1650	ENC03
51793-8	216SMW2404	03-30-95/1540	ENC03
51793-9	216SMW2408	03-30-95/1600	ENC03

PARAMETER	51793-7	51793-8	51793-9
Semivolatile Organics (8270)			
Naphthalene, ug/kg dw	<390	<380	<380
Acenaphthylene, ug/kg dw	<390	<380	<380
Acenaphthene, ug/kg dw	<390	<380	<380
Fluorene, ug/kg dw	<390	<380	<380
Phenanthrene, ug/kg dw	<390	<380	<380
Anthracene, ug/kg dw	<390	<380	<380
Fluoranthene, ug/kg dw	<390	<380	<380
Pyrene, ug/kg dw	<390	<380	<380
Chrysene, ug/kg dw	<390	<380	<380
Benzo(a)anthracene, ug/kg dw	<390	<380	<380
Benzo(b)fluoranthene, ug/kg dw	<390	<380	<380
Benzo(k)fluoranthene, ug/kg dw	<390	<380	<380
Benzo(a)pyrene, ug/kg dw	<390	<380	<380
Indeno(1,2,3-cd)pyrene, ug/kg dw	<390	<380	<380
Dibenz(a,h)anthracene, ug/kg dw	<390	<380	<380
Benzo(g,h,i)perylene, ug/kg dw	<390	<380	<380
2-Methylnaphthalene, ug/kg dw	<390	<380	<380
1-Methylnaphthalene, ug/kg dw	<390	<380	<380
Surrogate-NBZ	60 %	64 %	58 %
Surrogate-2FBP	81 %	82 %	68 %
Surrogate-TPH	69 %	62 %	74 %
Date Extracted	04.05.95	04.05.95	04.05.95
Date Analyzed	04.22.95	04.22.95	04.27.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-7	216SMW2418	03-30-95/1650	ENC03
51793-8	216SMW2404	03-30-95/1540	ENC03
51793-9	216SMW2408	03-30-95/1600	ENC03

PARAMETER	51793-7	51793-8	51793-9
Percent Solids (160.3), %	84	87	87

SAVANNAH LABORATORIES
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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-2	216SMW2502	03-31-95/0900	ENC03
51812-3	216SMW2514	03-31-95/0915	ENC03
51812-4	216SMW2518	03-31-95/0930	ENC03
51812-5	216SMW2604	03-31-95/1040	ENC03
51812-6	216SMW2618	03-31-95/1135	ENC03

PARAMETER	51812-2	51812-3	51812-4	51812-5	51812-6
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	<5.5	290	<5.8	<5.4	<6.0
Toluene, ug/kg dw	<5.5	800	<5.8	<5.4	<6.0
Ethylbenzene, ug/kg dw	<5.5	6000	92	<5.4	<6.0
Total Xylenes, ug/kg dw	<5.5	50000	98	<5.4	<6.0
Surrogate - a,a,a-Trifluorotoluene	146	8126	133	141	134
Surrogate - Expected Value, ug/kg dw	150	5100	150	150	150
Surrogate - % Actual Recovery	97 %	159 %*F36	89 %	94 %	89 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.12.95	04.14.95	04.13.95	04.12.95	04.12.95
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	18	230	78	70	37
Date Analyzed	04.13.95	04.13.95	04.13.95	04.13.95	04.13.95

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-2	216SMW2502	03-31-95/0900	ENC03
51812-3	216SMW2514	03-31-95/0915	ENC03
51812-4	216SMW2518	03-31-95/0930	ENC03
51812-5	216SMW2604	03-31-95/1040	ENC03
51812-6	216SMW2618	03-31-95/1135	ENC03

PARAMETER	51812-2	51812-3	51812-4	51812-5	51812-6
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<350	2500	<380	<360	<390
Acenaphthylene, ug/kg dw	<350	<410	<380	<360	<390
Acenaphthene, ug/kg dw	<350	<410	<380	<360	<390
Fluorene, ug/kg dw	<350	<410	<380	<360	<390
Phenanthrene, ug/kg dw	<350	<410	<380	<360	<390
Anthracene, ug/kg dw	<350	<410	<380	<360	<390
Fluoranthene, ug/kg dw	<350	<410	<380	<360	<390
Pyrene, ug/kg dw	<350	<410	<380	<360	<390
Chrysene, ug/kg dw	<350	<410	<380	<360	<390
Benzo(a)anthracene, ug/kg dw	<350	<410	<380	<360	<390
Benzo(b)fluoranthene, ug/kg dw	<350	<410	<380	<360	<390
Benzo(k)fluoranthene, ug/kg dw	<350	<410	<380	<360	<390
Benzo(a)pyrene, ug/kg dw	<350	<410	<380	<360	<390
Indeno(1,2,3-cd)pyrene, ug/kg dw	<350	<410	<380	<360	<390
Dibenz(a,h)anthracene, ug/kg dw	<350	<410	<380	<360	<390
Benzo(g,h,i)perylene, ug/kg dw	<350	<410	<380	<360	<390
2-Methylnaphthalene, ug/kg dw	<350	2900	434	<360	<390
1-Methylnaphthalene, ug/kg dw	<350	3200	<380	<360	<390
Surrogate-NBZ	63 %	55 %	57 %	65 %	55 %
Surrogate-2FBP	73 %	63 %	66 %	74 %	64 %
Surrogate-TPH	85 %	88 %	90 %	91 %	88 %
Date Extracted	04.10.95	04.10.95	04.10.95	04.10.95	04.10.95
Date Analyzed	04.24.95	04.24.95	04.24.95	04.24.95	04.24.95

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-2	216SMW2502	03-31-95/0900	ENC03
51812-3	216SMW2514	03-31-95/0915	ENC03
51812-4	216SMW2518	03-31-95/0930	ENC03
51812-5	216SMW2604	03-31-95/1040	ENC03
51812-6	216SMW2618	03-31-95/1135	ENC03

PARAMETER	51812-2	51812-3	51812-4	51812-5	51812-6
Percent Solids (160.3), %	91	80	86	92	83

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-1	216SMW2610	03-31-95/1050	ENC03/1

PARAMETER	51812-1
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	2500
Toluene, ug/kg dw	<31
Ethylbenzene, ug/kg dw	2400
Total Xylenes, ug/kg dw	1000
Surrogate - a,a,a-Trifluorotoluene	640*F36
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	427 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.13.95
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	2000
Date Analyzed	04.17.95

SL SAVANNAH LABORATORIES
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-1	216SMW2610	03-31-95/1050	ENC03/1

PARAMETER	51812-1
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	5400
Acenaphthylene, ug/kg dw	<820
Acenaphthene, ug/kg dw	<820
Fluorene, ug/kg dw	<820
Phenanthrene, ug/kg dw	<820
Anthracene, ug/kg dw	<820
Fluoranthene, ug/kg dw	<820
Pyrene, ug/kg dw	<820
Chrysene, ug/kg dw	<820
Benzo(b)fluoranthene, ug/kg dw	<820
Benzo(k)fluoranthene, ug/kg dw	<820
Benzo(a)pyrene, ug/kg dw	<820
Indeno(1,2,3-cd)pyrene, ug/kg dw	<820
Dibenz(a,h)anthracene, ug/kg dw	<820
Benzo(g,h,i)perylene, ug/kg dw	<820
2-Methylnaphthalene, ug/kg dw	7900
1-Methylnaphthalene, ug/kg dw	5500
Surrogate-NBZ	71 %
Surrogate-2FBP	48 %
Surrogate-TPH	62 %
Date Extracted	04.10.95
Date Analyzed	04.24.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<1.6
Date Analyzed	04.13.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-1	216SMW2610	03-31-95/1050	ENC03/1

PARAMETER	51812-1
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<12
Hydrocarbons as Diesel Fuel, mg/kg dw	<12
Hydrocarbons as Heavy Oils, mg/kg dw	<41
Hydrocarbons as Mineral Spirits, mg/kg dw	<12
Hydrocarbons as Naphtha, mg/kg dw	<12
Hydrocarbons as Varsol, mg/kg dw	<12
Hydrocarbons as Fuel Oil, mg/kg dw	<41
Date Extracted	04.04.95
Date Analyzed	04.06.95
Percent Solids (160.3), %	80

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-7	216SMW2712	03-31-95/1430	ENC03
51812-8	216SMW2720	03-31-95/1600	ENC03

PARAMETER	51812-7	51812-8
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	98	<6.0
Toluene, ug/kg dw	260	<6.0
Ethylbenzene, ug/kg dw	1100	<6.0
Total Xylenes, ug/kg dw	5900	<6.0
Surrogate - a,a,a-Trifluorotoluene	1200*F36	138
Surrogate - Expected Value, ug/kg dw	150	150
Surrogate - % Actual Recovery	800 %	92 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.14.95	04.13.95
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	54	<12
Date Analyzed	04.13.95	04.13.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-7	216SMW2712	03-31-95/1430	ENC03
51812-8	216SMW2720	03-31-95/1600	ENC03

PARAMETER	51812-7	51812-8
Semivolatile Organics (8270)		
Naphthalene, ug/kg dw	<390	<390
Acenaphthylene, ug/kg dw	<390	<390
Acenaphthene, ug/kg dw	<390	<390
Fluorene, ug/kg dw	<390	<390
Phenanthrene, ug/kg dw	940	<390
Anthracene, ug/kg dw	<390	<390
Fluoranthene, ug/kg dw	890	<390
Pyrene, ug/kg dw	720	<390
Chrysene, ug/kg dw	<390	<390
Benzo(a)anthracene, ug/kg dw	<390	<390
Benzo(b)fluoranthene, ug/kg dw	<390	<390
Benzo(k)fluoranthene, ug/kg dw	<390	<390
Benzo(a)pyrene, ug/kg dw	<390	<390
Indeno(1,2,3-cd)pyrene, ug/kg dw	<390	<390
Dibenz(a,h)anthracene, ug/kg dw	<390	<390
Benzo(g,h,i)perylene, ug/kg dw	<390	<390
2-Methylnaphthalene, ug/kg dw	<390	<390
1-Methylnaphthalene, ug/kg dw	<390	<390
Surrogate-NBZ	66 %	63 %
Surrogate-2FBP	71 %	65 %
Surrogate-TPH	78 %	72 %
Date Extracted	04.10.95	04.10.95
Date Analyzed	04.24.95	04.24.95
Percent Solids (160.3), %	83	83

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LOG NO: S5-51840

Received: 04 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-2	216SMW2802	04-03-95/0940	ENC04
51840-3	216SMW2812	04-03-95/0900	ENC04
51840-4	216SMW2816	04-03-95/0930	ENC04
51840-5	216SMW2906	04-03-95/1115	ENC04
51840-6	216SMW2918	04-03-95/1150	ENC04

PARAMETER	51840-2	51840-3	51840-4	51840-5	51840-6
Petroleum Hydrocarbons					
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	18	490	23	1600	<12
Date Analyzed	04.12.95	04.12.95	04.19.95	04.19.95	04.19.95
Purgeable Aromatics (8020)					
Benzene, ug/kg dw	<5.3	220	<6.0	<1100	<5.8
Toluene, ug/kg dw	<5.3	<29	<6.0	3000	<5.8
Ethylbenzene, ug/kg dw	<5.3	200	<6.0	7000	<5.8
Total Xylenes, ug/kg dw	<5.3	390	<6.0	45000	<5.8
Surrogate - a,a,a-Trifluorotoluene	150	153	145	24447	143
Surrogate - Expected Value, ug/kg dw	150	150	150	26100	150
Surrogate - % Actual Recovery	100 %	102 %	97 %	94 %	95 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.15.95	04.17.95	04.15.95	04.15.95	04.15.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-2	216SMW2802	04-03-95/0940	ENC04
51840-3	216SMW2812	04-03-95/0900	ENC04
51840-4	216SMW2816	04-03-95/0930	ENC04
51840-5	216SMW2906	04-03-95/1115	ENC04
51840-6	216SMW2918	04-03-95/1150	ENC04

PARAMETER	51840-2	51840-3	51840-4	51840-5	51840-6
Semivolatile Organics (8270)					
Naphthalene, ug/kg dw	<350	1700	<390	4300	<380
Acenaphthylene, ug/kg dw	<350	<390	<390	<760	<380
Acenaphthene, ug/kg dw	<350	<390	<390	<760	<380
Phenanthrene, ug/kg dw	<350	<390	<390	<760	<380
Anthracene, ug/kg dw	<350	<390	<390	<760	<380
Fluoranthene, ug/kg dw	<350	400	<390	<760	<380
Pyrene, ug/kg dw	<350	400	<390	<760	<380
Chrysene, ug/kg dw	<350	<390	<390	<760	<380
Benzo(a)anthracene, ug/kg dw	<350	<390	<390	<760	<380
Benzo(b)fluoranthene, ug/kg dw	<350	<390	<390	<760	<380
Benzo(k)fluoranthene, ug/kg dw	<350	<390	<390	<760	<380
Benzo(a)pyrene, ug/kg dw	<350	<390	<390	<760	<380
Indeno(1,2,3-cd)pyrene, ug/kg dw	<350	<390	<390	<760	<380
Dibenz(a,h)anthracene, ug/kg dw	<350	<390	<390	<760	<380
Benzo(g,h,i)perylene, ug/kg dw	<350	<390	<390	<760	<380
2-Methylnaphthalene, ug/kg dw	<350	4200	<390	6800	<380
1-Methylnaphthalene, ug/kg dw	<350	3300	<390	4100	<380
Surrogate-NBZ	52 %	91 %	48 %	50 %	46 %
Surrogate-2FBP	66 %	71 %	60 %	67 %	62 %
Surrogate-TPH	84 %	86 %	84 %	68 %	72 %
Date Extracted	04.05.95	04.05.95	04.05.95	04.05.95	04.05.95
Date Analyzed	04.28.95	04.28.95	04.28.95	05.03.95	05.02.95

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Received: 04 APR 95

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Nashville, TN 37217

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-2	216SMW2802	04-03-95/0940	ENC04
51840-3	216SMW2812	04-03-95/0900	ENC04
51840-4	216SMW2816	04-03-95/0930	ENC04
51840-5	216SMW2906	04-03-95/1115	ENC04
51840-6	216SMW2918	04-03-95/1150	ENC04

PARAMETER	51840-2	51840-3	51840-4	51840-5	51840-6
Percent Solids (160.3), %	95	85	84	87	86

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-7	216HMW2918	04-03-95/1150	ENC04

PARAMETER	51840-7
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<11
Date Analyzed	04.19.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.7
Toluene, ug/kg dw	<5.7
Ethylbenzene, ug/kg dw	<5.7
Total Xylenes, ug/kg dw	<5.7
Surrogate - a,a,a-Trifluorotoluene	142
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	95 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.15.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-7	216HMW2918	04-03-95/1150	ENC04

PARAMETER	51840-7
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	<380
Acenaphthylene, ug/kg dw	<380
Acenaphthene, ug/kg dw	<380
Phenanthrene, ug/kg dw	<380
Anthracene, ug/kg dw	<380
Fluoranthene, ug/kg dw	<380
Pyrene, ug/kg dw	<380
Chrysene, ug/kg dw	<380
Benzo(a)anthracene, ug/kg dw	<380
Benzo(b)fluoranthene, ug/kg dw	<380
Benzo(k)fluoranthene, ug/kg dw	<380
Benzo(a)pyrene, ug/kg dw	<380
Indeno(1,2,3-cd)pyrene, ug/kg dw	<380
Dibenz(a,h)anthracene, ug/kg dw	<380
Benzo(g,h,i)perylene, ug/kg dw	<380
2-Methylnaphthalene, ug/kg dw	<380
1-Methylnaphthalene, ug/kg dw	<380
Surrogate-NBZ	<380
Surrogate-2FBP	41 %
Surrogate-TPH	54 %
Date Extracted	62 %
Date Analyzed	04.05.95
Percent Solids (160.3), %	05.02.95
	88

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LOG NO: S5-5184

Received: 04 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-1	216SMW2812	04-03-95/0900	ENC01

PARAMETER	51840-1
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<1.5
Date Analyzed	04.17.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	54
Hydrocarbons as Diesel Fuel, mg/kg dw	<23
Hydrocarbons as Heavy Oils, mg/kg dw	<77
Hydrocarbons as Mineral Spirits, mg/kg dw	<23
Hydrocarbons as Naphtha, mg/kg dw	<23
Hydrocarbons as Varsol, mg/kg dw	<23
Hydrocarbons as Fuel Oil, mg/kg dw	<77
Date Extracted	04.05.95
Date Analyzed	04.11.95
Percent Solids (160.3), %	85

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LOG NO: S5-51874

Received: 05 APR 95

Purchase Order: 0225/95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC04/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51874-1	216SRW1006	04-04-95/0850	ENC04
51874-2	216SRW1018	04-04-95/1020	ENC04
51874-3	216SRW2010	04-04-95/1400	ENC04
51874-4	216SRW2002	04-04-95/1350	ENC04

PARAMETER	51874-1	51874-2	51874-3	51874-4
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	4000	130	3800	<11
Date Analyzed	04.19.95	04.19.95	04.20.95	04.20.95
Purgeable Aromatics (8020)				
Benzene, ug/kg dw	<2200	<120	5100	<5.5
Toluene, ug/kg dw	<2200	300	<1200	<5.5
Ethylbenzene, ug/kg dw	38000	1700	47000	<5.5
Total Xylenes, ug/kg dw	170000	7600	120000	<5.5
Surrogate - a,a,a-Trifluorotoluene	3916	2587	26404	143
Surrogate - Expected Value, ug/kg dw	53400	2520	24600	150
Surrogate - % Actual Recovery	7.3 %*F36	103 %	107 %	95 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.18.95	04.15.95	04.17.95	04.15.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51874-1	216SRW1006	04-04-95/0850	ENC04
51874-2	216SRW1018	04-04-95/1020	ENC04
51874-3	216SRW2010	04-04-95/1400	ENC04
51874-4	216SRW2002	04-04-95/1350	ENC04

PARAMETER	51874-1	51874-2	51874-3	51874-4
Semivolatile Organics (8270)				
Naphthalene, ug/kg dw	21000	430	6500	<360
Acenaphthylene, ug/kg dw	<3700	<390	<800	<360
Acenaphthene, ug/kg dw	<3700	<390	<800	<360
Fluorene, ug/kg dw	<3700	<390	<800	<360
Phenanthrene, ug/kg dw	<3700	<390	<800	<360
Anthracene, ug/kg dw	<3700	<390	<800	<360
Fluoranthene, ug/kg dw	<3700	<390	<800	<360
Pyrene, ug/kg dw	<3700	<390	<800	<360
Chrysene, ug/kg dw	<3700	<390	<800	<360
Benzo(a)anthracene, ug/kg dw	<3700	<390	<800	<360
Benzo(b)fluoranthene, ug/kg dw	<3700	<390	<800	<360
Benzo(k)fluoranthene, ug/kg dw	<3700	<390	<800	<360
Benzo(a)pyrene, ug/kg dw	<3700	<390	<800	<360
Indeno(1,2,3-cd)pyrene, ug/kg dw	<3700	<390	<800	<360
Dibenz(a,h)anthracene, ug/kg dw	<3700	<390	<800	<360
Benzo(g,h,i)perylene, ug/kg dw	<3700	<390	<800	<360
2-Methylnaphthalene, ug/kg dw	31000	970	9300	<360
1-Methylnaphthalene, ug/kg dw	18000	570	5800	<360
Surrogate-NBZ	86 %	33 %	44 %	41 %
Surrogate-2FBP	93 %	47 %	49 %	53 %
Surrogate-TPH	89 %	54 %	58 %	60 %
Date Extracted	04.10.95	04.10.95	04.10.95	04.10.95
Date Analyzed	05.02.95	05.02.95	05.02.95	05.02.95

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LOG NO: S5-51874

Received: 05 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC04/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51874-1	216SRW1006	04-04-95/0850	ENC04
51874-2	216SRW1018	04-04-95/1020	ENC04
51874-3	216SRW2010	04-04-95/1400	ENC04
51874-4	216SRW2002	04-04-95/1350	ENC04

PARAMETER	51874-1	51874-2	51874-3	51874-4
Percent Solids (160.3), %	89	84	82	91

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LOG NO: S5-51927

Received: 06 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51927-2	216SRW3003	04-05-95/1030	ENC04
51927-3	216SRW3013	04-05-95/1135	ENC04
51927-4	216SRW3015	04-05-95/1150	ENC04

PARAMETER	51927-2	51927-3	51927-4
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	17	450	140
Date Analyzed	04.18.95	04.18.95	04.17.95
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<5.8	16000	8800
Toluene, ug/kg dw	<5.8	45000	24000
Ethylbenzene, ug/kg dw	<5.8	23000	<6100
Total Xylenes, ug/kg dw	<5.8	65000	18000
Surrogate - a,a,a-Trifluorotoluene	139	104535	120130
Surrogate - Expected Value, ug/kg dw	150	103500	123000
Surrogate - % Actual Recovery	93 %	101 %	98 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.17.95	04.18.95	04.18.95

SL SAVANNAH LABORATORIES
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5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51927

Received: 06 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51927-2	216SRW3003	04-05-95/1030	ENC04
51927-3	216SRW3013	04-05-95/1135	ENC04
51927-4	216SRW3015	04-05-95/1150	ENC04

PARAMETER	51927-2	51927-3	51927-4
Semivolatile Organics (8270)			
Naphthalene, ug/kg dw	<380	2700	890
Acenaphthylene, ug/kg dw	<380	<420	<400
Acenaphthene, ug/kg dw	<380	<420	<400
Fluorene, ug/kg dw	<380	<420	<400
Phenanthrene, ug/kg dw	<380	<420	<400
Anthracene, ug/kg dw	<380	<420	<400
Fluoranthene, ug/kg dw	<380	<420	<400
Pyrene, ug/kg dw	<380	<420	<400
Chrysene, ug/kg dw	<380	<420	<400
Benzo(a)anthracene, ug/kg dw	<380	<420	<400
Benzo(b)fluoranthene, ug/kg dw	<380	<420	<400
Benzo(k)fluoranthene, ug/kg dw	<380	<420	<400
Benzo(a)pyrene, ug/kg dw	<380	<420	<400
Indeno(1,2,3-cd)pyrene, ug/kg dw	<380	<420	<400
Dibenz(a,h)anthracene, ug/kg dw	<380	<420	<400
Benzo(g,h,i)perylene, ug/kg dw	<380	<420	<400
2-Methylnaphthalene, ug/kg dw	<380	3300	1900
1-Methylnaphthalene, ug/kg dw	<380	3000	1300
Surrogate-NBZ	56 %	64 %	51 %
Surrogate-2FBP	83 %	80 %	87 %
Surrogate-TPH	78 %	62 %	66 %
Date Extracted	04.10.95	04.10.95	04.10.95
Date Analyzed	04.24.95	05.01.95	05.01.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51927-2	216SRW3003	04-05-95/1030	ENC04
51927-3	216SRW3013	04-05-95/1135	ENC04
51927-4	216SRW3015	04-05-95/1150	ENC04

PARAMETER	51927-2	51927-3	51927-4
Percent Solids (160.3), %	86	79	82

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51927-1	216SRW3013	04-05-95/1135	ENC01

PARAMETER	51927-1
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	2500
Date Analyzed	04.18.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	740
Hydrocarbons as Diesel Fuel, mg/kg dw	<250
Hydrocarbons as Heavy Oils, mg/kg dw	<840
Hydrocarbons as Mineral Spirits, mg/kg dw	<250
Hydrocarbons as Naphtha, mg/kg dw	<250
Hydrocarbons as Varsol, mg/kg dw	<250
Hydrocarbons as Fuel Oil, mg/kg dw	<840
Date Extracted	04.10.95
Date Analyzed	04.14.95
Percent Solids (160.3), %	79

SOIL ANALYTICAL QUALITY CONTROL/ QUALITY ASSURANCE DOCUMENTATION

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LOG NO: S5-51709

Received: 28 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51709-13	Method Blank	ENC01

PARAMETER	51709-13
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	26.7
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	89 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.06.95

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LOG NO: S5-51709

Received: 28 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-14	Method Blank	ENC01

PARAMETER	51709-14
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.04.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	136
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	91 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.03.95

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LOG NO: S5-51709

Received: 28 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-14	Method Blank	ENC01

PARAMETER	51709-14
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	67 %
Surrogate-2FBP	76 %
Surrogate-TPH	92 %
Date Extracted	03.30.95
Date Analyzed	04.06.95

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LOG NO: S5-51709

Received: 28 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-14	Method Blank	ENC01

PARAMETER	51709-14
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.05.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	03.31.95
Date Analyzed	04.05.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-15	Method Blank	ENC01
51709-16	Method Blank	ENC01
51709-17	Method Blank	ENC01

PARAMETER	51709-15	51709-16	51709-17
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<5.0	<100	<100
Toluene, ug/kg dw	<5.0	<100	<100
Ethylbenzene, ug/kg dw	<5.0	<100	<100
Total Xylenes, ug/kg dw	<5.0	<100	<100
Surrogate - a,a,a-Trifluorotoluene	138	2480	2900
Surrogate - Expected Value, ug/kg dw	150	3000	3000
Surrogate - % Actual Recovery	92 %	83 %	97 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.04.95	04.04.95	04.05.95
Hydrocarbons (Modified 8015)			
Hydrocarbons as Gasoline, mg/kg dw	<0.25	<0.25	<0.25
Date Analyzed	04.04.95	04.04.95	04.06.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-18	Method Blank	ENC01

PARAMETER	51709-18
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.03.95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-19	LCS/LCS Duplicate % Recovery	ENC01
51709-20	LCS % RPD	ENC01

PARAMETER	51709-19	51709-20
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	81/83 %	2.4 %
Purgeable Aromatics (8020)		
Benzene	98/103 %	5.0 %
Toluene	98/102 %	4.0 %
Surrogate - a,a,a-Trifluorotoluene	134/137 %	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	89/91 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	83/72 %	14 %
N-Nitrosodi-N-Propylamine	78/66 %	17 %
1,2,4-Trichlorobenzene	67/57 %	16 %
Acenaphthene	95/84 %	12 %
2,4-Dinitrotoluene	72/63 %	13 %
Pyrene	120/120 %	0 %
Surrogate-NBZ	69/56 %	---
Surrogate-2FBP	88/72 %	---
Surrogate-TPH	78/76 %	---
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	66/67 %	1.5 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	98/95 %	14 %

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51709-21	LCS/LCS Duplicate % Recovery	ENC01
51709-22	LCS % RPD	ENC01

PARAMETER	51709-21	51709-22
Purgeable Aromatics (8020)		
Benzene	125/124 %	0.81 %
Toluene	108/103 %	4.7 %
Surrogate - a,a,a-Trifluorotoluene	27.9/28.0	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	93/93 %	---
Surrogate - Control Limit	77-140 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51709-23	LCS/LCS Duplicate % Recovery	ENC01
51709-24	LCS % RPD	ENC01

PARAMETER	51709-23	51709-24
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	88/84 %	4.7 %
Purgeable Aromatics (8020)		
Benzene	85/84 %	1.2 %
Toluene	84/84 %	0 %
Surrogate - a,a,a-Trifluorotoluene	2460/2520	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	82/84 %	---
Surrogate - Control Limit	67-137 %	---

Methods: EPA SW-846

*F36 = Surrogate recovery was outside established limits due to coeluting matrix interference in the sample.

X(MOD-8100) = >35 %D on channel A versus channel B

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

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LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51737-17	Method Blank	ENC02

PARAMETER	51737-17
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	26.9
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	90 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.31.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-18	Method Blank	ENC01

PARAMETER	51737-18
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.05.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	136
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	91 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.03.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-18	Method Blank	ENC01

PARAMETER	51737-18
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	64 %
Surrogate-2FBP	84 %
Surrogate-TPH	79 %
Date Extracted	03.30.95
Date Analyzed	04.12.95

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Received: 29 MAR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-18	Method Blank	ENC01

PARAMETER	51737-18
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.08.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	03.31.95
Date Analyzed	04.05.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-19	Method Blank	ENC02

PARAMETER	51737-19
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.07.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	138
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	92 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.04.95

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LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-19	Method Blank	ENC02

PARAMETER	51737-19
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	67 %
Surrogate-2FBP	77 %
Surrogate-TPH	92 %
Date Extracted	03.30.95
Date Analyzed	04.18.95

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LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-19	Method Blank	ENC02

PARAMETER	51737-19				

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-20	Method Blank	ENC01
51737-21	Method Blank	ENC01

PARAMETER	51737-20	51737-21
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	<100	<100
Toluene, ug/kg dw	<100	<100
Ethylbenzene, ug/kg dw	<100	<100
Total Xylenes, ug/kg dw	<100	<100
Surrogate - a,a,a-Trifluorotoluene	3000	3010
Surrogate - Expected Value, ug/kg dw	3000	3000
Surrogate - % Actual Recovery	100 %	100 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.08.95	04.09.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-22	Method Blank	ENC01

PARAMETER	51737-22
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.07.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<100
Toluene, ug/kg dw	<100
Ethylbenzene, ug/kg dw	<100
Total Xylenes, ug/kg dw	<100
Surrogate - a,a,a-Trifluorotoluene	2950
Surrogate - Expected Value, ug/kg dw	3000
Surrogate - % Actual Recovery	98 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.06.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51737-23	LCS/LCS Duplicate % Recovery	ENC01
51737-24	LCS % RPD	ENC01

PARAMETER	51737-23	51737-24
Purgeable Aromatics (8020)		
Benzene	125/124 %	0.80 %
Toluene	108/103 %	4.7 %
Surrogate - a,a,a-Trifluorotoluene	27.9/28.0	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	93/93 %	---
Surrogate - Control Limit	77-140 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-25	LCS/LCS Duplicate % Recovery	ENC01
51737-26	LCS % RPD	ENC01

PARAMETER	51737-25	51737-26
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	82/81 %	1.2 %
Purgeable Aromatics (8020)		
Benzene	98/103 %	5.0 %
Toluene	98/102 %	4.0 %
Surrogate - a,a,a-Trifluorotoluene	134/137 %	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	89/91 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	72/56 %	25 %
N-Nitrosodi-N-Propylamine	78/58 %	29 %
1,2,4-Trichlorobenzene	77/62 %	22 %
Acenaphthene	87/72 %	19 %
2,4-Dinitrotoluene	83/70 %	17 %
Pyrene	104/97 %	7.0 %
Surrogate-NBZ	60/46 %	---
Surrogate-2FBP	80/65 %	---
Surrogate-TPH	79/71 %	---
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	66/67 %	1.5 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	98/85 %	14 %

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-27	Method Blank	ENC02

PARAMETER	51737-27
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.10.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-28	LCS/LCS Duplicate % Recovery	ENC01
51737-29	LCS % RPD	ENC01

PARAMETER	51737-28	51737-29
Purgeable Aromatics (8020)		
Benzene	85/84 %	1.2 %
Toluene	84/84 %	0 %
Surrogate - a,a,a-Trifluorotoluene	2460/2520	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	82/84 %	---
Surrogate - Control Limit	67-137 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-30	LCS/LCS Duplicate % Recovery	ENC02
51737-31	LCS % RPD	ENC02
51737-32	LCS/LCS Duplicate % Recovery	ENC02
51737-33	LCS % RPD	ENC02

PARAMETER	51737-30	51737-31	51737-32	51737-33
Purgeable Aromatics (8020)				
Benzene	98/103 %	5.0 %	85/84 %	1.2 %
Toluene	98/102 %	4.0 %	84/84 %	0 %
Surrogate - a,a,a-Trifluorotoluene	134/137 %	---	2460/2520	---
Surrogate - Expected Value	150	---	3000	---
Surrogate - % Actual Recovery	89/91 %	---	82/84 %	---
Surrogate - Control Limit	67-137 %	---	67-137 %	---
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1)	101/82 %	21 %	80/83 %	3.7 %

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Project: 0102 08420 NAS Corpus Christi (ENC01/02)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51737-34	Method Blank	ENC01

PARAMETER	51737-34
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<100
Toluene, ug/kg dw	<100
Ethylbenzene, ug/kg dw	<100
Total Xylenes, ug/kg dw	<100
Surrogate - a,a,a-Trifluorotoluene	2480
Surrogate - Expected Value, ug/kg dw	3000
Surrogate - % Actual Recovery	83 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.04.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.04.95

Methods: EPA SW-846

*F43 = The hydrocarbon pattern present in the sample chromatogram did not correspond to patterns of the laboratory's reference standards.

X(MOD-8100) = >35 %D on channel A versus channel B

Linda A. Wolfe

Linda A. Wolfe

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LOG NO: S5-51762

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Project: 010208420 NAS Corpus Christi (ENC02/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51762-9	Method Blank	ENC02

PARAMETER	51762-9
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	29.6
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	99 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.08.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-10	Method Blank	ENC02/1

PARAMETER	51762-10
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.10.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	147
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	98 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.10.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-10	Method Blank	ENC02/1

PARAMETER	51762-10
Semivolatile Organics (8270)	
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	59 %
Surrogate-2FBP	84 %
Surrogate-TPH	76 %
Date Extracted	04.03.95
Date Analyzed	04.14.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-10	Method Blank	ENC02/1

PARAMETER	51762-10
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<5.0
Date Analyzed	04.10.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	04.03.95
Date Analyzed	04.06.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-11	Method Blank	ENC02
51762-12	Method Blank	ENC02

PARAMETER	51762-11	51762-12
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	<5.0	<100
Toluene, ug/kg dw	<5.0	<100
Ethylbenzene, ug/kg dw	<5.0	<100
Total Xylenes, ug/kg dw	<5.0	<100
Surrogate - a,a,a-Trifluorotoluene	142	2830
Surrogate - Expected Value, ug/kg dw	150	3000
Surrogate - % Actual Recovery	95 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.11.95	04.12.95

Methods: EPA SW-846

*F43 = The hydrocarbon pattern present in the sample chromatogram did not correspond to patterns of the laboratory's reference standards.

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51762-13	LCS/LCS Duplicate % Recovery	ENC02
51762-14	LCS % RPD	ENC02

PARAMETER	51762-13	51762-14
Purgeable Aromatics (8020)		
Benzene	125/124 %	0.80 %
Toluene	108/103 %	4.7 %
Surrogate - a,a,a-Trifluorotoluene	27.9/28.0	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	93/93 %	---
Surrogate - Control Limit	77-140 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-15	LCS/LCS Duplicate % Recovery	ENC02
51762-16	LCS % RPD	ENC02

PARAMETER	51762-15	51762-16
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	75/78 %	3.9 %
Purgeable Aromatics (8020)		
Benzene	126/127 %	0.79 %
Toluene	106/110 %	3.7 %
Surrogate - a,a,a-Trifluorotoluene	141/141	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	94/94 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	69/56 %	21 %
N-Nitrosodi-N-Propylamine	76/57 %	28 %
1,2,4-Trichlorobenzene	74/64 %	14 %
Acenaphthene	83/68 %	20 %
2,4-Dinitrotoluene	88/70 %	23 %
Pyrene	85/81 %	4.8 %
Surrogate-NBZ	56/45 %	---
Surrogate-2FBP	75/65 %	---
Surrogate-TPH	66/64 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-17	LCS/LCS Duplicate % Recovery	ENC01
51762-18	LCS % RPD	ENC01

PARAMETER	51762-17	51762-18
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	110/92 %	18 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Kerosene	49/52 %	5.9 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-19	Method Blank	ENC02

PARAMETER	51762-19
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.06.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<100
Toluene, ug/kg dw	<100
Ethylbenzene, ug/kg dw	<100
Total Xylenes, ug/kg dw	<100
Surrogate - a,a,a-Trifluorotoluene	2370
Surrogate - Expected Value, ug/kg dw	3000
Surrogate - % Actual Recovery	79 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.11.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-20	LCS/LCS Duplicate % Recovery	ENC02
51762-21	LCS % RPD	ENC02

PARAMETER	51762-20	51762-21
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	80/83 %	3.7 %
Purgeable Aromatics (8020)		
Benzene	116/113 %	2.6 %
Toluene	106/107 %	0.94 %
Surrogate - a,a,a-Trifluorotoluene	3210/3060	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	107/102 %	---
Surrogate - Control Limit	67-137 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51762-22	LCS/LCS Duplicate % Recovery	ENC01
51762-23	LCS % RPD	ENC01

PARAMETER	51762-22	51762-23
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	97/90 %	7.5 %

Methods: EPA SW-846

*F43 = The hydrocarbon pattern present in the sample chromatogram did not correspond to patterns of the laboratory's reference standards.

Soil samples requiring MOD-8015 and MOD-8100 are in SDG ENC01.

Linda A. Wolfe

Linda A. Wolfe

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LOG NO: S5-51793

Received: 31 MAR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51793-13	Method Blank	ENC03

PARAMETER	51793-13
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	29.6
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	99 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.08.95

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51793-13	Method Blank	ENC03

PARAMETER	51793-13
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/l	<10
N-Nitrosodi-N-Propylamine, ug/l	<10
1,2,4-Trichlorobenzene, ug/l	<10
Naphthalene, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Fluorene, ug/l	<10
2,4-Dinitrotoluene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Pyrene, ug/l	<10
Chrysene, ug/l	<10
Benzo(b)fluoranthene, ug/l	<10
Benzo(k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenz(a,h)anthracene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
Surrogate-NBZ	66 %
Surrogate-2FBP	73 %
Surrogate-TPH	86 %
Date Extracted	04.04.95
Date Analyzed	04.19.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51793-13	Method Blank	ENC03

PARAMETER	51793-13
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Analyzed	04.18.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	<0.050
Date Analyzed	04.08.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/l	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30
Hydrocarbons as Varsol, mg/l	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0
Date Extracted	04.04.95
Date Analyzed	04.07.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-14	Method Blank	ENC02/1

PARAMETER	51793-14
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	147
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	98 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.10.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-14	Method Blank	ENC02/1

PARAMETER	51793-14
Semivolatile Organics (8270)	
1,3-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	71 %
Surrogate-2FBP	92 %
Surrogate-TPH	67 %
Date Extracted	04.05.95
Date Analyzed	04.21.95

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Received: 31 MAR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-14	Method Blank	ENC02/1

PARAMETER	51793-14
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.10.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<5.0
Date Analyzed	04.12.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	04.04.95
Date Analyzed	04.06.95

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LOG NO: S5-51793

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-15	Method Blank	ENC03

PARAMETER	51793-15
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	147
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	98 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.10.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-15	Method Blank	ENC03

PARAMETER	51793-15
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	71 %
Surrogate-2FBP	92 %
Surrogate-TPH	67 %
Date Extracted	04.05.95
Date Analyzed	04.21.95

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Purchase Order: 0225/95

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-15	Method Blank	ENC03

PARAMETER	51793-15
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.10.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-31	LCS/LCS Duplicate % Recovery	ENC02
51793-32	LCS % RPD	ENC02

PARAMETER	51793-31	51793-32
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	80/83 %	3.7 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-33	LCS/LCS Duplicate % Recovery	ENC03
51793-34	LCS % RPD	ENC03
51793-35	LCS/LCS Duplicate % Recovery	ENC03
51793-36	LCS % RPD	ENC03

PARAMETER	51793-33	51793-34	51793-35	51793-36
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1)	80/83 %	3.7 %	71/82 %	14 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-26	LCS/LCS Duplicate % Recovery	ENC03
51793-27	LCS % RPD	ENC03

PARAMETER	51793-26	51793-27
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	97/89 %	8.6 %
Purgeable Aromatics (8020)		
Benzene	116/113 %	2.6 %
Toluene	106/107 %	0.94 %
Surrogate - a,a,a-Trifluorotoluene	3210/3060	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	107/102 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	81/68 %	17 %
N-Nitrosodi-N-Propylamine	94/78 %	19 %
1,2,4-Trichlorobenzene	80/67 %	18 %
Acenaphthene	100/87 %	14 %
2,4-Dinitrotoluene	98/90 %	8.5 %
Pyrene	105/104 %	0.96 %
Surrogate-NBZ	71/57 %	---
Surrogate-2FBP	88/75 %	---
Surrogate-TPH	77/75 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-28	Method Blank	ENC02
51793-29	Method Blank	ENC03
51793-30	Method Blank	ENC03

PARAMETER	51793-28	51793-29	51793-30
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10	<10	<10
Date Analyzed	04.17.95	04.19.95	04.17.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-22	LCS/LCS Duplicate % Recovery	ENC01
51793-23	LCS % RPD	ENC01

PARAMETER	51793-22	51793-23
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	110/110 %	0 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	49/51 %	4.0 %

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-24	LCS/LCS Duplicate % Recovery	ENC02
51793-25	LCS % RPD	ENC02

PARAMETER	51793-24	51793-25
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	71/82 %	14 %
Purgeable Aromatics (8020)		
Benzene	126/127 %	0.79 %
Toluene	106/110 %	3.7 %
Surrogate - a,a,a-Trifluorotoluene	141/141	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	94/94 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	81/68 %	17 %
N-Nitrosodi-N-Propylamine	94/78 %	19 %
1,2,4-Trichlorobenzene	80/67 %	18 %
Acenaphthene	100/87 %	14 %
2,4-Dinitrotoluene	98/90 %	8.5 %
Pyrene	105/104 %	1.0 %
Surrogate-NBZ	71/57 %	---
Surrogate-2FBP	88/75 %	---
Surrogate-TPH	77/73 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-16	Method Blank	ENC03
51793-17	Method Blank	ENC03
51793-18	Method Blank	ENC03
51793-19	Method Blank	ENC03

PARAMETER	51793-16	51793-17	51793-18	51793-19
Purgeable Aromatics (8020)				
Benzene, ug/kg dw	<5.0	<5.0	<100	<100
Toluene, ug/kg dw	<5.0	<5.0	<100	<100
Ethylbenzene, ug/kg dw	<5.0	<5.0	<100	<100
Total Xylenes, ug/kg dw	<5.0	<5.0	<100	<100
Surrogate - a,a,a-Trifluorotoluene	142	152	2830	2870
Surrogate - Expected Value, ug/kg dw	150	150	3000	3000
Surrogate - % Actual Recovery	95 %	101 %	94 %	96 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %	67-137 %
Date Analyzed	04.11.95	04.12.95	04.12.95	04.13.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51793-20	LCS/LCS Duplicate % Recovery	ENC03
51793-21	LCS % RPD	ENC03

PARAMETER	51793-20	51793-21
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90/95 %	5.4 %
Purgeable Aromatics (8020)		
Benzene	125/124 %	0.80 %
Toluene	108/103 %	4.7 %
Surrogate - a,a,a-Trifluorotoluene	27.9/28.0	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	93/93 %	---
Surrogate - Control Limit	77-140 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	64/54 %	17 %
N-Nitrosodi-N-Propylamine	75/66 %	13 %
1,2,4-Trichlorobenzene	65/56 %	15 %
Acenaphthene	79/73 %	7.9 %
2,4-Dinitrotoluene	57/55 %	3.6 %
Pyrene	142/132 %	7.3 %
Surrogate-NBZ	68/58 %	---
Surrogate-2FBP	74/65 %	---
Surrogate-TPH	92/83 %	---
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	95/100 %	5.1 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	56/62 %	10 %

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51793-37	Method Blank	ENC02

PARAMETER	51793-37
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	140
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	95 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.12.95

Methods: EPA SW-846

Soil samples requiring TPH (MOD-8015) are in SDG ENC01.

*F34 = Due to the abundance of organics in the sample, dilution was required.

*F36 = Surrogate recovery was outside established limits due to coeluting matrix interference in the sample.

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

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Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51812-12	Method Blank	ENC03

PARAMETER	51812-12
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	29.5
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	98 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.09.95

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

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Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51812-12	Method Blank	ENC03

PARAMETER	51812-12
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/l	<10
N-Nitrosodi-N-Propylamine, ug/l	<10
1,2,4-Trichlorobenzene, ug/l	<10
Naphthalene, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Fluorene, ug/l	<10
2,4-Dinitrotoluene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Pyrene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)anthracene, ug/l	<10
Benzo(b)fluoranthene, ug/l	<10
Benzo(k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenz(a,h)anthracene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
Surrogate-NBZ	66 %
Surrogate-2FBP	73 %
Surrogate-TPH	86 %
Date Extracted	04.04.95
Date Analyzed	04.19.95

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51812-12	Method Blank	ENC03

PARAMETER	51812-12
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Analyzed	04.18.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	<0.050
Date Analyzed	04.09.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/l	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30
Hydrocarbons as Varsol, mg/l	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0
Date Extracted	04.04.95
Date Analyzed	04.07.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-13	Method Blank	ENC03/1

PARAMETER	51812-13
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	152
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	101 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.12.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-13	Method Blank	ENC03/1

PARAMETER	51812-13
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	55 %
Surrogate-2FBP	63 %
Surrogate-TBP	84 %
Date Extracted	04.10.95
Date Analyzed	04.24.95

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Project: 0102 08420 Corpus Christi (ENC03/01)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-13	Method Blank	ENC03/1

PARAMETER	51812-13
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.13.95
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.13.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	04.04.95
Date Analyzed	04.06.95

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Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-14	Method Blank	ENC03
51812-15	Method Blank	ENC03
51812-16	Method Blank	ENC03

PARAMETER	51812-14	51812-15	51812-16
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<5.0	<5.0	<100
Toluene, ug/kg dw	<5.0	<5.0	<100
Ethylbenzene, ug/kg dw	<5.0	<5.0	<100
Total Xylenes, ug/kg dw	<5.0	<5.0	<100
Surrogate - a,a,a-Trifluorotoluene	150	144	2830
Surrogate - Expected Value, ug/kg dw	150	150	3000
Surrogate - % Actual Recovery	100 %	96 %	94 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.13.95	04.14.95	04.14.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-17	Method Blank	ENC03

PARAMETER	51812-17
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.17.95

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Project: 0102 08420 Corpus Christi (ENC03/01)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51812-18	LCS/LCS Duplicate % Recovery	ENC03
51812-19	LCS % RPD	ENC03

PARAMETER	51812-18	51812-19
Purgeable Aromatics (8020)		
Benzene	102/115 %	12 %
Toluene	90/99 %	9.5 %
Surrogate - a,a,a-Trifluorotoluene	26.4/28.0	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	88/93 %	---
Surrogate - Control Limit	77-140 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	64/54 %	17 %
N-Nitrosodi-N-Propylamine	75/66 %	13 %
1,2,4-Trichlorobenzene	65/56 %	15 %
Acenaphthene	79/73 %	7.9 %
2,4-Dinitrotoluene	57/55 %	3.6 %
Pyrene	142/132 %	7.3 %
Surrogate-NBZ	68/58 %	---
Surrogate-2FBP	74/65 %	---
Surrogate-TPH	92/83 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90/95 %	5.4 %
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	120/110 %	8.7 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	56/62 %	10 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-20	LCS/LCS Duplicate % Recovery	ENC01
51812-21	LCS % RPD	ENC01

PARAMETER	51812-20	51812-21
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	90/90 %	0 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	49/51 %	4.0 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-22	LCS/LCS Duplicate % Recovery	ENC03
51812-23	LCS % RPD	ENC03

PARAMETER	51812-22	51812-23
Purgeable Aromatics (8020)		
Benzene	106/114 %	7.3 %
Toluene	106/106 %	0 %
Surrogate - a,a,a-Trifluorotoluene	145/143	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	97/95 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	55/51 %	7.5 %
N-Nitrosodi-N-Propylamine	57/54 %	5.4 %
1,2,4-Trichlorobenzene	52/49 %	5.9 %
Acenaphthene	64/61 %	4.8 %
2,4-Dinitrotoluene	66/62 %	6.2 %
Pyrene	86/86 %	0 %
Surrogate-NBZ	48/47 %	---
Surrogate-2FBP	57/56 %	---
Surrogate-TPH	62/62 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	86/87 %	1.2 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51812-24	LCS/LCS Duplicate % Recovery	ENC03
51812-25	LCS % RPD	ENC03

PARAMETER	51812-24	51812-25
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	71/82 %	14 %

Methods: EPA SW-846

*F36 = Surrogate recovery was outside established limits due to coeluting matrix interference in the sample.

Soil samples for TPH (MOD-8015) are in SDG ENC01.

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

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LOG NO: S5-51840

Received: 04 APR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51840-12	Method Blank	ENC04

PARAMETER	51840-12
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Analyzed	04.18.95
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	28.3
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	94 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

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LOG NO: S5-51840

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51840-12	Method Blank	ENC04

PARAMETER	51840-12
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/l	<10
N-Nitrosodi-N-Propylamine, ug/l	<10
1,2,4-Trichlorobenzene, ug/l	<10
Naphthalene, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
2,4-Dinitrotoluene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Pyrene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)anthracene, ug/l	<10
Benzo(b)fluoranthene, ug/l	<10
Benzo(k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenz(a,h)anthracene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
Surrogate-NBZ	56 %
Surrogate-2FBP	70 %
Surrogate-TPH	82 %
Date Extracted	04.05.95
Date Analyzed	04.12.95

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Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51840-12	Method Blank	ENC04

PARAMETER	51840-12
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	<0.050
Date Analyzed	04.17.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/l	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30
Hydrocarbons as Varsol, mg/l	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0
Date Extracted	04.05.95
Date Analyzed	04.07.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-13	Method Blank	ENC01

PARAMETER	51840-13
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.17.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	04.05.95
Date Analyzed	04.07.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-14	Method Blank	ENC04

PARAMETER	51840-14
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.12.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	139
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	93 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.15.95

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Received: 04 APR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-14	Method Blank	ENC04

PARAMETER	51840-14
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	49 %
Surrogate-2FBP	60 %
Surrogate-TPH	74 %
Date Extracted	04.05.95
Date Analyzed	04.28.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-15	Method Blank	ENC04
51840-16	Method Blank	ENC04

PARAMETER	51840-15	51840-16
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	<5.0	<100
Toluene, ug/kg dw	<5.0	<100
Ethylbenzene, ug/kg dw	<5.0	<100
Total Xylenes, ug/kg dw	<5.0	<100
Surrogate - a,a,a-Trifluorotoluene	138	2960
Surrogate - Expected Value, ug/kg dw	150	3000
Surrogate - % Actual Recovery	92 %	99 %
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.17.95	04.15.95

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LOG NO: S5-51840

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51840-17	LCS/LCS Duplicate % Recovery	ENC04
51840-18	LCS % RPD	ENC04

PARAMETER	51840-17	51840-18
Purgeable Aromatics (8020)		
Benzene	114/108 %	5.4 %
Toluene	100/96 %	4.1 %
Surrogate - a,a,a-Trifluorotoluene	27.4/28.2	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	91/94 %	---
Surrogate - Control Limit	77-140 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	57/66 %	15 %
N-Nitrosodi-N-Propylamine	55/62 %	12 %
1,2,4-Trichlorobenzene	60/68 %	12 %
Acenaphthene	71/81 %	13 %
2,4-Dinitrotoluene	66/76 %	14 %
Pyrene	106/113 %	6.4 %
Surrogate-NBZ	50/58 %	---
Surrogate-2FBP	62/70 %	---
Surrogate-TPH	83/88 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90/95 %	5.4 %
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	96/94 %	2.1 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	68/51 %	28 %

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LOG NO: S5-51840

Received: 04 APR 95

Purchase Order: 0225/95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-19	LCS/LCS Duplicate % Recovery	ENC01
51840-20	LCS % RPD	ENC01

PARAMETER	51840-19	51840-20
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	88/89 %	1.1 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	71/65 %	8.8 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-21	LCS/LCS Duplicate % Recovery	ENC04
51840-22	LCS% RPD	ENC04

PARAMETER	51840-21	51840-22
Purgeable Aromatics (8020)		
Benzene	106/114 %	7.3 %
Toluene	106/106 %	0 %
Surrogate - a,a,a-Trifluorotoluene	145/143	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	97/95 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	52/57 %	9.2 %
N-Nitrosodi-N-Propylamine	55/63 %	14 %
1,2,4-Trichlorobenzene	55/60 %	8.7 %
Acenaphthene	64/69 %	7.5 %
2,4-Dinitrotoluene	59/67 %	13 %
Pyrene	85/92 %	7.9 %
Surrogate-NBZ	47/52 %	---
Surrogate-2FBP	57/62 %	---
Surrogate-TPH	67/74 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	71/76 %	6.8 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-23	Method Blank	ENC01

PARAMETER	51840-23
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<0.25
Date Analyzed	04.21.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-24	LCS/LCS Duplicate % Recovery	ENC04
51840-25	LCS % RPD	ENC04

PARAMETER	51840-24	51840-25
Purgeable Aromatics (8020)		
Benzene	106/120 %	12 %
Toluene	102/107 %	4.8 %
Surrogate - a,a,a-Trifluorotoluene	142/145	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	95/97 %	---
Surrogate - Control Limit	67-137 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	97/89 %	8.6 %

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Purchase Order: 0225/95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-26	Method Blank	ENC04

PARAMETER	51840-26
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.19.95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-26	Method Blank	ENC04

PARAMETER	51840-26
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	44 %
Surrogate-2FBP	56 %
Surrogate-TPH	56 %
Date Extracted	04.05.95
Date Analyzed	05.02.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-26	Method Blank	ENC04

PARAMETER	51840-26

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51840-27	LCS/LCS Duplicate % Recovery	ENC04
51840-28	LCS % RPD	ENC04

PARAMETER	51840-27	51840-28
Purgeable Aromatics (8020)		
Benzene	126/127 %	0.79 %
Toluene	106/110 %	3.7 %
Surrogate - a,a,a-Trifluorotoluene	141/141	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	94/94 %	---
Surrogate - Control Limit	67-137 %	---

Methods: EPA SW-84

Linda A. Wolfe

Linda A. Wolfe

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51874-6	Method Blank	ENC04

PARAMETER	51874-6
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	28.3
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	94 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-7	Method Blank	ENC04

PARAMETER	51874-7
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.19.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	139
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	93 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.15.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-7	Method Blank	ENC04

PARAMETER	51874-7
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	60 %
Surrogate-2FBP	59 %
Surrogate-TPH	77 %
Date Extracted	04.10.95
Date Analyzed	04.28.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-7	Method Blank	ENC04

PARAMETER	51874-7

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-8	Method Blank	ENC04
51874-9	Method Blank	ENC04
51874-10	Method Blank	ENC04

PARAMETER	51874-8	51874-9	51874-10
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<100	<100	<100
Toluene, ug/kg dw	<100	<100	<100
Ethylbenzene, ug/kg dw	<100	<100	<100
Total Xylenes, ug/kg dw	<100	<100	<100
Surrogate - a,a,a-Trifluorotoluene	2960	2780	2620
Surrogate - Expected Value, ug/kg dw	3000	3000	3000
Surrogate - % Actual Recovery	99 %	93 %	87 %
Surrogate - Control Limit	67-137 %	67-137 %	67-137 %
Date Analyzed	04.15.95	04.17.95	04.18.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51874-11	LCS/LCS Duplicate % Recovery	ENC04
51874-12	LCS % RPD	ENC04

PARAMETER	51874-11	51874-12
Purgeable Aromatics (8020)		
Benzene	114/108 %	5.4 %
Toluene	100/96 %	4.1 %
Surrogate - a,a,a-Trifluorotoluene	27.4/28.2	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	91/94 %	---
Surrogate - Control Limit	77-140 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-13	LCS/LCS Duplicate % Recovery	ENC04
51874-14	LCS % RPD	ENC04

PARAMETER	51874-13	51874-14
Purgeable Aromatics (8020)		
Benzene	106/114 %	7.3 %
Toluene	106/106 %	0 %
Surrogate - a,a,a-Trifluorotoluene	145/143	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	97/95 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	61/63 %	3.2 %
N-Nitrosodi-N-Propylamine	57/58 %	1.7 %
1,2,4-Trichlorobenzene	67/71 %	5.8 %
Acenaphthene	68/72 %	5.7 %
2,4-Dinitrotoluene	76/80 %	5.1 %
Pyrene	103/103 %	0 %
Surrogate-NBZ	60/62 %	---
Surrogate-2FBP	63/66 %	---
Surrogate-TPH	75/74 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	97/89 %	8.6 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-15	LCS/LCS Duplicate % Recovery	ENC04
51874-16	LCS % RPD	ENC04

PARAMETER	51874-15	51874-16
Purgeable Aromatics (8020)		
Benzene	116/113 %	2.6 %
Toluene	106/107 %	0.94 %
Surrogate - a,a,a-Trifluorotoluene	3210/3060	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	107/102 %	---
Surrogate - Control Limit	67-137 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90/86 %	4.5 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-17	Method Blank	ENC04

PARAMETER	51874-17
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.20.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-17	Method Blank	ENC04

PARAMETER	51874-17
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	44 %
Surrogate-2FBP	57 %
Surrogate-TPH	66 %
Date Extracted	04.10.95
Date Analyzed	05.02.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-17	Method Blank	ENC04

PARAMETER	51874-17

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51874-18	LCS/LCS Duplicate % Recovery	ENC04
51874-19	LCS % RPD	ENC04

PARAMETER	51874-18	51874-19
Purgeable Aromatics (8020)		
Benzene	106/120 %	12 %
Toluene	102/107 %	4.8 %
Surrogate - a,a,a-Trifluorotoluene	142/145	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	95/97 %	---
Surrogate - Control Limit	67-137 %	---

Methods: EPA SW-846

*F36 = Surrogate recovery was outside established limits due to coeluting matrix interference in the sample.

Linda A. Wolfe

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Received: 06 APR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51927-6	Method Blank	ENC04

PARAMETER	51927-6
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	28.3
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	94 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

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LOG NO: S5-51927

Received: 06 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-7	Method Blank	ENC01

PARAMETER	51927-7
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/kg dw	<5.0
Date Analyzed	04.18.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<33
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<33
Date Extracted	04.10.95
Date Analyzed	04.13.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-8	Method Blank	ENC04

PARAMETER	51927-8
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.17.95
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	138
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	92 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.17.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-8	Method Blank	ENC04

PARAMETER	51927-8
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/kg dw	<330
N-Nitrosodi-N-Propylamine, ug/kg dw	<330
1,2,4-Trichlorobenzene, ug/kg dw	<330
Naphthalene, ug/kg dw	<330
Acenaphthylene, ug/kg dw	<330
Acenaphthene, ug/kg dw	<330
Fluorene, ug/kg dw	<330
2,4-Dinitrotoluene, ug/kg dw	<330
Phenanthrene, ug/kg dw	<330
Anthracene, ug/kg dw	<330
Fluoranthene, ug/kg dw	<330
Pyrene, ug/kg dw	<330
Chrysene, ug/kg dw	<330
Benzo(a)anthracene, ug/kg dw	<330
Benzo(b)fluoranthene, ug/kg dw	<330
Benzo(k)fluoranthene, ug/kg dw	<330
Benzo(a)pyrene, ug/kg dw	<330
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330
Dibenz(a,h)anthracene, ug/kg dw	<330
Benzo(g,h,i)perylene, ug/kg dw	<330
2-Methylnaphthalene, ug/kg dw	<330
1-Methylnaphthalene, ug/kg dw	<330
Surrogate-NBZ	54 %
Surrogate-2FBP	75 %
Surrogate-TPH	60 %
Date Extracted	04.10.95
Date Analyzed	04.20.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-8	Method Blank	ENC04

PARAMETER	51927-8				

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-9	Method Blank	ENC04

PARAMETER	51927-9
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<100
Toluene, ug/kg dw	<100
Ethylbenzene, ug/kg dw	<100
Total Xylenes, ug/kg dw	<100
Surrogate - a,a,a-Trifluorotoluene	2690
Surrogate - Expected Value, ug/kg dw	3000
Surrogate - % Actual Recovery	90 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.18.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-10	Method Blank	ENC04

PARAMETER	51927-10
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<5.0
Toluene, ug/kg dw	<5.0
Ethylbenzene, ug/kg dw	<5.0
Total Xylenes, ug/kg dw	<5.0
Surrogate - a,a,a-Trifluorotoluene	159
Surrogate - Expected Value, ug/kg dw	150
Surrogate - % Actual Recovery	106 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.21.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51927-11	LCS/LCS Duplicate % Recovery	ENC04
51927-12	LCS % RPD	ENC04

PARAMETER	51927-11	51927-12
Purgeable Aromatics (8020)		
Benzene	114/108 %	5.4 %
Toluene	100/96 %	4.1 %
Surrogate - a,a,a-Trifluorotoluene	27.4/28.2	---
Surrogate - Expected Value	30	---
Surrogate - % Actual Recovery	91/94 %	---
Surrogate - Control Limit	77-140 %	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-13	LCS/LCS Duplicate % Recovery	ENC01
51927-14	LCS % RPD	ENC01

PARAMETER	51927-13	51927-14
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	90/90 %	0 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	80/69 %	15 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-15	LCS/LCS Duplicate % Recovery	ENC04
51927-16	LCS % RPD	ENC04

PARAMETER	51927-15	51927-16
Purgeable Aromatics (8020)		
Benzene	106/114 %	7.3 %
Toluene	106/106 %	0 %
Surrogate - a,a,a-Trifluorotoluene	145/143	---
Surrogate - Expected Value	150	---
Surrogate - % Actual Recovery	97/95 %	---
Surrogate - Control Limit	67-137 %	---
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	68/65 %	4.5 %
N-Nitrosodi-N-Propylamine	61/58 %	5.0 %
1,2,4-Trichlorobenzene	61/58 %	5.0 %
Acenaphthene	74/72 %	2.7 %
2,4-Dinitrotoluene	62/61 %	1.6 %
Pyrene	81/78 %	3.8 %
Surrogate-NBZ	51/49 %	---
Surrogate-2FBP	70/67 %	---
Surrogate-TPH	57/55 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	71/82 %	14 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-17	LCS/LCS Duplicate % Recovery	ENC04
51927-18	LCS % RPD	ENC04

PARAMETER	51927-17	51927-18
Purgeable Aromatics (8020)		
Benzene	68/68 %	0 %
Toluene	68/68 %	0 %
Surrogate - a,a,a-Trifluorotoluene	2800/2810	---
Surrogate - Expected Value	3000	---
Surrogate - % Actual Recovery	93/94 %	---
Surrogate - Control Limit	67-137 %	---
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	97/91 %	6.4 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51927-19	Method Blank	ENC04

PARAMETER	51927-19
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10
Date Analyzed	04.18.95

Methods: EPA SW-846

Linda A. Wolfe

Linda A. Wolfe

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Project: NAS Corpus Christi (ENC05)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51960-5	Method Blank	ENC05
51960-6	LCS/LCS Duplicate % Recovery	ENC05
51960-7	LCS % RPD	ENC05

PARAMETER	51960-5	51960-6	51960-7
Purgeable Aromatics (8020)			
Benzene, ug/l	<1.0	114/108 %	5.4 %
Toluene, ug/l	<1.0	100/96 %	4.1 %
Ethylbenzene, ug/l	<1.0	---	---
Total Xylenes, ug/l	<1.0	---	---
Surrogate - a,a,a-Trifluorotoluene	28.3	27.4/28.2	---
Surrogate - Expected Value, ug/l	30	30	---
Surrogate - % Actual Recovery	94 %	91/94 %	---
Surrogate - Control Limit	77-140 %	77-140 %	---
Date Analyzed	04.17.95	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51960-5	Method Blank	ENC05
51960-6	LCS/LCS Duplicate % Recovery	ENC05
51960-7	LCS % RPD	ENC05

PARAMETER	51960-5	51960-6	51960-7
Semivolatile Organics (8270)			
1,4-Dichlorobenzene, ug/l	<10	87/85 %	2.3 %
N-Nitrosodi-N-Propylamine, ug/l	<10	83/76 %	8.8 %
1,2,4-Trichlorobenzene, ug/l	<10	97/98 %	1.0 %
Naphthalene, ug/l	<10	---	---
Acenaphthylene, ug/l	<10	---	---
Acenaphthene, ug/l	<10	105/100 %	4.9 %
Fluorene, ug/l	<10	---	---
2,4-Dinitrotoluene, ug/l	<10	109/103 %	5.7 %
Phenanthrene, ug/l	<10	---	---
Anthracene, ug/l	<10	---	---
Fluoranthene, ug/l	<10	---	---
Pyrene, ug/l	<10	122/119 %	2.5 %
Chrysene, ug/l	<10	---	---
Benzo(a)anthracene, ug/l	<10	---	---
Benzo(b)fluoranthene, ug/l	<10	---	---
Benzo(k)fluoranthene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	---	---
Indeno(1,2,3-cd)pyrene, ug/l	<10	---	---
Dibenz(a,h)anthracene, ug/l	<10	---	---
Benzo(g,h,i)perylene, ug/l	<10	---	---
2-Methylnaphthalene, ug/l	<10	---	---

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51960-5	Method Blank	ENC05
51960-6	LCS/LCS Duplicate % Recovery	ENC05
51960-7	LCS % RPD	ENC05

PARAMETER	51960-5	51960-6	51960-7
1-Methylnaphthalene, ug/l	<10	---	---
Surrogate-NBZ	63 %	97/94 %	---
Surrogate-2FBP	79 %	98/93 %	---
Surrogate-TPH	83 %	93/89 %	---
Date Extracted	04.10.95	---	---
Date Analyzed	05.02.95	---	---
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	90/95 %	5.4 %
Date Analyzed	04.18.95	---	---
Total Organic Halogen			
Total Organic Halogen, mg/l	<0.010	99/100 %	1.0 %
Date Analyzed	04.10.95	---	---
Cyanide			
Total Releasable Cyanide, mgHCN/l	<0.010	---	0 %
Date Analyzed	04.13.95	---	---
Sulfide			
Total Releasable Sulfide, mgH2S/l	<0.40	---	0 %
Date Analyzed	04.12.95	---	---
Arsenic (7060)			
Arsenic (7060), mg/l	<0.010	104/101 %	2.9 %
Date Analyzed	04.17.95	---	---
Barium (6010)			
Barium (6010), mg/l	<0.010	98/95 %	3.1 %
Date Analyzed	04.17.95	---	---

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51960-5	Method Blank	ENC05
51960-6	LCS/LCS Duplicate % Recovery	ENC05
51960-7	LCS % RPD	ENC05

PARAMETER	51960-5	51960-6	51960-7
Cadmium (6010)			
Cadmium (6010), mg/l	<0.0050	104/105 %	0.96 %
Date Analyzed	04.17.95	---	---
Chromium (6010)			
Chromium (6010), mg/l	<0.010	100/101 %	1.0 %
Date Analyzed	04.18.95	---	---
Lead			
Lead (7421), mg/l	<0.0050	102/99 %	3.0 %
Date Analyzed	04.17.95	---	---
Silver (6010)			
Silver (6010), mg/l	<0.010	101/99 %	2.0 %
Date Analyzed	04.17.95	---	---
Selenium (7740)			
Selenium (7740), mg/l	<0.010	109/105 %	3.7 %
Date Analyzed	04.17.95	---	---
Mercury			
Mercury (7470/7471), mg/l	<0.00020	95/94 %	1.1 %
Date Analyzed	04.10.95	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51960-8	Method Blank	ENC05
51960-9	LCS/LCS Duplicate % Recovery	ENC05
51960-10	LCS % RPD	ENC05

PARAMETER	51960-8	51960-9	51960-10
Purgeable Aromatics (8020)			
Benzene, ug/kg dw	<100	68/68 %	0 %
Toluene, ug/kg dw	<100	68/68 %	0 %
Ethylbenzene, ug/kg dw	<100	---	---
Total Xylenes, ug/kg dw	<100	---	---
Surrogate - a,a,a-Trifluorotoluene	3170	2800/2810	---
Surrogate - Expected Value, ug/kg dw	3000	3000	---
Surrogate - % Actual Recovery	106 %	93/94 %	---
Surrogate - Control Limit	67-137 %	67-137 %	---
Date Analyzed	04.19.95	---	---

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51960-8	Method Blank	
51960-9	LCS/LCS Duplicate % Recovery	ENC05
51960-10	LCS % RPD	ENC05
		ENC05

PARAMETER	51960-8	51960-9	51960-10
Semivolatile Organics (8270)			
1,4-Dichlorobenzene, ug/kg dw	<330	68/65 %	4.5 %
N-Nitrosodi-N-Propylamine, ug/kg dw	<330	61/58 %	5.0 %
1,2,4-Trichlorobenzene, ug/kg dw	<330	61/58 %	5.0 %
Naphthalene, ug/kg dw	<330	---	---
Acenaphthylene, ug/kg dw	<330	---	---
Acenaphthene, ug/kg dw	<330	74/72 %	2.7 %
Fluorene, ug/kg dw	<330	---	---
2,4-Dinitrotoluene, ug/kg dw	<330	62/61 %	1.6 %
Phenanthrene, ug/kg dw	<330	---	---
Anthracene, ug/kg dw	<330	---	---
Fluoranthene, ug/kg dw	<330	---	---
Pyrene, ug/kg dw	<330	81/78 %	3.8 %
Chrysene, ug/kg dw	<330	---	---
Benzo(a)anthracene, ug/kg dw	<330	---	---
Benzo(b)fluoranthene, ug/kg dw	<330	---	---
Benzo(k)fluoranthene, ug/kg dw	<330	---	---
Benzo(a)pyrene, ug/kg dw	<330	---	---
Indeno(1,2,3-cd)pyrene, ug/kg dw	<330	---	---
Dibenz(a,h)anthracene, ug/kg dw	<330	---	---
Benzo(g,h,i)perylene, ug/kg dw	<330	---	---
2-Methylnaphthalene, ug/kg dw	<330	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51960-8	Method Blank	ENC05
51960-9	LCS/LCS Duplicate % Recovery	ENC05
51960-10	LCS % RPD	ENC05

PARAMETER	51960-8	51960-9	51960-10
1-Methylnaphthalene, ug/kg dw	<330	---	---
Surrogate-NBZ	54 %	51/49 %	---
Surrogate-2FBP	75 %	70/67 %	---
Surrogate-TPH	60 %	57/55 %	---
Date Extracted	04.10.95	---	---
Date Analyzed	04.20.95	---	---
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<10	93/87 %	6.7 %
Date Analyzed	05.01.95	---	---
Total Organic Halogen (9020)			
Total Organic Halogen, mg/kg dw	<10	115/95 %	19 %
Date Analyzed	04.11.95	---	---
Cyanide			
Total Releasable Cyanide, mgHCN/kg	<1.0	---	0 %
Date Analyzed	04.13.95	---	---
Sulfide			
Total Releasable Sulfide, mgH2S/kg	<10	---	0 %
Date Analyzed	04.12.95	---	---
Arsenic (7060)			
Arsenic (7060), mg/kg dw	<1.0	90/92 %	2.2 %
Date Analyzed	04.17.95	---	---

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LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51960-8	Method Blank	ENC05
51960-9	LCS/LCS Duplicate % Recovery	ENC05
51960-10	LCS % RPD	ENC05

PARAMETER	51960-8	51960-9	51960-10
Barium (6010)			
Barium (6010), mg/kg dw	<1.0	98/100 %	2.0 %
Date Analyzed	04.18.95	---	---
Cadmium (6010)			
Cadmium (6010), mg/kg dw	<0.50	101/102 %	0.99 %
Date Analyzed	04.18.95	---	---
Chromium (6010)			
Chromium (6010), mg/kg dw	<1.0	102/103 %	0.98 %
Date Analyzed	04.18.95	---	---
Lead			
Lead (7421), mg/kg dw	<0.50	87/91 %	4.5 %
Date Analyzed	04.17.95	---	---
Silver (6010)			
Silver (6010), mg/kg dw	<1.0	97/99 %	2.0 %
Date Analyzed	04.18.95	---	---
Selenium (7740)			
Selenium (7740), mg/kg dw	<1.0	103/102 %	0.98 %
Date Analyzed	04.17.95	---	---
Mercury			
Mercury (7470/7471), mg/kg dw	<0.010	92/90 %	2.2 %
Date Analyzed	04.11.95	---	---

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Project: NAS Corpus Christi (ENC05)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
51960-11	Method Blank	ENC05

PARAMETER	51960-11
Purgeable Aromatics (8020)	
Benzene, ug/kg dw	<100
Toluene, ug/kg dw	<100
Ethylbenzene, ug/kg dw	<100
Total Xylenes, ug/kg dw	<100
Surrogate - a,a,a-Trifluorotoluene	2690
Surrogate - Expected Value, ug/kg dw	3000
Surrogate - % Actual Recovery	90 %
Surrogate - Control Limit	67-137 %
Date Analyzed	04.18.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51960-12	Method Blank	ENC05

PARAMETER	51960-12
Semivolatile Organics (8270)	
1,4-Dichlorobenzene, ug/l	<10
N-Nitrosodi-N-Propylamine, ug/l	<10
1,2,4-Trichlorobenzene, ug/l	<10
Naphthalene, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Fluorene, ug/l	<10
2,4-Dinitrotoluene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Pyrene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)anthracene, ug/l	<10
Benzo(b)fluoranthene, ug/l	<10
Benzo(k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenz(a,h)anthracene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
Surrogate-NBZ	83 %
Surrogate-2FBP	85 %
Surrogate-TPH	89 %
Date Extracted	04.10.95
Date Analyzed	04.27.95

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Project: NAS Corpus Christi (ENC05)
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	SDG#
51960-12	Method Blank	ENC05

PARAMETER	51960-12

Methods: EPA SW-846

*F36 = Surrogate recovery was outside established limits due to coeluting matrix interference in the sample.

*F6 = The physical characteristics (hard, semisolid) of the sample prohibited continual stirring required by the Pensky-Martens Method. Therefore, the sample was heated to >140 F without continual stirring and a test flame applied to the sample surface. No apparent ignition of vapors over the sample was observed.

Linda A. Wolfe

Linda A. Wolfe

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LOG NO: S5-ENCC01

Received: 28 MAR 95

Purchase Order: 0225/95

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Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC01-1	MS % Recovery (216SB00108)	ENC01
ENCC01-2	MSD % Recovery (216SB00108)	ENC01

PARAMETER	ENCC01-1	ENCC01-2
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	54 %	62 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	*F62	*F62

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LOG NO: S5-ENCC01

Received: 28 MAR 95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC01-3	MS % Recovery (216KB00910)	ENC01
ENCC01-4	MSD % Recovery (216KB00910)	ENC01

PARAMETER	ENCC01-3	ENCC01-4
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90 %	80 %
Purgeable Aromatics (8020)		
Benzene	77 %	66 %
Toluene	106 %	82 %
Surrogate - a,a,a-Trifluorotoluene	136	130
Surrogate - Expected Value	150	150
Surrogate - % Actual Recovery	91 %	87 %
Surrogate - Control Limit	67-137 %	67-137 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	74 %	53 %
N-Nitrosodi-N-Propylamine	85 %	60 %
1,2,4-Trichlorobenzene	80 %	58 %
Acenaphthene	88 %	70 %
2,4-Dinitrotoluene	86 %	67 %
Pyrene	97 %	96 %
Surrogate-NBZ	64 %	45 %
Surrogate-2FBP	81 %	63 %
Surrogate-TPH	74 %	76 %

Methods: EPA SW-846

*F62 = Matrix spikes were not recovered due to sample dilution required prior to analysis.

Linda A. Wolfe

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LOG NO: S5-ENCC04

Received: 04 APR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC04-1	MS % Recovery (216SMW2802)	ENC04
ENCC04-2	MSD % Recovery (216SMW2802)	ENC04

PARAMETER	ENCC04-1	ENCC04-2
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	70 %	55 %
Purgeable Aromatics (8020)		
Benzene	161 %	162 %
Toluene	147 %	147 %
Surrogate - a,a,a-Trifluorotoluene	156	157
Surrogate - Expected Value	150	150
Surrogate - % Actual Recovery	104 %	105 %
Surrogate - Control Limit	67-137 %	67-137 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	55 %	50 %
N-Nitrosodi-N-Propylamine	59 %	54 %
1,2,4-Trichlorobenzene	59 %	53 %
Acenaphthene	66 %	65 %
2,4-Dinitrotoluene	62 %	64 %
Pyrene	88 %	99 %
Surrogate-NBZ	50 %	45 %
Surrogate-2FBP	60 %	55 %
Surrogate-TPH	70 %	77 %

Linda Wolfe
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LOG NO: S5-51709

Received: 28 MAR 95

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Purchase Order: 0225/95

Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51709-11	216TE00004	03-27-95	ENC01
51709-12	216TE00005	03-27-95	ENC01

PARAMETER	51709-11	51709-12
Purgeable Aromatics (8020)		
Benzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	27.2	26.1
Surrogate - Expected Value, ug/l	30	30
Surrogate - % Actual Recovery	91 %	87 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	04.06.95	04.06.95

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-10	216P000010	03-30-95/1715	ENC03
51793-11	216E000010	03-30-95/1745	ENC03

PARAMETER	51793-10	51793-11
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0
Date Analyzed	04.18.95	04.18.95
Purgeable Aromatics (8020)		
Benzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.5	24.9
Surrogate - Expected Value, ug/l	30	30
Surrogate - % Actual Recovery	85 %	83 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	04.08.95	04.08.95

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-10	216P000010	03-30-95/1715	ENC03
51793-11	216E000010	03-30-95/1745	ENC03

PARAMETER	51793-10	51793-11
Semivolatile Organics (8270)		
Naphthalene, ug/l	<10	<10
Acenaphthylene, ug/l	<10	<10
Acenaphthene, ug/l	<10	<10
Fluorene, ug/l	<10	<10
Phenanthrene, ug/l	<10	<10
Anthracene, ug/l	<10	<10
Fluoranthene, ug/l	<10	<10
Pyrene, ug/l	<10	<10
Chrysene, ug/l	<10	<10
Benzo(b)fluoranthene, ug/l	<10	<10
Benzo(k)fluoranthene, ug/l	<10	<10
Benzo(a)pyrene, ug/l	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10
Dibenz(a,h)anthracene, ug/l	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10
2-Methylnaphthalene, ug/l	<10	<10
1-Methylnaphthalene, ug/l	<10	<10
Surrogate-NBZ	93 %	92 %
Surrogate-2FBP	106 %	107 %
Surrogate-TPH	154 %	159 %
Date Extracted	04.04.95	04.04.95
Date Analyzed	04.19.95	04.19.95

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LOG NO: S5-51793

Received: 31 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51793-10	216P000010	03-30-95/1715	ENC03
51793-11	216E000010	03-30-95/1745	ENC03

PARAMETER	51793-10	51793-11
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline, mg/l	<0.050	<0.050
Date Analyzed	04.08.95	04.08.95
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Kerosene, mg/l	<0.30	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30	<0.30
Hydrocarbons as Varsol, mg/l	<0.30	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0	<1.0
Date Extracted	04.04.95	04.04.95
Date Analyzed	04.08.95	04.08.95

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LOG NO: S5-51793

Received: 31 MAR 95

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Purchase Order: 0225/95

Project: 0102 08420 NAS Corpus Christi (ENC01/02/03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51793-12	216TE00010	03-30-95	ENC03

PARAMETER	51793-12
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.9
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	86 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.08.95

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LOG NO: S5-51812

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Purchase Order: 0225/95

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Nashville, TN 37217

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-9	216F000010	03-31-95/1520	ENC03

PARAMETER	51812-9
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	1.6
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	26.9
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	90 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.09.95
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Analyzed	04.18.95

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Purchase Order: 0225/95

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-9	216F000010	03-31-95/1520	ENC03

PARAMETER	51812-9				
Semivolatile Organics (8270)					
Naphthalene, ug/l	<10				
Acenaphthylene, ug/l	<10				
Acenaphthene, ug/l	<10				
Fluorene, ug/l	<10				
Phenanthrene, ug/l	<10				
Anthracene, ug/l	<10				
Fluoranthene, ug/l	<10				
Pyrene, ug/l	<10				
Chrysene, ug/l	<10				
Benzo(a)anthracene, ug/l	<10				
Benzo(b)fluoranthene, ug/l	<10				
Benzo(k)fluoranthene, ug/l	<10				
Benzo(a)pyrene, ug/l	<10				
Indeno(1,2,3-cd)pyrene, ug/l	<10				
Dibenz(a,h)anthracene, ug/l	<10				
Benzo(g,h,i)perylene, ug/l	<10				
2-Methylnaphthalene, ug/l	<10				
1-Methylnaphthalene, ug/l	<10				
Surrogate-NBZ	75 %				
Surrogate-2FBP	65 %				
Surrogate-TPH	76 %				
Date Extracted	04.04.95				
Date Analyzed	04.24.95				

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LOG NO: S5-51812

Received: 01 APR 95

Purchase Order: 0225/95

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Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51812-9	216F000010	03-31-95/1520	ENC03

PARAMETER	51812-9
Hydrocarbons (Modified 8015)	
Hydrocarbons as Gasoline, mg/l	<0.050
Date Analyzed	04.09.95
Hydrocarbons (Modified 8015E)	
Hydrocarbons as Kerosene, mg/l	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30
Hydrocarbons as Varsol, mg/l	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0
Date Extracted	04.04.95
Date Analyzed	04.08.95

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LOG NO: S5-51812

Received: 01 APR 95

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Nashville, TN 37217

Purchase Order: 0225/95

Project: 0102 08420 Corpus Christi (ENC03/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51812-10	216TE00011	03-31-95	ENC03
51812-11	216TE00012	03-31-95	ENC03

PARAMETER	51812-10	51812-11
Purgeable Aromatics (8020)		
Benzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.9	27.1
Surrogate - Expected Value, ug/l	30	30
Surrogate - % Actual Recovery	86 %	90 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	04.09.95	04.09.95

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LOG NO: S5-ENCC01

Received: 28 MAR 95

Purchase Order: 0225/95

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC01-1	MS % Recovery (216SB00108)	ENC01
ENCC01-2	MSD % Recovery (216SB00108)	ENC01

PARAMETER	ENCC01-1	ENCC01-2
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline	54 %	62 %
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Diesel Fuel	*F62	*F62

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Project: 0102 08420 NAS Corpus Christi (ENC01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC01-3	MS % Recovery (216KB00910)	ENC01
ENCC01-4	MSD % Recovery (216KB00910)	ENC01

PARAMETER	ENCC01-3	ENCC01-4
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	90 %	80 %
Purgeable Aromatics (8020)		
Benzene	77 %	66 %
Toluene	106 %	82 %
Surrogate - a,a,a-Trifluorotoluene	136	130
Surrogate - Expected Value	150	150
Surrogate - % Actual Recovery	91 %	87 %
Surrogate - Control Limit	67-137 %	67-137 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	74 %	53 %
N-Nitrosodi-N-Propylamine	85 %	60 %
1,2,4-Trichlorobenzene	80 %	58 %
Acenaphthene	88 %	70 %
2,4-Dinitrotoluene	86 %	67 %
Pyrene	97 %	96 %
Surrogate-NBZ	64 %	45 %
Surrogate-2FBP	81 %	63 %
Surrogate-TPH	74 %	76 %

Methods: EPA SW-846

*F62 = Matrix spikes were not recovered due to sample dilution required prior to analysis.

Linda A. Wolfe (BJM)
Linda A. Wolfe

Final Page Of Report

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51737

Received: 29 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51737-16	216TE00006	03-28-95	ENC02

PARAMETER	51737-16
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	26.3
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	88 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.31.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51840

Received: 04 APR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-8	216P000020	04-03-95/1600	ENC04
51840-9	216E000020	04-03-95/1630	ENC04

PARAMETER	51840-8	51840-9
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0
Date Analyzed	04.18.95	04.18.95
Purgeable Aromatics (8020)		
Benzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	28.1	26.1
Surrogate - Expected Value, ug/l	30	30
Surrogate - % Actual Recovery	94 %	87 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	04.17.95	04.17.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51840

Received: 04 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-8	216P000020	04-03-95/1600	ENC04
51840-9	216E000020	04-03-95/1630	ENC04

PARAMETER	51840-8	51840-9
Semivolatile Organics (8270)		
Naphthalene, ug/l	<10	<10
Acenaphthylene, ug/l	<10	<10
Acenaphthene, ug/l	<10	<10
Phenanthrene, ug/l	<10	<10
Anthracene, ug/l	<10	<10
Fluoranthene, ug/l	<10	<10
Pyrene, ug/l	<10	<10
Chrysene, ug/l	<10	<10
Benzo(a)anthracene, ug/l	<10	<10
Benzo(b)fluoranthene, ug/l	<10	<10
Benzo(k)fluoranthene, ug/l	<10	<10
Benzo(a)pyrene, ug/l	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10
Dibenz(a,h)anthracene, ug/l	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10
2-Methylnaphthalene, ug/l	<10	<10
1-Methylnaphthalene, ug/l	<10	<10
Surrogate-NBZ	54 %	53 %
Surrogate-2FBP	80 %	80 %
Surrogate-TPH	90 %	80 %
Date Extracted	04.05.95	04.05.95
Date Analyzed	04.27.95	04.27.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51840

Received: 04 APR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-8	216P000020	04-03-95/1600	ENC04
51840-9	216E000020	04-03-95/1630	ENC04

PARAMETER	51840-8	51840-9
Hydrocarbons (Modified 8015)		
Hydrocarbons as Gasoline, mg/l	<0.050	<0.050
Date Analyzed	04.17.95	04.17.95
Hydrocarbons (Modified 8015E)		
Hydrocarbons as Kerosene, mg/l	<0.30	<0.30
Hydrocarbons as Diesel Fuel, mg/l	<0.30	<0.30
Hydrocarbons as Heavy Oils, mg/l	<1.0	<1.0
Hydrocarbons as Mineral Spirits, mg/l	<0.30	<0.30
Hydrocarbons as Naphtha, mg/l	<0.30	<0.30
Hydrocarbons as Varsol, mg/l	<0.30	<0.30
Hydrocarbons as Fuel Oil, mg/l	<1.0	<1.0
Date Extracted	04.05.95	04.05.95
Date Analyzed	04.08.95	04.08.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51840

Received: 04 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51840-10	216TE00013	04-03-95/1545	ENC04
51840-11	216TE00014	04-03-95/1635	ENC04

PARAMETER	51840-10	51840-11
Purgeable Aromatics (8020)		
Benzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.9	25.5
Surrogate - Expected Value, ug/l	30	30
Surrogate - % Actual Recovery	86 %	85 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	04.17.95	04.17.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51874

Received: 05 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC04/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51874-5	216TE00015	04-04-95/1530	ENC04

PARAMETER	51874-5
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.4
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	85 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51960-4	216TE00016	04-06-95	ENC05

PARAMETER	51960-4
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.5
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	85 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-ENCC02

Received: 30 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 010208420 NAS Corpus Christi (ENC02)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC02-1	MS % Recovery (216SB01104)	ENC02
ENCC02-2	MSD % Recovery (216SB01104)	ENC02

PARAMETER	ENCC02-1	ENCC02-2
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	68 %	104 %
Purgeable Aromatics (8020)		
Benzene	121 %	145 %
Toluene	103 %	123 %
Surrogate - a,a,a-Trifluorotoluene	138	139
Surrogate - Expected Value	150	150
Surrogate - % Actual Recovery	92 %	93 %
Surrogate - Control Limit	67-137 %	67-137 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	65 %	72 %
N-Nitrosodi-N-Propylamine	64 %	71 %
1,2,4-Trichlorobenzene	73 %	81 %
Acenaphthene	78 %	85 %
2,4-Dinitrotoluene	85 %	95 %
Pyrene	90 %	94 %
Surrogate-NBZ	52 %	59 %
Surrogate-2FBP	75 %	82 %
Surrogate-TPH	73 %	76 %

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-ENCC03

Received: 31 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC03)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SDG#
ENCC03-1	MS % Recovery (216SMW2312)	ENC03
ENCC03-2	MSD % Recovery (216SMW2312)	ENC03

PARAMETER	ENCC03-1	ENCC03-2
Purgeable Aromatics (8020)		
Benzene	118 %	124 %
Toluene	114 %	114 %
Surrogate - a,a,a-Trifluorotoluene	4835	4961
Surrogate - Expected Value	4740	4740
Surrogate - % Actual Recovery	102 %	105 %
Surrogate - Control Limit	67-137 %	67-137 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	59 %	59 %
N-Nitrosodi-N-Propylamine	70 %	70 %
1,2,4-Trichlorobenzene	62 %	69 %
Acenaphthene	73 %	70 %
2,4-Dinitrotoluene	61 %	64 %
Pyrene	97 %	88 %
Surrogate-NBZ	55 %	58 %
Surrogate-2FBP	60 %	60 %
Surrogate-TPH	76 %	67 %
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	106 %	64 %

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51762

Received: 30 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: 010208420 NAS Corpus Christi (ENC02/01)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED	SDG#
51762-8	216TE00008	03-29-95	ENC02

PARAMETER	51762-8
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	28.3
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	94 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.08.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51927

Received: 06 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: 0102 08420 NAS Corpus Christi (ENC01/04)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51927-5	216TE00016	04-05-95/1600	ENC04

PARAMETER	51927-5
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.6
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	85 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

CHAIN-OF-CUSTODY DOCUMENTATION

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER LARRY Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTANNERS	TPH 418.1	PAH 8270	BTEX 8020					REMARKS
216SB00408	3-27-95	1610	Soil	Glass JARS	4°C	—	3	X	X	X					
216HB00410	↓	1615	Soil	↓	↓		3	X	X	X					
216SB00410		1615	↓				3	X	X	X					
216SB00404		1600													
216TB00005	3-27-95		H_2O	40 ml Vial	4°C	HCL	3			X					

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE Shanna Curley	3/27/95	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED SHANNA CURLEY	TIME	PRINTED	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	1815	COMPANY		COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature) (A)	DATE	TIME
J. Campbell 1-615-517-1071	5/28/95	8:15

3/24 per Shanna Curley 216SB00404 requires 418.1/8270/8020 - also for BN

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: 0102 08420
MEDIA STATUS: (A, B, OR C) SOL

PROJECT MANAGER: LARRY Reynolds
TELEPHONE NO.: 615 399 8800
FAX. NO.: 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 8101	8020 BTEX	8270 PAH	8015-Purgeable	8015-Extractable			REMARKS
216SB00208	3-27-95	1345	Soil	Glass JAR	4°C		3	X	X	X					
216SB00108	↓	1130	↓	↓	↓		3	X	X	X	X	X			TPH Modified 8015 ALSO
216SB00310	↓	1450	↓	↓	↓		3	X	X	X					
216SB00210	↓	1350	↓	↓	↓		3	X	X	X	X	X			TPH Modified 8015 ALSO
216SB00112	↓	1145	↓	↓	↓		3	X	X	X					
216SB00308	↓	1440	↓	↓	↓		3	X	X	X					
~~TE~~ (SRC)															
216TE00004			H_2O	3 40 ml Vials	4°C	HCl	3		X						Trip Blank.
Temp Blank															

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE: Shanna Curley	3/27/95	SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED: SHANNA CURLEY		PRINTED:		PRINTED:		PRINTED:	
COMPANY: EnSafe	TIME	COMPANY:	TIME	COMPANY:	TIME	COMPANY:	TIME
REASON: Analysis	1815	REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: Fed EX
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS:
* MODIFIED 8015 - PURGEABLE AND EXTRACTABLE

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature) (B)	DATE	TIME
D. Campbell 55-51709	3/28/95	3:55

3/29 per Shanna Curley use 216SB00108 for 8015 P+E MS/MSD - see fax BH

CHANCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi

ADDRESS

PROJECT NAME/NUMBER 0102 08420

MEDIA STATUS: (A, B, OR C)

PROJECT MANAGER LARRY Reynolds

TELEPHONE NO. 615-399 8800

FAX. NO. 615 399 7467

SAMPLERS: (SIGNATURE) Shanna Curley

ANALYSIS REQUIRED

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	BTEX 8020					REMARKS
216SB00408	3-27-95	1610	Soil	Glass JARS	4°C	—	3	X	X	X					
216HB00410	↓	1615	Soil	↓	↓		3	X	X	X					
216SB00410		1615	↓				3	X	X	X					
216SB00404		1600					3	X	X	X					
216TE00005			H_2O	40ml Vial			3	✓							

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE Shanna Curley	3/27 1610	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED SHANNA CURLEY		PRINTED		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY		COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: FedEx

SHIPMENT NO.

SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHAINCUST

MS/MSD for Modified 8015

CHAIN OF CUSTODY RECORD

EN SAFE®

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi

ADDRESS

PROJECT NAME/NUMBER 0102 08420

MEDIA STATUS: (A, B, OR C)

PROJECT MANAGER LARRY Reynolds

TELEPHONE NO. 615 399 8800

FAX. NO. 615 399 7467

SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH/1001	8020 BTEX	8270 PAH	8015-Purgeable	8015-Extractable			REMARKS
216SB00208	3-27-95	1345	Soil	Gloss JAR	4°C		3	X	X	X					
216SB00108		1130					3	X	X	X	X	X			TPH Modified 8015 ALSO
216SB00310		1450					3	X	X	X					
216SB00210		1350					3	X	X	X	X	X			TPH Modified 8015 ALSO
216SB00112		1145					3	X	X	X					
216SB00308		1440					3	X	X	X					
216TC00004															

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE Shanna Curley	3/21/95	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED SHANNA CURLEY	TIME	PRINTED	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe		COMPANY		COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT:

SHIPMENT NO.

SPECIAL INSTRUCTION:

COMMENTS:

* MODIFIED 8015 - PURGEABLE AND EXTRACTABLE

AFTER ANALYSIS, SAMPLES ARE TO BE:

- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

216SB00108 - MS/MSD for 8015 - Purgeable & Extractable

CHANCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 , 615/399-8800

CLIENT NAS Corpus Christi

PROJECT MANAGER LARRY Reynolds

ADDRESS Fuel Farm 316

TELEPHONE NO. 615 399 8806

PROJECT NAME/NUMBER 0102 08420

FAX. NO. 615 399 7467

MEDIA STATUS: (A, B, OR C) Soil

SAMPLERS: (SIGNATURE) S Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	PAH 8270 Extractable	TPH 418.1	TPH modified					REMARKS
2165B00812	3-28-95	1120	Soil	GLASS JAR	4°C		2	X	X	X					8015 modified Extractable
2165B00814		1130					2	X	X						
2165B00910		1350					2	X	X			ONLY			Matrix Spike / Matrix Spike Duplica
2165B00905		1340					2	X	X						
2165B00910		1350					2	X	X						
2165B01008		1600					2	X	X						
2165B01016		1615					2	X	X						
2165B01002		1545					2	X	X						
Temp Blank							1								

RELINQUISHED BY	DATE	RELINQUISHED BY	DATE	RELINQUISHED BY	DATE	RELINQUISHED BY	DATE
SIGNATURE S Curley	3/28	SIGNATURE L. Bonds	3-28-95	SIGNATURE		SIGNATURE	
PRINTED S Curley		PRINTED L. Bonds		PRINTED		PRINTED	
COMPANY ENSAFE	TIME	COMPANY SL-51737	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1800	REASON	9:34	REASON		REASON	

Received

METHOD OF SHIPMENT: FedEx

SHIPMENT NO.

SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 2 OF 2

Purgeable Extractable (SNC)

CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER Larry Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shannon Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	ANALYSIS REQUIRED: Bld B020	ANALYSIS REQUIRED: 8015 Modified						REMARKS
216KB00910	3-28-95	1350	Soil	Glass JAR	4°C	None	1	X							Matrix Spike/MS Dup.
216SB00908	↓	1340	↓	↓	↓	↓	1	X							
216SB00910	↓	1350	↓	↓	↓	↓	1	X							
216SB01008	↓	1600	↓	↓	↓	↓	1	X							
216SB01016	↓	1615	↓	↓	↓	↓	1	X							
216SB01002	↓	1545	↓	↓	↓	↓	1	X							
~~TP~~ (SNC)	↓				↓	↓	1	X							
216TE00006	↓		H_2O	40ml Vial	↓	HCL	3	X							TRIP
Temp Blank	↓		H_2O		↓		1								

RELINQUISHED BY:	DATE / TIME	~~RELINQUISHED~~ Received BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE Shannon Curley	3/28	SIGNATURE L. Bonds C	3-29-95	SIGNATURE		SIGNATURE	
PRINTED S CURLEY		PRINTED L. Bonds		PRINTED		PRINTED	
COMPANY ENSAFE	1800	COMPANY SL-51737	9:34 a	COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

EN SAFE

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CHAIN OF CUSTODY RECORD

PAGE 1 OF 2

CLIENT NAS CORPUS CHRISTI
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER LARRY Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shannon Curley

ANALYSIS REQUIRED: Purgeable Extractable Soil

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	Bkt 8020	8015-Modified						REMARKS
216SB00506	3-28-95	830	Soil	Glass JAR	4°C	None	1	X							
216SB00510		845					1	X	X						8015 Modified Purgeable
216SB00606		910					1	X							
216SB00610		920					1	X							
216SB00706		955					1	X							
216SB00710		1000					1	X							
216SB00804		1100					1	X							
216SB00806		1110					1	X							
216SB00812		1120					1	X	X						8015 Modified Purgeable
216SB00814		1130					1	X							

RELINQUISHED BY:	DATE	~~RELINQUISHED BY:~~ Received	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE Shannon Curley	3/28	SIGNATURE L. Bonds	3-29-95	SIGNATURE		SIGNATURE	
PRINTED S. CURLEY		PRINTED L. Bonds		PRINTED		PRINTED	
COMPANY EnSafe	TIME	COMPANY SL-51737	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1800	REASON	9:34 am	REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE

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CLIENT NAS Corpus Christi

ADDRESS Fuel Farm 216

PROJECT NAME/NUMBER 0102 08420

MEDIA STATUS: (A, B, OR C)

PROJECT MANAGER LARRY Reynolds

TELEPHONE NO. 615 399 8800

FAX. NO. 615 399 7467

SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	PAH 8270	TPH 418.1	TPH MODIFIED Extractable					REMARKS
216SB00506	3-28-95	830	Soil	Glass JAR	4°C	None	2	X	X						
216SB00510		845					2	X	X	X					8015 Modifed-Extractable
216SB00606		910					2	X	X						
216SB00610		920					2	X	X						
216SB00706		955					2	X	X						
216SB0710		1000					2	X	X						
216SB00804		1100					2	X	X						
216SB00806		1110					2	X	X						

RELINQUISHED BY:	DATE	~~RELINQUISHED~~ Received BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	3/28	SIGNATURE L. Bonds	3-29-95	SIGNATURE		SIGNATURE	
PRINTED S CURLEY		PRINTED L. Bonds		PRINTED		PRINTED	
COMPANY ENSAFE	TIME	COMPANY SL-51737	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1800	REASON	9:34 am	REASON		REASON	

METHOD OF SHIPMENT: Fed EX

SHIPMENT NO.

SPECIAL INSTRUCTION:

COMMENTS: 1:30 per Shanna Curley about sample taken at 1000 should have an ID of 216SB00710 to match other COC + bottles. Bct

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

EnSafe

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: 0102-08420
MEDIA STATUS: (A, B, OR C) SOIL

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

ANALYSIS REQUIRED: Purgable & Extractable

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	TPH Modified				REMARKS
216SB01104	3-29-95	1342	Soil	Glass jars	4°C		3	X	X	X					
216SB01112	3-29-95	1410	↓	↓	↓		3	X	X	X	X				8015 modified Purgables & Extractable
216SB01206	↓	1500	↓	↓	↓		3	X	X	X					
216SB01210	↓	1515	↓	↓	↓		3	X	X	X					
216SB01302	↓	1545	↓	↓	↓		3	X	X	X					
216SB01306	↓	1600	↓	↓	↓		3	X	X	X					
216SB01310	↓	1610	↓	↓	↓		3	X	X	X					
216TE00008			H_2O	40ml VIALS			3	X							Trip

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE: [signature]	3/29/95	SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED: [signature]		PRINTED:		PRINTED:		PRINTED:	
COMPANY: EnSafe		COMPANY:		COMPANY:		COMPANY:	
REASON: Analysis	1815	REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS: 3/30 per Shanna Curley use 216SB01104 for MS/MSD. BH

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
[signature] 55-51762	3/30/95	9:27

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE®

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PAGE 1 OF 1

CLIENT: NAS Corpus Christi
PROJECT MANAGER: Larry Reynolds
ADDRESS: Fuel Farm 216
TELEPHONE NO.: 615-399-8800
PROJECT NAME/NUMBER: 0102-08420
FAX. NO.: 615-399-7467
MEDIA STATUS: (A, B, OR C) water
SAMPLERS: (SIGNATURE)

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	8015 modified to be run also				REMARKS
216P000010	3-30-95	1715	water	40 ml vial	4°C	HCl	3	X			X				8015 modified to be run also
↓	↓	↓	↓	~~500~~ ml amber	↓	HCl	1		X						
↓	↓	↓	↓	1 litre amber	↓	–	2			X					
216E000010	3-30-95	1745	water	40 ml vial	4°C	HCl	3	X			X				8015 modified to be run also
↓	↓	↓	↓	500 ml amber	↓	HCl	1		X						
↓	↓	↓	↓	1 litre amber	↓	–	2			X					
216TE00010	3-30-95	–	water	40 ml vial	4°C	HCl	3	X							

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE	3/31/95	Received SIGNATURE L. Bonds	3/31/95	SIGNATURE		SIGNATURE	
PRINTED J. Georgi	TIME	PRINTED L. Bonds	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	1840	COMPANY 51793	9:21 am	COMPANY		COMPANY	
REASON Shipto lab for analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

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CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0162 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER Carry Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) S. Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	PAH 8270	TPH 418.1	Modified 8015 - Purgeable	Modified 8015 - Extractable			REMARKS
216SMW2208	3-30-95	850	Soil	Glass JARS	4°C	NONE	3	X	X	X					
216SMW2214		915					3	X	X	X					
216SMW2217		930					3	X	X	X					
216SMW2304		1108					3	X	X	X	X	X			8015 - Purgeable/Extractable
216SMW2312		1350					3	X	X	X					
216HMW2415		1650					3	X	X	X					
216SMW2418		1650					3	X	X	X					
216SMW2404		1540					3	X	X	X					
216SMW2408		1600					3	X	X	X					
216TE00009			H_2O	40 ml vial		HCl	3	X	NO	NO					TRIP - DO NOT Analyze

RELINQUISHED BY:	DATE	RECEIVED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	3/30	SIGNATURE L. Bonds	5-30-95	SIGNATURE		SIGNATURE	
PRINTED S CURLEY		PRINTED L. Bonds B		PRINTED		PRINTED	
COMPANY ENSAFE	TIME	COMPANY 51793	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1800	REASON	9:21 am	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe

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PAGE 1 OF 1

CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER LARRY Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) S. Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	Modified 8015 - Pageable	Modified 8015 - Extractable			REMARKS
216SMW2502	3-31-95	900	Soil	Glass Jar	4°C	None	3	X	X	X					
216SMW2514	3-31-95	915					3	X	X	X					
216SMW2518		930					3	X	X	X					
216SMW2604		1040					3	X	X	X					
216SMW2610		1050					3	X	X	X	X	X			
216SMW2618		1135					3	X	X	X					
216SMW2712		1430					3	X	X	X					
216SMW2720		1600					3	X	X	X					
~~216TE00[illegible]~~															
216TE00012	3-31-95		H_2O	40 ml Vial	4°C	HCL	3	X							

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	3-31	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED S Curley		PRINTED		PRINTED		PRINTED	
COMPANY EnSafe	TIME	COMPANY	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1730	REASON		REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
A. Campbell (B) 51812	4/1/95	11:16

CHANCUST

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CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: 0102 08420
MEDIA STATUS: (A, B, OR C) Water
PROJECT MANAGER: LARRY Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) S Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	TPH 8015-Purge	TPH 8015 Extract			REMARKS
216TE00011	3-31-95		H_2O	40 ml VIAL	4°C	HCL	3	X							
216F000010	3-31-95	1520	H_2O	1 Liter Amber	↓	NONE	2			X					
216F000010	↓	↓	H_2O	1 Amber Glass	↓	HCL	1		X			~~X~~			
216F000010	↓	↓	H_2O	~~40~~ 40 ml VIAL	↓	HCL	6	X			X	X			
Temp Blank	↓		H_2O												

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	3-31-95	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED S HANNA CURLEY	TIME	PRINTED	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	1730	COMPANY		COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: Fedex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
A. Campbell (A) 51812	4/1/95	11:14

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: 0102 08420
MEDIA STATUS: (A, B, OR C) H_2O

PROJECT MANAGER: Lacky Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shawna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTANNERS	PAH 8270	TPH 418.1	BTEX 8020	8015 Purgeable	8015 Extractable			REMARKS
216P000020	4-3-95	1600	H_2O	1 liter Amber	4°C	None	2	X							Potable Water
↓	↓	↓	↓	500 ml Amber		HCl	1		X						Blank
				40 ml Vial		HCl	3			X	X	X			
216E000020	4-3-95	1630	H_2O	1 liter Amber	4°C	None	2	X							Equip Rinsate
↓	↓	↓	↓	500 ml Amber		HCl	1		X						
				40 ml Vial		HCl	3			X	X	X			
216TE00014	4-3-95	1635	H_2O	40 ml Vial	4°C	HCl	3			X					
Temp Blank															

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	4-3-95	SIGNATURE L Baker		SIGNATURE		SIGNATURE	
PRINTED S. CURLEY	TIME	PRINTED L Baker	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe		COMPANY JLES		COMPANY		COMPANY	
REASON Analysis	1645	REASON 55-51840		REASON		REASON	

METHOD OF SHIPMENT: Fedex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER Larry Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	BTEX 8020	Modified 8015 - Purgeable	Modified 8015 - Extractable			REMARKS
216SmW2802	4-3-95	840	Soil	GLASS JARS	4°C	NONE	3	X	X	X					
216SmW2812		900					3	X	X	X	X	X			8015 - Purgeable/Extractable
216SmW2816		930					3	X	X	X					
216SmW2906		1115					3	X	X	X					
216SmW2918		1150					3	X	X	X					
216HMW2918		1150					3	X	X	X					
216TE00013		1545	H_2O	40 ml VAL	4°C	HCL	3			X					TRIP Blank
Temp Blank															

RELINQUISHED BY:	DATE	~~RELINQUISHED~~ RECEIVED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Curley	4-3-95	SIGNATURE L Baker	4/11/95	SIGNATURE		SIGNATURE	
PRINTED S CURLEY		PRINTED L BAKER		PRINTED		PRINTED	
COMPANY ENSAFE	TIME	COMPANY SLES	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1600	REASON SS-51840	9:35	REASON		REASON	

METHOD OF SHIPMENT: Fed-EX
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE®

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CLIENT NAS Corpus Christi
ADDRESS Fuel Farm 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER LARRY Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Cauley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	BTEX 8020					REMARKS
216SRW1006	4-4-95	850	Soil	Glass Jars	4°C	None	3	X	X	X					
216SRW1018	4-4-95	1020	↓	↓	↓	↓	3	X	X	X					
216SRW2010	4-4-95	1400	↓	↓	↓	↓	3	X	X	X					
216SRW2002	↓	1350	↓	↓	↓	↓	3	X	X	X					
216TE00015	4-4-95	1530	H_2O	40ml VIAL	4°C	HCl	3	NO	NO	X					Trip - For Bhex only
Temp Blank															

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S. Cauley	4-4-95	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED S. Cauley	TIME	PRINTED	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY ENSAFE	1630	COMPANY		COMPANY		COMPANY	
REASON ANALYSIS		REASON		REASON		REASON	

METHOD OF SHIPMENT: FED EX
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
A. Campbell SS-51874	4/5/95	9:21

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel FARM 216
PROJECT NAME/NUMBER: 0102 084420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER: LARRY Reynolds
TELEPHONE NO.: 615 399 8800
FAX. NO.: 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	PAH 8270	TPH 418.1	TPH 8015 purgeable	8015 Extractable			REMARKS
216SRW3003	4-5-95	1030	Soil	GLASS JAR	4°C	NONE	3	X	X	X					
216SRW3013	↓	1135	↓	↓	↓	↓	3	X	X	X	X	X			8015 Purge/Extract
216SRW3015	↓	1150	↓	↓	↓	↓	3	X	X	X					
216TE000116	4-5-95	1600	H_2O	40 ml VIAL	4°C	HCl	3	X							
Temp Blank															

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE Shanna Curley	4-5-95	Received SIGNATURE L. Bond	4-6-95	SIGNATURE		SIGNATURE	
PRINTED SHANNA CURLEY	1615	PRINTED L. Bonds 51927		PRINTED		PRINTED	
COMPANY EnSafe	TIME	COMPANY 65 51927	TIME	COMPANY	TIME	COMPANY	TIME
REASON Analysis	1615	REASON	9:30 am	REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

SOIL BORING LOGS

Environmental & Safety Designs, Inc.

Log of Boring SB01

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *11:04 on 3-27-95*	Surface Elevation: *11.76 feet msl*
Completed at *11:42 on 3-27-95*	Depth to Groundwater: *4.5 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TEERA ENV. DRILLING*	Total Depth: *12 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Silt** with minor Clay, very fine, brown, moderately dense, dry, grass in upper portion, roots throughout (topsoil).	11.1
			02	100	0		SP	**Sand**, very fine, gray, poorly graded, rounded to subrounded, loose to slightly dense, "sugar sand" appearance, lense of dark brown Silty Clay from 1.8 to 2.0 feet bgs, moderately dense, dry.	9.3
			04	100	0		ML	**Clay and Sand** with minor Silt, very fine, brown, poorly graded Sand, moderately dense, hydrocarbon staining from 4.2 to 6.8 feet bgs, gray color, strong hydrocarbon odor, slightly moist, higher Clay content in lower portion of return.	
5			06	67	57				
			08	92	155		ML	**Clay and Sand**, with some Silt, gray-green, moderately dense, slightly moist, slightly plastic, moderate hydrocarbon odor.	5
			10	96	65				
10			12	100	14		CL	**Clay**, gray-green, hard, plastic, crumbly, slightly moist to wet, minor Sand lenses in lower portion of return, slight hydrocarbon odor.	1.8
									2
								End of Boring - 12 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
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Environmental & Safety Designs, Inc.

Log of Boring SB02

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *13:20 on 3-27-95*	Surface Elevation: *10.95 feet msl*
Completed at *13:46 on 3-27-95*	Depth to Groundwater: *6 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TEERA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Silt** with minor Clay, very fine, brown, moderately dense, dry, grass in upper portion, roots throughout (topsoil).	
			02	75	0		SP	**Sand**, very fine, gray, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, dry, no odor, laminae of dark brown clay in lower portion of interval.	
			04	100	0				6.9
5			06	67	0		SC	**Sand and Clay**, very fine, light brown, poorly graded Sand, moderately dense, slightly moist to wet at bottom of interval, clay laminae throughout, no odor or visual staining until after 6 feet bgs, then diesel odor and hydrocarbon staining (dark gray).	
			08	100	107				[illegible]
			10	100	196		ML	**Clay and Sand**, minor Silt, gray-green, moderately dense to soft, wet, mottled with light brown clay throughout, moderate hydrocarbon odor, hydrocarbon staining.	
								higher Silt content and severe hydrocarbon staining (to 8.5 feet bgs)	
								Clay and Sand, gray-green, soft, mottled with dark green clay.	
10									.9
								End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
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Environmental & Safety Designs, Inc.

Log of Boring SB03

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *14:00 on 3-27-95*	Surface Elevation: *11.94 feet msl*
Completed at *14:45 on 3-27-95*	Depth to Groundwater: *3.5 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Silt** with minor Clay, very fine, brown, moderately dense, dry, grass in upper portion, roots throughout (topsoil).	
			02	79	0		SP	**Sand**, very fine, gray, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, dry, no odor.	
			04	67	314		SC	**Sand and Clay**, very fine, gray-green, poorly graded, dense, rounded to subrounded, moist to wet, hydrocarbon odor.	8.9
5			06	79	311		ML	**Clay and Sand**, minor Silt lenses, gray-green, stiff (hard) to soft in intervals, wet, sticky, mottled with light brown clay laminae to 6 feet bgs, moderate hydrocarbon odor, hydrocarbon staining throughout.	7.9
			08	100	527				
							SC	**Sand and Clay**, gray-green, stiff, crumbly, Sand is very fine, poorly graded, subrounded to rounded, moderate hydrocarbon odor, sticky at bottom.	4.4
							ML		3.9
			10	79	412		SP	**Clay and Sand**, gray-green to light brown, stiff, slightly wet, Sand is very fine, poorly graded, rounded to subrounded, moderate hydrocarbon odor.	3.4
10								**Sand**, very fine, tan, poorly graded, rounded to subrounded, wet, "sugar sand", moderate hydrocarbon odor.	1.9
15									
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End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.

Environmental & Safety Designs, Inc.

Log of Boring SB04

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *15:35 on 3-27-95*	Surface Elevation: *11.81 feet msl*
Completed at *16:25 on 3-27-95*	Depth to Groundwater: *4.0 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Silt** with minor Clay, very fine, brown, moderately dense, dry, grass in upper portion, roots throughout (topsoil).	
			02	90	0		SP	**Sand**, very fine, gray, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry to slightly moist, no odor.	
			04	100	14			Sand as above, wet, slight hydrocarbon odor.	
								Sand as above, soft, wet, moderate hydrocarbon odor.	7.1
5			06	100	305		SC	**Clay and Sand**, gray-green, dense, Sand is poorly graded rounded to subrounded, moist to wet, hydrocarbon odor.	5.8
			08	100	396		SP	**Sand**, very fine, tan, soft to loose, poorly graded, rounded to subrounded, wet, mottled with dark green clay laminae, moderate hydrocarbon odor.	4
			10	100	171		ML	**Clay and Silt**, with occasional Sand, gray-green, dense, stiff, Sand is poorly graded and subrounded to rounded, moderate hydrocarbon odor, slightly moist, alternating intervals of poorly graded tan Sand and green mottled Clay from 8 to 9 feet bgs. **Silt and Sand**, with some Clay at 9 to 10 feet bgs, gray-green, dense, (hard), dry.	
10									1.8
								End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
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Environmental & Safety Designs, Inc.

Log of Boring SB05

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *8:15 on 3-28-95*	Surface Elevation: *11.75 feet msl*
Completed at *8:42 on 3-28-95*	Depth to Groundwater: *4.8 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	91	0		SM	**Sand and Silt**, very fine, light brown, moderately dense, dry, grass in upper portion, roots throughout (topsoil), some clay from 0.5 to 0.7 feet bgs, shell fragments (bivalves) at 0.7 feet bgs.	10.9
			04	96	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry to slightly moist, massive overall appearance.	
5			06	54	0			Sand as above, slightly moist, no odor.	
			08	100	40			Sand as above, wet, no odor.	
								Sand as above, wet, orange-brown Clay mottling throughout, moderate hydrocarbon odor.	4.6
			10	79	80		SC	**Sand and Clay**, very fine, gray-green, stiff to dense, strong hydrocarbon odor, Sand is rounded to subrounded, poorly graded, wet, with Clay which is slightly plastic, crumbly.	3.7
							SP		3.3
							ML	**Sand**, tan, very fine, poorly graded, rounded to subrounded, wet, loose, moderate hydrocarbon odor.	2.8
10							SP	**Silt and Clay**, gray-green, dense, stiff, laminated, wet, slightly sticky and crumbly, moderate hydrocarbon odor.	1.7
								Sand tan, very fine, poorly graded, rounded to subrounded, loose to dense, moderate hydrocarbon odor.	
								End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
15									
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Environmental & Safety Designs, Inc.

Log of Boring SB06

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *9:00 on 3-28-95*	Surface Elevation: *12.29 feet msl*
Completed at *9:20 on 3-28-95*	Depth to Groundwater: *5.8 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SM	**Sand and Silt**, fine, brown to dark brown, dense, dry, well graded, grass in upper portion, roots throughout (topsoil), no odor.	11.6
			02	100	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry to slightly moist, massive overall appearance, no odor.	
			04	100	0				8.9
							SM	**Silt and Sand**, brown, stiff to dense, poorly graded, mottled yellow brown to light brown, dry, massive overall appearance, no odor.	8.3
							SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, slightly dense, slightly moist, no odor.	8.1
5			06	100	0		SM	**Silt and Sand**, light brown, mottled with yellow-brown Clay, crumbly, dry overall to slightly moist at bottom, slight hydrocarbon odor at bottom.	5
			08	100	56		SP	**Sand**, with minor Clay, fine, tan, soft, poorly graded, rounded to subrounded, sticky, wet, no odor.	5.1
							SC	**Clay and Sand**, gray-green, stiff (hard) slightly moist, moderate hydrocarbon odor.	
			10	100	88		SM	Sand, fine, tan, as above.	3.4
10								Clay with some Sand, gray-green, as above.	2.3
								Sand, fine, tan, as above.	
								Silt and Sand, gray-green, stiff, crumbly, areas of dark gray hydrocarbon staining throughout, moist, moderate hydrocarbon odor, Sand is fine and rounded to subrounded.	
								End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
15									
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Environmental & Safety Designs, Inc.

Log of Boring SB07

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *9:38 on 3-28-95*	Surface Elevation: *12.67 feet msl*
Completed at *10:00 on 3-28-95*	Depth to Groundwater: *6.0 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	92	0		SM	**Sand and Silt**, with minor Clay, fine, brown to dark brown, dense, dry, well graded, grass in upper portion, roots throughout (topsoil), no odor, at 0.7 grades to yellow-brown to tan Silt, Clay, and Sand, crumbly, shell fragments present.	11.8
			04	100	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry to slightly moist, massive overall appearance, no odor.	8
5			06	100	2		SM	**Silt and Sand**, with some Clay, brown to red-brown, sticky, Sand is very fine, rounded to subrounded, no odor.	7.1
							SC	**Clay and Sand**, gray-green, stiff (hard), crumbly, slightly moist, no odor, Sand is very fine and rounded to subrounded.	6.7
							SP	**Sand**, very fine, tan, moist, as above, no odor.	6.2
			08	100	2		ML	**Clay and Sand**, gray-green, as above, no odor.	5.9
							SP	**Sand**, very fine, tan, wet, as above, no odor.	5.5
							ML	**Clay and Sand**, gray-green, stiff (hard), light brown Clay laminae throughout, crumbly, slight hydrocarbon odor.	4.7
			10	90	15		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, wet, very slight hydrocarbon odor.	3.5
10							ML	**Clay and Sand**, gray-green, stiff (hard), crumbly, moderate hydrocarbon odor, some dark gray staining, Sand is very fine, poorly graded and rounded to subrounded.	2.7
15									
20									

End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.

Environmental & Safety Designs, Inc.

Log of Boring SB08

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *10:25 on 3-28-95*	Surface Elevation: *12.21 feet msl*
Completed at *11:25 on 3-28-95*	Depth to Groundwater: *3.8 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *14 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	83	0		SM	**Sand and Silt**, fine, brown, dense, dry, well graded, grass in upper portion, roots throughout (topsoil), no odor grades to yellow-brown to Sand, crumbly.	
			04	75	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry to moist at 3.8 feet bgs, massive overall appearance, hydrocarbon odor when wet (3.8 feet bgs and below).	
5			06	76	102				
			08	100	29		ML	**Clay and Silt**, with some Sand, yellow-brown, slight hydrocarbon odor, Sand is very fine, rounded to subrounded.	6.7
							SP		6.2
							ML	**Sand**, very fine, tan, poorly graded, rounded to subrounded, wet, moderate hydrocarbon odor.	5.9
							SP	**Silt and Sand**, gray-green, stiff, moist to wet, strong hydrocarbon odor.	5
							SM	**Sand**, very fine, tan, wet, soft, poorly graded, rounded to subrounded, strong hydrocarbon odor.	4.3
			10	100	41		SP	**Clay and Silt**, with some Sand, gray-green, some red-yellow -brown Clay mottling, wet, moderate hydrocarbon odor.	3.8
10			12	100	169		ML	**Sand**, very fine, tan, poorly graded, rounded to subrounded, wet, soft, slight hydrocarbon odor.	2.2
								Clay and Sand, gray-green, stiff, crumbly, strong hydrocarbon odor, Sand is very fine, poorly graded and rounded to subrounded.	2
			14	100	2		CL	**Clay**, with minor Sand, gray-green, plastic very stiff, moist white caliche at 13.25 feet bgs, moderate hydrocarbon odor (within caliche interval).	1.8
15								*End of Boring - 14 feet: Boring backfilled with cement-bentonite grout from TD to surface.*	
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Environmental & Safety Designs, Inc.

Log of Boring SB09

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *13:20 on 3-28-95*	Surface Elevation: *12.17 feet msl*
Completed at *14:15 on 3-28-95*	Depth to Groundwater: *5.0 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SM	**Sand and Silt**, fine, brown, dense, dry, well graded, grass in upper portion, roots throughout (topsoil), no odor, grades to Sand below, crumbly.	
			02	71	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry, massive overall.	
			04	75	0		ML	**Clay and Silt**, with some Sand, light red-brown to tanish gray, mottled appearance, crumbly, no odor.	9.2
5			06	100	0		SC	**Clay and Sand**, light brown-gray, Sand is very fine, poorly graded, rounded to subrounded, crumbly, slightly sticky, moist, no odor.	8.2
			08	100	2		SM	**Sand and Silt**, tan to brown, very fine, dry to moist, mottled with red-yellow Clay, no odor.	6.2
							SP	**Sand**, very fine, tan, wet, slightly loose, poorly graded, rounded to subrounded, dry to slightly moist, no odor.	5.5
							SC	**Clay and Sand**, occasional Silt, gray-green, slightly dense, no odor.	4.6
			10	100	9		SM	**Clay and Silt**, gray-green, stiff, crumbly, hydrocarbon odor at 8.6 feet bgs and deeper, hydrocarbon staining from [illegible] feet bgs, moist.	4.2
10									2.2
								End of Boring - 10 feet; boring backfilled with cement-bentonite grout from TD to surface.	
15									
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Environmental & Safety Designs, Inc.

Log of Boring SB11

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *13:30 on 3-29-95*	Surface Elevation: *11.73 feet msl*
Completed at *14:15 on 3-29-95*	Depth to Groundwater: *4.0 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *12 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	98	0		ML / CL	**Silt and Sand**, fine, brown, dense, dry, well graded, crumbly, grass in upper portion, roots throughout (topsoil), no odor.	10.7
								Clay, dark gray, stiff, plastic, dry, crumbly, no odor, massive.	
			04	71	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, loose, "sugar sand" appearance, loose, dry, massive overall, no odor,	
								Sand, becomes moist, no odor.	
								Sand, wet, trace Silt and Gravel, no odor.	
5			06	92	0				
								Sand, wet, soft, sticky, no odor.	
			08	100	0				
			10	100	0		ML	**Sand and Silt**, with trace Clay, tan, soft, wet, sticky, shell fragments at 8.6 feet bgs, slight hydrocarbon odor at 9.5 feet bgs.	3.7
10			12	100	50		CL	**Clay**, gray-green, stiff, plastic, slightly moist, slight hydrocarbon odor, slightly sticky, brown mottling from 10 to 11 feet bgs, intervals of white caliche nodules from 11 to 12 feet bgs, moderate hydrocarbon odor in caliche intervals.	1.7
									-.3
								End of Boring - 12 feet: Boring backfilled with cement-bentonite grout from TD to surface.	
15									
20									

Environmental & Safety Designs, Inc.

Log of Boring SB12

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *14:30 on 3-29-95*	Surface Elevation: *10.09 feet msl*
Completed at *15:25 on 3-29-95*	Depth to Groundwater: *3.0 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	79	0		GC	**Sand and Gravel**, dark brown, dense, dry, well graded, crumbly, grass in upper portion, roots throughout, with some Silt and Clay, no odor.	9.1
							SP	**Sand**, very fine, light brown, poorly graded, rounded to subrounded, slightly loose, "sugar sand" appearance, moist, massive overall, no odor.	8.1
			04	75	126		SC	**Sand and Clay**, with some Silt, gray, stiff, moist, slightly sticky, Sand is very fine to fine, poorly graded, rounded to subrounded, moderate hydrocarbon odor.	6.1
5			06	92	576		ML	**Silt and Sand** with Clay, gray-green, Sand and Clay occur in lenses, mottled with brown Clay from 4 to 5.2 feet bgs, strong hydrocarbon odor from 6 to 10 feet bgs, hydrocarbon staining from 6.3 to 6.8 feet, caliche from 8 to 10 feet bgs.	
			08	100	437				
			10	100	91				
10								*End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.*	.1
15									
20									

Environmental & Safety Designs, Inc.

Log of Boring SB13

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Geologist: *J. GEORGE*
Started at *15:35 on 3-29-95*	Surface Elevation: *8.87 feet msl*
Completed at *16:40 on 3-29-95*	Depth to Groundwater: *1.9 feet* Measured:
Drilling Method: *HSA*	Groundwater Elevation: *feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *10 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			SS-1	92	43		GC	**Sand and Gravel**, dark gray, loose, dry, well graded, crumbly, grass in upper portion, roots throughout, with some Silt and Clay, brick fragments, no odor.	7.9
							SP	**Sand**, very fine, light brown, poorly graded, rounded to subrounded, slightly loose, "sugar sand" appearance, dry to moist at 1.9 feet bgs, strong hydrocarbon odor at 1.9 feet bgs.	6.9
			SS-2	75	28		SC	**Sand and Clay**, with some Silt, gray-green, stiff to soft, crumbly, moist, mottled with gray Clay throughout, moderate hydrocarbon odor throughout, hydrocarbon stain from 3.5 to 4 feet bgs.	
5			SS-3	100	624				2.9
			SS-4	75	258		ML	**Silt and Clay** with Sand, gray-green, Sand and Clay occur in lenses, mottled with brown Clay from 4 to 5.2 feet bgs, moist, strong hydrocarbon odor throughout, hydrocarbon staining from 6 to 6.5 feet bgs, massive appearance from 8 to 9.5 feet bgs.	
			SS-5	100	179				.6
10							SP	**Sand**, very fine, gray-brown, poorly graded, rounded to subrounded, wet, slight hydrocarbon odor.	.9
							CL	**Clay**, minor Sand, gray-green, stiff (hard), plastic, slightly moist, white caliche throughout, hydrocarbon odor only at caliche occurrances.	-1.1
15									
20									

End of Boring - 10 feet: Boring backfilled with cement-bentonite grout from TD to surface.

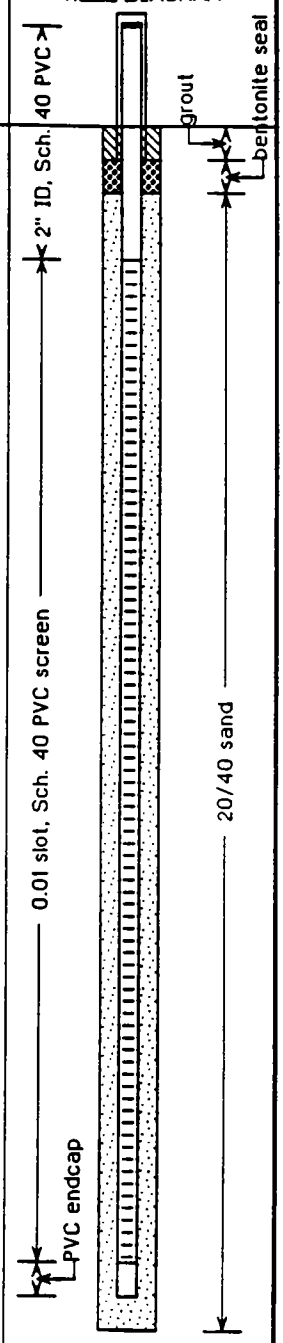
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-21

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.91 feet msl*
Started at *14:20 on 3-28-95*	TOC Elevation: *11.31 feet msl*
Completed at *16:30 on 3-28-95*	Depth to Groundwater: *10.08 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *4.40 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, somewhat degraded, 8-inches thick, minor steel rebar throughout, no odor.	
			02	100	98		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, moist, "sugar sand", HC odor.	
			04	100	33		SM	**Silt and Sand**, gray-green, stiff, dry to slightly moist to moist, moderate HC odor, crumbly, Sand is subrounded, very fine and in occasional lenses (3 and 6 feet bgs) which are soft.	
5			06	100	175				
			08	100	176				
							SP	**Sand**, very fine, gray-green, poorly graded, rounded to subrounded, moist, HC odor.	
			10	100	83		SM	**Sand and Silt**, gray-green, stiff, mottled with hydrocarbon stain, moderate HC odor, moist to wet at 8.8 feet bgs.	
10							ML	**Silt and Clay**, gray-green, stiff (hard), slightly moist, mottled with brown Clay, moderate HC odor.	
			12	75	91		CL	**Clay**, gray-green, stiff, plastic, wet, mottled with brown clay, high dilatency, vertical parting from 10.5 to 12 feet bgs, moderate HC odor.	
							SP	**Sand**, very fine, gray-green, poorly sorted, rounded to rounded, HC odor.	
			14	75	74		SM	**Silt and Sand**, gray-green, stiff to soft, slightly moist to moist, minor Clay from 14.9 to 15.2 feet bgs, Sand is very fine, subrounded, wet, occurs as lense from 14.8 to 14.9 feet bgs, HC odor throughout.	
15			16	100	160				
							SP	**Sand**, very fine, gray-green, poorly sorted, dense to slightly soft, moist, strong HC odor.	
			18	100	21		ML	**Silt and Clay**, minor Sand, gray-green, very dense (hard), vertical partings in return, moderate HC odor.	
20								*End of Boring - 18 feet: Monitoring Well 21 installed within boring.*	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

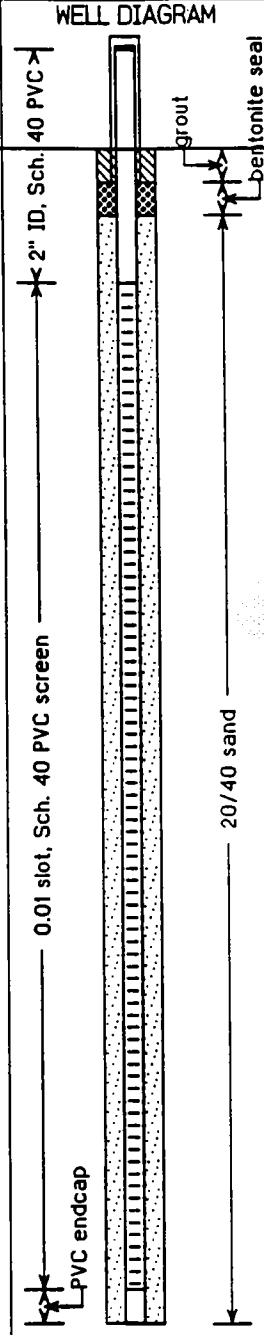
Log of Monitoring Well MW-22

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.61 feet msl*
Started at *8:30 on 3-30-95*	TOC Elevation: *13.49 feet msl*
Completed at *10:15 on 3-30-95*	Depth to Groundwater: *10.56 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.11 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *17.5 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION
	02	100	0	ML, SC	**Clay and Silt**, dark brown, dense to slightly loose, crumbly, dry, roots and root tubes throughout, no odor.
	04	75	0	SP	**Clay and Sand**, tan, very fine, poorly graded, rounded to subrounded, stiff to dense, dry to slightly moist, no odor. **Sand**, very fine, tan, poorly graded, rounded to subrounded, moist, "sugar sand", no odor.
5	06	75	24	SM	**Silt and Sand**, minor Clay, gray-green, stiff to dense, moist, strong HC odor, crumbly, mottled green throughout, Sand is very fine and rounded to subrounded.
	08	93	332		
	10	96	283	ML, SM, SC	**Clay and Silt**, with some Sand, gray-green, stiff (hard), wet, slightly sticky, slightly plastic, HC odor. **Sand and Silt**, gray-green, stiff, mottled with HC stain, moderate odor, wet.
10	12	100	67	CL	**Clay and Sand**, gray-green, stiff, slightly moist, slightly plastic, mottled with brown Clay, moderate HC odor. **Clay**, gray-green, stiff, plastic, dry to wet, mottled with brown and green Clay, moderate odor, Sand lense from 11.0 to 11.1 feet, soft, strong HC odor, white caliche from 11 to 12 feet bgs.
	14	100	209		
15	16	75	61	ML, SP	**Clay and Silt** with some Sand, gray-green, wet, strong HC odor, white caliche present throughout interval.
	18	75	29	ML	**Sand**, minor Silt, very fine, gray-green, poorly sorted, rounded to subrounded, loose, wet, strong odor. **Silt and Clay**, with minor Sand, gray-green, stiff, brown and green mottling, moist to wet, Sand is very fine, poorly graded, strong HC odor.
20					*End of Boring - 17.5 feet: Monitoring Well 22 installed within boring.*

ELEV. (ft-msl)

WELL DIAGRAM



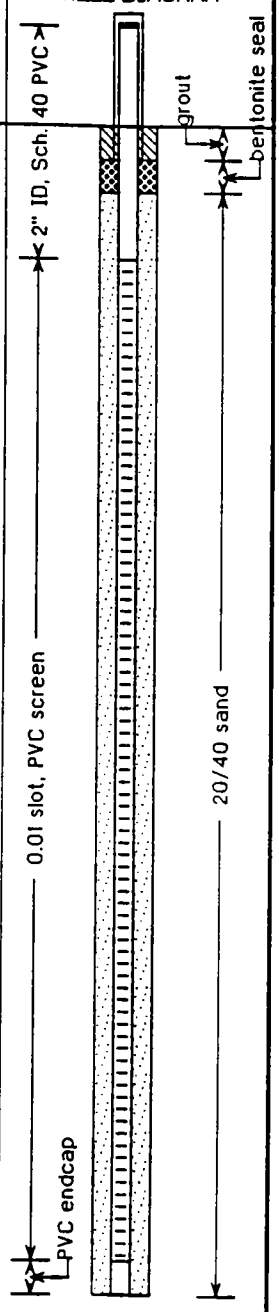
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-23

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.90 feet msl*
Started at *10:40 on 3-30-95*	TOC Elevation: *11.01 feet msl*
Completed at *15:15 on 3-30-95*	Depth to Groundwater: *7.41 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.60 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *17.5 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, somewhat degraded, 8-inches thick with occasional rebar steel, no odor.	
			02	82	19		ML	**Clay and Silt**, with some Sand, gray-green, stiff, moist, white caliche throughout, HC staining, moderate HC odor, Sand occurs as lenses from 0 to 0.25 and from 1 to 1.3 feet bgs, Sand is very fine, poorly graded, tan, moist, loose.	
			04	100	400		SP	**Sand**, very fine, dark gray, poorly graded, rounded to subrounded, "sugar sand", wet, soft, HC stained, moderate odor.	
5			06	75	180				
			08	50	152		SM	**Silt and Sand**, minor Clay, gray-green, soft, wet, loose, strong HC odor, HC staining throughout, minor shell fragments throughout.	
			10	75	307		CL	**Clay**, minor Silt, gray-green, stiff, plastic, brown mottling, slightly sticky, HC odor, slightly moist.	
10							SP	**Sand**, gray, very fine, wet, poorly graded, moderate HC odor, some HC staining, sheen in return.	
			12	100	240		CL		
							ML	**Clay**, gray-green, stiff, slightly moist, slightly plastic, crumbly, mottled with brown Clay, moderate odor.	
			14	50	117		SP	**Clay and Silt**, gray-green, slightly stiff to soft, moist, mottled with brown Clay, moderate HC odor, sheen in return.	
15			16	82	11		SC	**Sand**, minor Silt, very fine, gray-green, poorly sorted, rounded to subrounded, loose, moist, strong HC odor, sheen in return, gray mottling in HC-stained areas.	
			17	92	48			**Clay and Sand**, with minor Silt, gray-green, stiff, brown and green mottling, moist, crumbly, moderate HC odor, Sand is very fine, poorly graded, subrounded to subangular.	
20								*End of Boring - 17.5 feet: Monitoring Well 23 installed within boring.*	

WELL DIAGRAM



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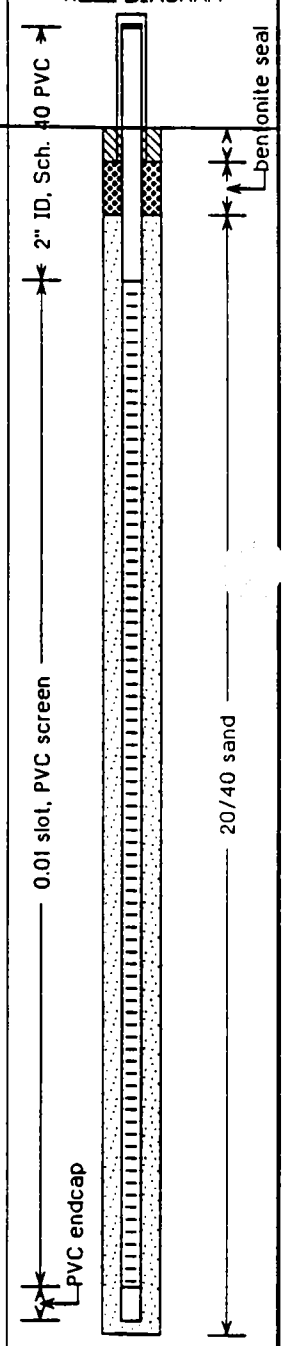
Log of Monitoring Well MW-24

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.24 feet msl*
Started at *15:34 on 3-30-95*	TOC Elevation: *14.32 feet msl*
Completed at *17:30 on 3-30-95*	Depth to Groundwater: *10.83 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.49 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18.0 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	2		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, upper 0.1 feet dark brown with roots and root tubes, dry to slightly moist to wet after 2.25 feet bgs, no odor.	
			04	100	9				
5			06	100	208		ML	**Silt and Sand**, minor Clay, gray-green, stiff, slightly moist, wet from 4.0 to 4.3 feet bgs, slightly plastic, brown and green mottling throughout, crumbly, moderate HC odor.	
			08	100	341				
			10	96	154		SC	**Clay and Sand**, gray-green, dense to loose, slightly moist, mottled brown throughout, crumbly, slight odor.	
							ML		
10							ML	**Clay and Silt**, gray-green, stiff, slightly plastic, brown and green mottling, slightly sticky, slightly moist, moderate HC odor.	
			12	100	44		SP		
							ML	**Silt and Sand**, gray-green, slightly moist, slightly loose, strong HC odor.	
			14	100	36		CL	**Sand**, gray-green, very fine, moist, soft, poorly graded, strong to moderate HC odor.	
								Clay and Silt, gray-green, stiff, moist, slightly plastic.	
15			16	100	178			**Clay**, gray-green, stiff, slightly moist, plastic, crumbly, white caliche from 12 to 13 feet bgs, mottled with brown Clay from 14 to 14.5 feet bgs, slight HC odor overall to strong odor in in caliche areas.	
			17	83	37		SM	**Sand, Clay and Silt**, gray-green, slightly stiff to soft, moist to wet, strong to moderate HC odor.	
							ML		
							SM	**Sand and Silt**, very fine, gray-green, poorly sorted, rounded to subrounded, loose, soft, wet, strong HC odor.	
20								*End of Boring - 18.0 feet: Monitoring Well 24 installed within boring.*	

WELL DIAGRAM



Environmental & Safety Designs, Inc.

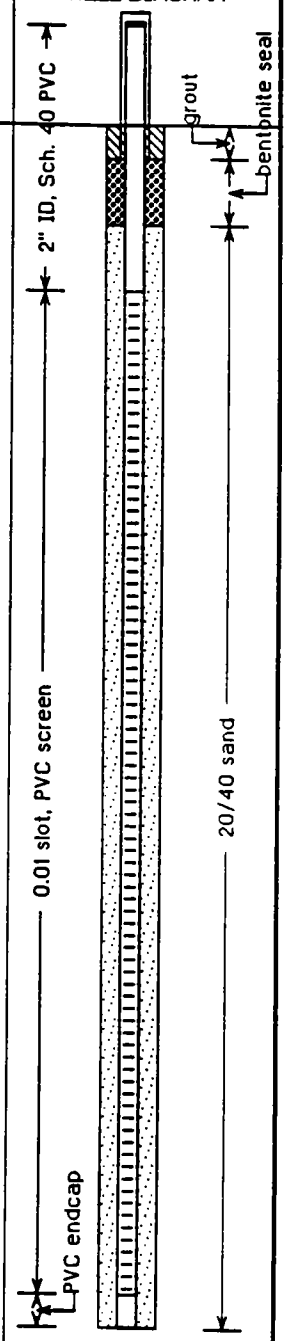
Log of Monitoring Well MW-25

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.54 feet msl*
Started at *8:05 on 3-31-95*	TOC Elevation: *13.72 feet msl*
Completed at *10:15 on 3-31-95*	Depth to Groundwater: *10.75 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.97 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18.0 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	SAMPLE NO.	% RECOVERY	PID (ppm)	SOIL CLASS	GEOLOGIC DESCRIPTION
	02	79	2	SM	**Silt and Sand**, dark brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.
				SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry to moist at 2.5 to wet at 2.8 feet bgs, slight HC odor and stain where wet.
	04	100	192	SC	**Sand and Clay**, light brown to orange-brown, dense, crumbly, slight HC odor.
5	06	100	543	CL	**Clay**, minor Sand and Silt, gray-green, stiff, crumbly, plastic, mottled brown and green throughout, moist to slightly moist, strong to moderate HC odor.
	08	93	147		
	10	100	258	SM	**Silt and Sand**, with Clay lenses, gray-gre[illegible] slightly stiff, strong HC odor.
10	12	100	112	CL	**Clay**, gray-green, very stiff [illegible] plastic, crumbly, no odor [illegible] where white caliche nodules [illegible] becomes strong, caliche occ[illegible] 3.8 feet bgs.
	14	100	>1500		
				SM	**Sand and S[illegible]** [illegible] increasing with depth, gra[illegible], st[illegible] wet, strong HC odor, Sand is very fine, p[illegible]rly graded, rounded to subrounded, hydrocarbon sheen on return.
15	16	75	235	SC	
	18	92	225	ML	**Sand and Clay**, [illegible]ery fine, gray-green, poorly sorted, rounded to subrounded, loose, soft, wet, strong HC odor, sheen on return.
					Silt and Clay, minor very fine Sand, gray-green, slightly moist to moist, white caliche throughout interval, slight to moderate HC odor.
20					*End of Boring - 18.0 feet: Monitoring Well 25 installed within boring.*

ELEV. (ft-msl)

WELL DIAGRAM



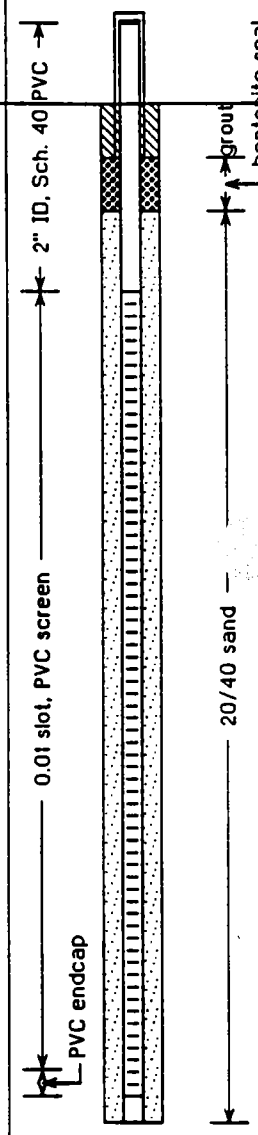
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-26

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.05 feet msl*
Started at *10:35 on 3-31-95*	TOC Elevation: *13.51 feet msl*
Completed at *12:25 on 3-31-95*	Depth to Groundwater: *10.77 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.32 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *19 feet*
Geologist: *J. George*	Well Screen: *3.5 to 18.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	20		SM	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, 0.5 foot interval of white caliche from 0.5 to 1.0 feet bgs, no odor.	
							SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry, no odor.	
			04	100	10		SM	**Silt and Sand**, brown to gray-brown, slightly loose, dense, slight HC odor in lower portion of interval-strong from 4 feet bgs, Sand is very fine, poorly graded, rounded to subrounded.	
5			06	92	3012				
			08	100	3873		ML	**Clay and Silt**, gray-green, very stiff (hard) to soft from 8 to 8.8 feet bgs, moist to wet from 8 feet bgs, strong HC odor from 8 feet bgs.	
			10	100	3928				
10									
			12	100	919		CL	**Clay**, gray-green, very stiff (hard), crumbly, plastic, mottled brown and green throughout, moist to slightly moist, white caliche throughout, HC odor strong near caliche, moderate elsewhere, hydrocarbon sheen on return.	
			14	100	37				
15			16	75	42		SC	**Sand and Clay**, gray-green, very fine, soft, wet, poorly graded, dense, strong HC odor.	
			18	100	<10		ML	**Silt and Clay**, occasional very fine Sand from 18 to 20 feet bgs, brown-gray to gray-green, stiff, wet to moist in lower portion of return, moderate odor from 16 to 18 feet bgs then no odor from 18 to 20 feet bgs.	
			20	100	<10				
20								*End of Boring - 20.0 feet: Monitoring Well 26 installed within boring.*	
25									

WELL DIAGRAM



EnSafe (SM)

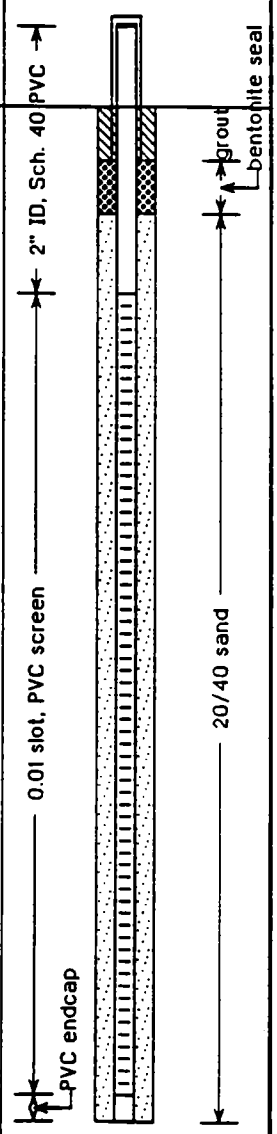
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-27

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.01 feet msl*
Started at *13:55 on 3-31-95*	TOC Elevation: *13.54 feet msl*
Completed at *16:00 on 3-31-95*	Depth to Groundwater: *9.57 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.97 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *19 feet*
Geologist: *J. George*	Well Screen: *3.5 to 18.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	75	2		SM	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.	
			04	79	2		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry to wet at 3.8 feet bgs, no odor.	
5			06	100	2			Sand, very fine, tan, as above, with Silty Clay at 4 to 4.2 feet, no odor.	
			08	54	2			Sand, very fine, tan, wet, as above, no odor.	
			10	33	2015			Sand, very fine, wet, gray (hydrocarbon stained), soft, strong HC odor, wood fragments, sheen on return.	
10			12	67	2101		ML	**Silt and Clay**, with some Sand, gray-green, wet to moist from 14 feet bgs, white caliche nodules from 14 feet bgs on with strong HC odor, no odor from 17.5 to 18 feet bgs, Sand is very fine and poorly graded.	
			14	54	32				
15			16	71	841				
			18	71	55				
20			20	100	20		CL	**Clay**, trace Sand, gray-green, stiff, green mottling throughout, trace HC staining.	
								End of Boring - 20.0 feet: Monitoring Well 27 installed within boring.	
25									

WELL DIAGRAM



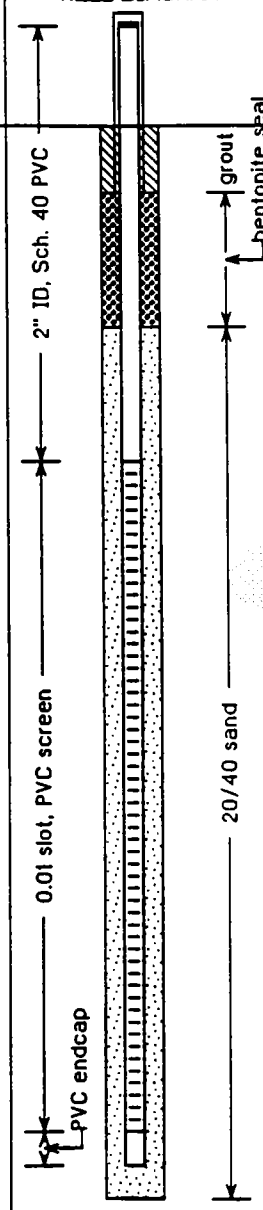
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-28

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.18 feet msl*
Started at *8:30 on 4-3-95*	TOC Elevation: *13.74 feet msl*
Completed at *10:15 on 4-3-95*	Depth to Groundwater: *9.92 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.82 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *5.0 to 15.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							SM	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.	
			02	100	0		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry, no odor.	
			04	100	0		SC	**Clay and Sand**, light brown to red-brown, moist, stiff, Sand is very fine, rounded to subrounded, poorly graded, no odor.	
5			06	100	8		ML	**Silt and Clay**, gray-green, stiff, dry, slight HC odor, crumbly, brown mottling.	
							SP	**Sand**, very fine, tan, poorly graded, loose, slightly moist, slight HC odor.	
			08	100	137		CL	**Clay**, minor Silt and Sand, gray-green, stiff, moist, brown mottling, strong HC odor and dark gray staining from 7 to 7.2 feet bgs.	
			10	88	70		SP	**Sand**, very fine, tan, loose, soft, poorly graded, very moist, no odor.	
10									
			12	96	279		SC	**Clay and Sand**, gray-green, stiff, moist to wet, strong HC odor, slightly sticky.	
							SP	**Sand**, very fine, tan, soft, loose, as above, slight HC odor.	
							CL	**Clay**, gray-green, stiff, mottled with caliche nodules, moist, sticky, moderate odor.	
			14	100	14		ML	**Clay and Silt**, some Sand, gray-green, moist, slightly sticky, moderate HC odor, Sand is very fine, poorly graded, soft.	
15			16	83	9		CL	**Clay**, greenish- to whitish-gray, soft to stiff from 17.1 feet bgs, slightly plastic, moist to wet, sticky, small blebs of caliche throughout interval, no odor.	
			18	100	6				
								End of Boring - 18.0 feet: Monitoring Well 28 installed within boring.	
20									

WELL DIAGRAM



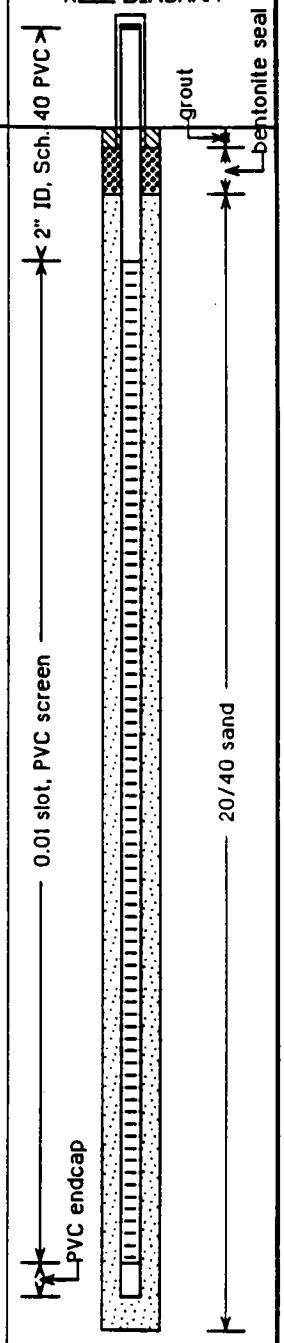
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-29

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.78 feet msl*
Started at *10:30 on 4-3-95*	TOC Elevation: *10.73 feet msl*
Completed at *12:30 on 4-3-95*	Depth to Groundwater: *8.03 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.70 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.0 to 17.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	76		GW	**Gravel**, with Fill material (concrete, bricks, wood fragments), and Sand and Silt, brown, moist, earthy odor, gravel and fill up to 3 inches in diameter.	
			04	100	279		ML	**Clay and Silt**, gray-green, stiff, slightly moist to moist, hydrocarbon staining, strong HC odor.	
							SC	**Clay and Sand**, gray-green, stiff to dense, moist, strong HC odor, Sand is very fine, poorly graded, brown mottling throughout, crumbly.	
5			06	100	421		ML	**Clay and Silt**, gray-green, stiff, moist to wet, crumbly, strong HC odor, slightly sticky.	
			08	100	233				
			10	100	400		CL	**Clay**, gray-green, plastic stiff (hard), occasional Silt from 10 to 12 feet, bgs, brown Clay mottling, strong odor, minor dark gray hydrocarbon staining in lower portion of interval.	
10			12	100	101				
			14	100	70		ML	**Clay and Silt**, with occasional Sand, gray-green, stiff to soft from 14.2 to 14.6 feet bgs, crumbly, Sand is fine, poorly graded, rounded to subrounded, strong HC odor from 12 to 14 feet then slight odor from 14 to 16 feet, earthy odor from 16 to 18 feet, dark gray HC staining from 14 to 14.6, vertical partings from 14.0 to 14.6 and from 16 to 18 feet bgs.	
15			16	100	251				
			18	83	6				
								End of Boring - 18.0 feet: Monitoring Well 29 installed within boring.	
20									

WELL DIAGRAM



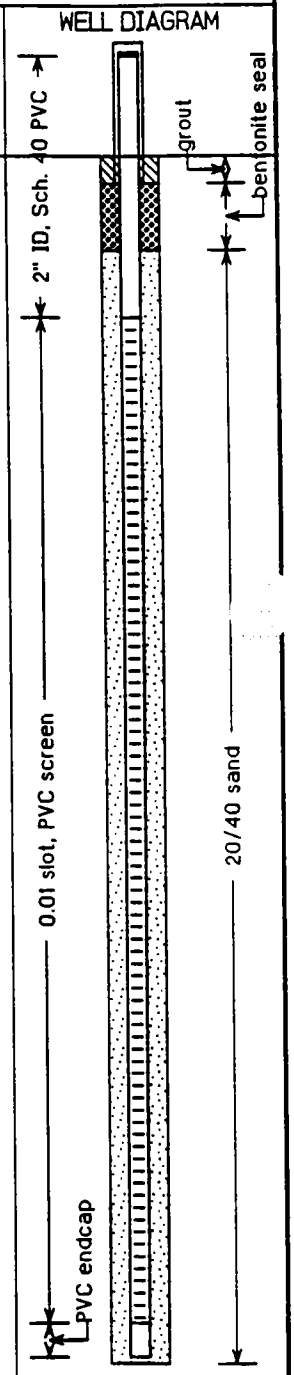
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-1

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.62 feet msl*
Started at *8:30 on 4-4-95*	TOC Elevation: *14.16 feet msl*
Completed at *11:40 on 4-4-95*	Depth to Groundwater: *11.05 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.11 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.4 to 17.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	83	0		ML	**Clay and Silt**, minor Sand, brown, stiff to slightly loose, dry to slighlty moist, roots and root tubes, no odor.	
							SP	**Sand**, very fine, tan, poorly graded, subrounded to subangular, dry to slightly moist, "sugar sand" appearance, no odor.	
			04	75	88		SM	**Silt and Sand**, trace Clay, gray-green, stiff, slightly moist, brown Clay mottling, strong HC odor, some dark staining throughout, crumbly.	
5			06	79	481				
			08	100	345		ML	**Clay and Silt**, gray-green, stiff, moist to wet, crumbly, strong odor, slightly sticky, minor Sand from 6 to 8 feet bgs, slightly plastic and brown mottling in lower portion of interval.	
			10	100	433				
10							SM	**Silt and Sand**, gray-green, dense, moist, strong HC odor, Sand is fine, rounded to subrounded.	
			12	96	307		ML	**Clay and Silt**, minor Sand, gray-green, stiff, moist, crumbly, brown Clay mottling throughout, strong HC odor.	
			14	100	228		CL	**Clay**, gray-green, plastic, stiff (hard), white caliche nodules throughout, brown Clay mottling, strong HC odor especially at caliche nodules, moist to slightly wet.	
15			16	92	295		ML	**Clay and Silt**, gray-green, stiff to soft, moist, strong HC odor, dark gray hydrocarbon staining.	
							CL	**Clay**, gray-green, plastic, moderate odor, as above.	
			18	100	158		ML	**Clay and Silt**, gray-green, wet, plastic, very stiff (hard), sticky, crumbly, brown Clay mottling throughout, sheen on return.	
20								*End of Boring - 18.0 feet: Well RW-1 installed within boring.*	

WELL DIAGRAM



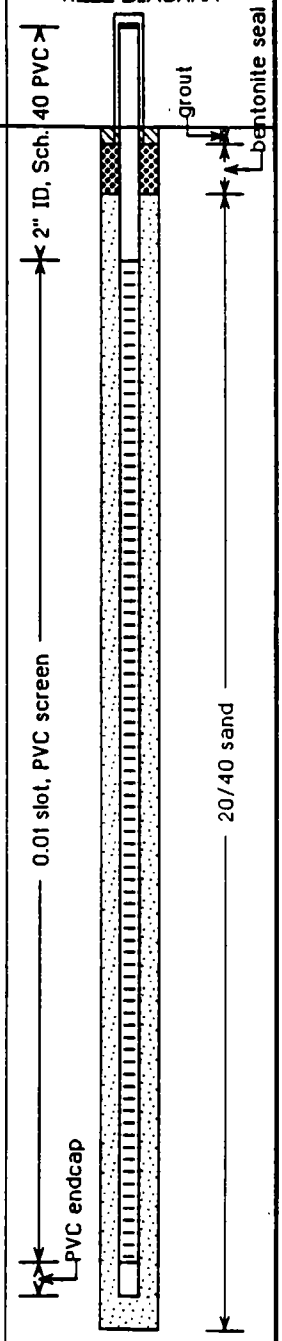
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-2

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.02 feet msl*
Started at *13:40 on 4-4-95*	TOC Elevation: *14.21 feet msl*
Completed at *9:00 on 4-5-95*	Depth to Groundwater: *10.63 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.59 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.0 to 17.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Silt and Sand**, brown, stiff to slightly loose, dry, roots and root tubes, no odor.	
			02	100	10		SP	**Sand**, very fine, tan, poorly graded, subrounded to subangular, dry, "sugar sand" appearance, no odor.	
			04	100	23		SC	**Clay and Sand**, trace Silt, brown to gray-green, stiff, moist, brown Clay mottling, strong HC odor, some dark staining throughout, crumbly, Sand is very fine, poorly graded.	
5			06	100	197				
			08	100	150		ML	**Clay and Silt**, gray-green, stiff, dry in upper section of interval to moist to wet, strong HC odor, slightly sticky, Silt lense at 9.4 to 10 feet bgs, slightly plastic and brown mottling in lower portion of interval.	
			10	100	306		SM	ilt, minor Clay, gray-green, soft, wet, HC odor.	
10			12	100	167				
			14	100	16		CL	**Clay**, gray-green, plastic, stiff (hard), white caliche nodules throughout, brown Clay mottling, strong odor especially near caliche nodules, moist to slightly wet.	
15			16	100	129		ML	**Silt**, with some Clay, gray-green, soft, moist, moderate odor, increasing Clay content with depth.	
			18	100	2		CL	**Clay**, gray-green to tan, plastic, stiff, white caliche nodules and stringers throughout interval, wet, crumbly, moderate HC odor especially near caliche.	
								End of Boring - 18.0 feet: Well RW-2 installed within boring.	
20									

WELL DIAGRAM



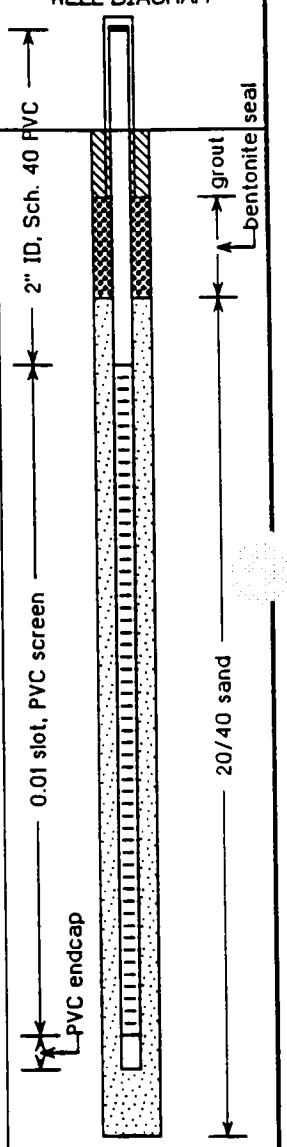
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-3

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.89 feet msl*
Started at *10:00 on 4-5-95*	TOC Elevation: *11.21 feet msl*
Completed at *12:15 on 4-5-95*	Depth to Groundwater: *8.39 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.87 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *15 feet*
Geologist: *J. George*	Well Screen: *3.5 to 13.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, slightly degraded, 8-inches thick, occasional steel rebar throughout, no odor.	
			02	100	8		SC	**Clay and Sand**, gray-green, stiff, slightly plastic, brown and green mottling throughout, moderate HC odor, gray hydrocarbon staining, crumbly.	
			04	100	79		ML	**Clay and Silt**, gray-green, from 3 to 3.5 soft and wet, rest of interval is stiff (hard) and dry, brown and green mottling, crumbly, upper portion has moderate HC odor, lower portion-slight odor.	
5			06	100	52		SM	**Silt and Sand**, gray to gray-green, soft, sticky, wet, spongy, dark gray hydrocarbon staining, moderate odor.	
							ML		
							CL		
			08	100	65		ML	**Clay and Sand**, gray-green, stiff, moist, brown Clay mottling, crumbly, HC odor, Sand is very fine and poorly graded.	
							CL		
							ML		
			10	100	74		CL	**Clay**, gray-green, stiff, plastic, moist, slight HC odor.	
10								**Clay and Silt**, gray-green, stiff, dry, crumbly, slight odor.	
			12	79	176			**Clay**, gray-green, stiff, slight odor, as above.	
								Clay and Silt, gray-green stiff, dry, as above.	
			14	75	172		ML	**Clay**, gray-green, plastic, stiff (hard), minor white caliche throughout, slightly moist, brown and green Clay mottling throughout, slight HC odor to no odor from 9 to 11 feet bgs.	
15								**Silt**, with increasing Clay in lower portion of interval, gray- green to gray, soft, loose, wet, strong HC odor, stiff in lower portion of return.	
								End of Boring - 15.0 feet: Well RW-3 installed within boring.	
20									

WELL DIAGRAM



APPENDIX D

GROUNDWATER ASSESSMENT

GROUNDWATER ANALYTICAL DATA

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-1	216GMW0301	03-14-95/1205
51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Petroleum Hydrocarbons Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	8.0	<1.0	<1.0	<1.0	<1.0
Date Analyzed	03.27.95	03.27.95	03.27.95	03.27.95	03.27.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Semivolatile Organics (8270)					
1,3-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
1,4-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
Hexachloroethane, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroethyl)ether, ug/l	<10	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether, ug/l	<10	<10	<10	<10	<10
N-Nitrosodi-N-Propylamine, ug/l	<10	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10	<10
Hexachlorobutadiene, ug/l	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene, ug/l	<10	<10	<10	<10	<10
Isophorone, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroethoxy)methane, ug/l	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene, ug/l	<10	<10	<10	<10	<10
2-Chloronaphthalene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Dimethylphthalate, ug/l	<10	<10	<10	<10	<10
2,6-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10

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51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Fluorene, ug/l	<10	<10	<10	<10	<10
4-Chlorophenyl-phenyl ether, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10
Diethylphthalate, ug/l	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine/Diph enylamine, ug/l	<10	<10	<10	<10	<10
Hexachlorobenzene, ug/l	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether, ug/l	<10	<10	<10	<10	<10
Phenanthrene, ug/l	<10	<10	<10	<10	<10
Anthracene, ug/l	<10	<10	<10	<10	<10
Di-n-butylphthalate, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
Benzidine, ug/l	<80	<80	<80	<80	<80
Butylbenzylphthalate, ug/l	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate, ug/l	<10	<10	<10	<10	<10
Chrysene, ug/l	<10	<10	<10	<10	<10
Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine, ug/l	<20	<20	<20	<20	<20
Di-n-octylphthalate, ug/l	<10	<10	<10	<10	<10

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51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Benzo(b)fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo(k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10	<10	<10	<10
Dibenz(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
N-Nitrosodimethylamine, ug/l	<10	<10	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10	<10	<10
2-Nitrophenol, ug/l	<10	<10	<10	<10	<10
Phenol, ug/l	<10	<10	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50	<50	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50	<50	<50
4-Nitrophenol, ug/l	<50	<50	<50	<50	<50
Benzyl alcohol, ug/l	<10	<10	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<10	<10

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LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-1	216GMW0301	03-14-95/1205
51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
3&4-Methylphenol (m&p-cresol), ug/l	<10	<10	<10	<10	<10
Benzoic acid, ug/l	<50	<50	<50	<50	<50
4-Chloroaniline, ug/l	<20	<20	<20	<20	<20
2-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2-Nitroaniline, ug/l	<50	<50	<50	<50	<50
3-Nitroaniline, ug/l	<50	<50	<50	<50	<50
Dibenzofuran, ug/l	<10	<10	<10	<10	<10
4-Nitroaniline, ug/l	<50	<50	<50	<50	<50
Surrogate-2FP	66 %	68 %	67 %	62 %	63 %
Surrogate-PHL	74 %	73 %	72 %	68 %	67 %
Surrogate-NBZ	71 %	69 %	71 %	70 %	69 %
Surrogate-2FBP	66 %	71 %	73 %	76 %	71 %
Surrogate-TBP	100 %	72 %	78 %	58 %	57 %
Surrogate-TPH	46 %	28 %	27 %	36 %	36 %
Date Extracted	03.16.95	03.16.95	03.16.95	03.16.95	03.16.95
Date Analyzed	03.21.95	03.21.95	03.21.95	03.21.95	03.21.95

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LOG NO: S5-51421

Received: 15 MAR 95

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311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-1	216GMW0301	03-14-95/1205
51421-2	216GMW0401	03-14-95/1445
51421-3	216GMW0701	03-14-95/1540
51421-4	216GMW0901	03-14-95/1020
51421-5	216HMW0901	03-14-95/1025

PARAMETER	51421-1	51421-2	51421-3	51421-4	51421-5
Purgeable Aromatics (8020)					
Benzene, ug/l	5.4	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	2.2	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	27.1	25.3	23.6	25.1	25.4
Surrogate - Expected Value, ug/l	30	30	30	30	30
Surrogate - % Actual Recovery	90 %	84 %	79 %	84 %	85 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	03.22.95	03.22.95	03.22.95	03.22.95	03.22.95
Total Dissolved Solids (160.1)					
Total Dissolved Solids (160.1), mg/l	1300	10000	2900	24000	22000
Date Analyzed	03.16.95	03.16.95	03.16.95	03.16.95	03.16.95

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LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0	<1.0
Date Analyzed	03.27.95	03.27.95	03.27.95	03.27.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES. INC.

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LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
Semivolatile Organics (8270)				
1,3-Dichlorobenzene, ug/l	<10	<10	<10	<10
1,4-Dichlorobenzene, ug/l	<10	<10	<10	<10
Hexachloroethane, ug/l	<10	<10	<10	<10
bis(2-Chloroethyl)ether, ug/l	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether, ug/l	<10	<10	<10	<10
N-Nitrosodi-N-Propylamine, ug/l	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10
Hexachlorobutadiene, ug/l	<10	<10	<10	<10
1,2,4-Trichlorobenzene, ug/l	<10	<10	<10	<10
Isophorone, ug/l	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10
bis(2-Chloroethoxy)methane, ug/l	<10	<10	<10	<10
Hexachlorocyclopentadiene, ug/l	<10	<10	<10	<10
2-Chloronaphthalene, ug/l	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10
Acenaphthene, ug/l	<10	<10	<10	<10
Dimethylphthalate, ug/l	<10	<10	<10	<10
2,6-Dinitrotoluene, ug/l	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10

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LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
4-Chlorophenyl-phenyl ether, ug/l	<10	<10	<10	<10
2,4-Dinitrotoluene, ug/l	<10	<10	<10	<10
Diethylphthalate, ug/l	<10	<10	<10	<10
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	<10	<10	<10
Hexachlorobenzene, ug/l	<10	<10	<10	<10
4-Bromophenyl phenyl ether, ug/l	<10	<10	<10	<10
Phenanthrene, ug/l	<10	<10	<10	<10
Anthracene, ug/l	<10	<10	<10	<10
Di-n-butylphthalate, ug/l	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10
Benzidine, ug/l	<80	<80	<80	<80
Butylbenzylphthalate, ug/l	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate, ug/l	<10	<10	<10	<10
Chrysene, ug/l	<10	<10	<10	<10
Benzo(a)anthracene, ug/l	<10	<10	<10	<10
3,3'-Dichlorobenzidine, ug/l	<20	<20	<20	<20
Di-n-octylphthalate, ug/l	<10	<10	<10	<10
Benzo(b)fluoranthene, ug/l	<10	<10	<10	<10
Benzo(k)fluoranthene, ug/l	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10

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51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10	<10	<10
Dibenz(a,h)anthracene, ug/l	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10
N-Nitrosodimethylamine, ug/l	<10	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10	<10
2-Nitrophenol, ug/l	<10	<10	<10	<10
Phenol, ug/l	<10	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50	<50
4-Nitrophenol, ug/l	<50	<50	<50	<50
Benzyl alcohol, ug/l	<10	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<10
3&4-Methylphenol (m&p-cresol), ug/l	<10	<10	<10	<10
Benzoic acid, ug/l	<50	<50	<50	<50
4-Chloroaniline, ug/l	<20	<20	<20	<20
2-Methylnaphthalene, ug/l	<10	<10	<10	<10

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<10
2-Nitroaniline, ug/l	<50	<50	<50	<50
3-Nitroaniline, ug/l	<50	<50	<50	<50
Dibenzofuran, ug/l	<10	<10	<10	<10
4-Nitroaniline, ug/l	<50	<50	<50	<50
Surrogate-2FP	54 %	63 %	62 %	64 %
Surrogate-PHL	57 %	68 %	66 %	69 %
Surrogate-NBZ	58 %	66 %	65 %	69 %
Surrogate-2FBP	62 %	72 %	71 %	71 %
Surrogate-TBP	70 %	67 %	60 %	71 %
Surrogate-TPH	50 %	41 %	79 %	32 %
Date Extracted	03.16.95	03.16.95	03.16.95	03.16.95
Date Analyzed	03.20.95	03.21.95	03.21.95	03.21.95
Purgeable Aromatics (8020)				
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0
Total Xylenes, ug/l	1.5	<1.0	<1.0	<1.0
Surrogate - a,a,a-Trifluorotoluene	29.6	27.9	24.0	23.2
Surrogate - Expected Value, ug/l	30	30	30	30
Surrogate - % Actual Recovery	99 %	93 %	80 %	77 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	03.21.95	03.21.95	03.22.95	03.22.95

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311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-1	216GMW1001	03-13-95/1505
51386-2	216GMW0801	03-13-95/1420
51386-3	216RE00100	03-13-95/1330
51386-4	216GMW1201	03-13-95/1340

PARAMETER	51386-1	51386-2	51386-3	51386-4
Total Dissolved Solids (160.1)				
Total Dissolved Solids (160.1), mg/l	350	2100	<5.0	970
Date Analyzed	03.16.95	03.16.95	03.16.95	03.16.95

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LOG NO: S5-51461

Received: 16 MAR 95

Purchase Order: 0225/95

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Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0	8.8
Date Analyzed	03.30.95	03.30.95	03.30.95	03.30.95

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LOG NO: S5-51461

Received: 16 MAR 95

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Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
Semivolatile Organics (8270)				
1,3-Dichlorobenzene, ug/l	<10	<10	<10	<20
1,4-Dichlorobenzene, ug/l	<10	<10	<10	<20
Hexachloroethane, ug/l	<10	<10	<10	<20
bis(2-Chloroethyl)ether, ug/l	<10	<10	<10	<20
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<20
bis(2-Chloroisopropyl)ether, ug/l	<10	<10	<10	<20
N-Nitrosodi-N-Propylamine, ug/l	<10	<10	<10	66
Nitrobenzene, ug/l	<10	<10	<10	<20
Hexachlorobutadiene, ug/l	<10	<10	<10	<20
1,2,4-Trichlorobenzene, ug/l	<10	<10	<10	<20
Isophorone, ug/l	<10	<10	<10	<20
Naphthalene, ug/l	<10	27	<10	160
bis(2-Chloroethoxy)methane, ug/l	<10	<10	<10	<20
Hexachlorocyclopentadiene, ug/l	<10	<10	<10	<20
2-Chloronaphthalene, ug/l	<10	<10	<10	<20
Acenaphthylene, ug/l	<10	<10	<10	<20
Acenaphthene, ug/l	<10	<10	<10	<20
Dimethylphthalate, ug/l	<10	<10	<10	<20
2,6-Dinitrotoluene, ug/l	<10	<10	<10	<20
Fluorene, ug/l	<10	<10	<10	<20

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
4-Chlorophenyl-phenyl ether, ug/l	<10	<10	<10	<20
2,4-Dinitrotoluene, ug/l	<10	<10	<10	<20
Diethylphthalate, ug/l	<10	<10	<10	<20
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	<10	<10	<20
Hexachlorobenzene, ug/l	<10	<10	<10	<20
4-Bromophenyl phenyl ether, ug/l	<10	<10	<10	<20
Phenanthrene, ug/l	<10	<10	<10	<20
Anthracene, ug/l	<10	<10	<10	<20
Di-n-butylphthalate, ug/l	<10	<10	<10	<20
Fluoranthene, ug/l	<10	<10	<10	<20
Pyrene, ug/l	<10	<10	<10	<20
Benzidine, ug/l	<80	<80	<80	<160
Butylbenzylphthalate, ug/l	<10	<10	<10	<20
bis(2-Ethylhexyl)phthalate, ug/l	<10	<10	<10	<20
Chrysene, ug/l	<10	<10	<10	<20
Benzo(a)anthracene, ug/l	<10	<10	<10	<20
3,3'-Dichlorobenzidine, ug/l	<20	<20	<20	<40
Di-n-octylphthalate, ug/l	<10	<10	<10	<20
Benzo(b)fluoranthene, ug/l	<10	<10	<10	<20
Benzo(k)fluoranthene, ug/l	<10	<10	<10	<20
Benzo(a)pyrene, ug/l	<10	<10	<10	<20

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Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10	<10	<20
Dibenz(a,h)anthracene, ug/l	<10	<10	<10	<20
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<20
N-Nitrosodimethylamine, ug/l	<10	<10	<10	<20
2-Chlorophenol, ug/l	<10	<10	<10	<20
2-Nitrophenol, ug/l	<10	<10	<10	<20
Phenol, ug/l	17	16	57	<20
2,4-Dimethylphenol, ug/l	<10	<10	<10	<20
2,4-Dichlorophenol, ug/l	<10	<10	<10	<20
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<20
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<20
2,4-Dinitrophenol, ug/l	<50	<50	<50	<100
2-Methyl-4,6-dinitrophenol, ug/l	<50	<50	<50	<100
Pentachlorophenol, ug/l	<50	<50	<50	<100
4-Nitrophenol, ug/l	<50	<50	<50	<100
Benzyl alcohol, ug/l	<10	<10	<10	<20
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<20
3&4-Methylphenol (m&p-cresol), ug/l	<10	<10	<10	<10
Benzoic acid, ug/l	<50	<50	<50	<100
4-Chloroaniline, ug/l	<20	<20	<20	<40
2-Methylnaphthalene, ug/l	<10	<10	<10	69

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<20
2-Nitroaniline, ug/l	<50	<50	<50	<100
3-Nitroaniline, ug/l	<50	<50	<50	<100
Dibenzofuran, ug/l	<10	<10	<10	<20
4-Nitroaniline, ug/l	<50	<50	<50	<100
Surrogate-2FP	79 %	78 %	82 %	64 %
Surrogate-PHL	97 %	102 %	98 %	25 %
Surrogate-NBZ	95 %	95 %	101 %	108 %
Surrogate-2FBP	98 %	98 %	100 %	82 %
Surrogate-TBP	145 %	149 %	139 %	126 %
Surrogate-TPH	85 %	67 %	48 %	36 %
Date Extracted	03.17.95	03.17.95	03.17.95	03.17.95
Date Analyzed	03.21.95	03.21.95	03.21.95	03.23.95
Purgeable Aromatics (8020)				
Benzene, ug/l	<1.0	130	<1.0	2400
Toluene, ug/l	<1.0	<2.0	<1.0	<50
Ethylbenzene, ug/l	<1.0	130	<1.0	80
Total Xylenes, ug/l	<1.0	3.1	<1.0	<50
Surrogate - a,a,a-Trifluorotoluene	24.5	29.6	24.6	27.4
Surrogate - Expected Value, ug/l	30	30	30	30
Surrogate - % Actual Recovery	82 %	99 %	82 %	91 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	03.27.95	03.27.95	03.27.95	03.29.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-1	216GMW1601	03-15-95
51461-2	216GMW1801	03-15-95
51461-3	216GMW0501	03-15-95
51461-4	216GMW1901	03-15-95

PARAMETER	51461-1	51461-2	51461-3	51461-4
Total Dissolved Solids (160.1)				
Total Dissolved Solids (160.1), mg/l	5000	1000	1000	3600
Date Analyzed	03.17.95	03.17.95	03.17.95	03.17.95

GROUNDWATER ANALYTICAL QUALITY CONTROL/ QUALITY ASSURANCE DOCUMENTATION

SL SAVANNAH LABORATORIES
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LOG NO: S5-51421

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Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-11	MS % Recovery (216KMW0901)
51421-12	MSD % Recovery (216XMW0901)

PARAMETER	51421-11	51421-12
Purgeable Aromatics (8020)		
Benzene	62 %	78 %
Toluene	60 %	75 %
Surrogate - a,a,a-Trifluorotoluene	21.8	24.1
Surrogate - Expected Value	30	30
Surrogate - % Actual Recovery	73 %	80 %
Surrogate - Control Limit	77-140 %	77-140 %

Methods: EPA SW-846 and 40 CFR Part 136.

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

SL SAVANNAH LABORATORIES
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LOG NO: S5-51386

Received: 14 MAR 95

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Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-6	Method Blank
51386-7	LCS/LCS Duplicate % Recovery
51386-8	LCS % RPD

PARAMETER		51386-6	51386-7	51386-8
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1),	mg/l	<1.0	92/96 %	4.3 %
Date Analyzed		03.27.95	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-6	Method Blank
51386-7	LCS/LCS Duplicate % Recovery
51386-8	LCS % RPD

PARAMETER	51386-6	51386-7	51386-8
Semivolatile Organics (8270)			
1,3-Dichlorobenzene, ug/l	<10	---	---
1,4-Dichlorobenzene, ug/l	<10	54/52 %	3.8 %
Hexachloroethane, ug/l	<10	---	---
bis(2-Chloroethyl)ether, ug/l	<10	---	---
1,2-Dichlorobenzene, ug/l	<10	---	---
bis(2-Chloroisopropyl)ether, ug/l	<10	---	---
N-Nitrosodi-N-Propylamine, ug/l	<10	72/68 %	5.7 %
Nitrobenzene, ug/l	<10	---	---
Hexachlorobutadiene, ug/l	<10	---	---
1,2,4-Trichlorobenzene, ug/l	<10	58/56 %	3.5 %
Isophorone, ug/l	<10	---	---
Naphthalene, ug/l	<10	---	---
bis(2-Chloroethoxy)methane, ug/l	<10	---	---
Hexachlorocyclopentadiene, ug/l	<10	---	---
2-Chloronaphthalene, ug/l	<10	---	---
Acenaphthylene, ug/l	<10	---	---
Acenaphthene, ug/l	<10	67/62 %	7.8 %
Dimethylphthalate, ug/l	<10	---	---
2,6-Dinitrotoluene, ug/l	<10	---	---
Fluorene, ug/l	<10	---	---
4-Chlorophenyl-phenyl ether, ug/l	<10	---	---

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LOG NO: S5-51386

Received: 14 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-6	Method Blank
51386-7	LCS/LCS Duplicate % Recovery
51386-8	LCS % RPD

PARAMETER	51386-6	51386-7	51386-8
2,4-Dinitrotoluene, ug/l	<10	67/64 %	4.6 %
Diethylphthalate, ug/l	<10	---	---
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	---	---
Hexachlorobenzene, ug/l	<10	---	---
4-Bromophenyl phenyl ether, ug/l	<10	---	---
Phenanthrene, ug/l	<10	---	---
Anthracene, ug/l	<10	---	---
Di-n-butylphthalate, ug/l	<10	---	---
Fluoranthene, ug/l	<10	---	---
Pyrene, ug/l	<10	103/96 %	7.0 %
Benzidine, ug/l	<80	---	---
Butylbenzylphthalate, ug/l	<10	---	---
bis(2-Ethylhexyl)phthalate, ug/l	<10	---	---
Chrysene, ug/l	<10	---	---
Benzo(a)anthracene, ug/l	<10	---	---
3,3'-Dichlorobenzidine, ug/l	<20	---	---
Di-n-octylphthalate, ug/l	<10	---	---
Benzo(b)fluoranthene, ug/l	<10	---	---
Benzo(k)fluoranthene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	---	---
Indeno(1,2,3-cd)pyrene, ug/l	<10	---	---
Dibenz(a,h)anthracene, ug/l	<10	---	---

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LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

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Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-8	Method Blank
51421-9	LCS/LCS Duplicate % Recovery
51421-10	LCS % RPD

PARAMETER	51421-8	51421-9	51421-10
Dibenzofuran, ug/l	<10	---	---
4-Nitroaniline, ug/l	<50	---	---
Surrogate-2FP	68 %	60/57 %	---
Surrogate-PHL	72 %	63/60 %	---
Surrogate-NBZ	71 %	61/57 %	---
Surrogate-2FBP	77 %	65/61 %	---
Surrogate-TBP	62 %	64/61 %	---
Surrogate-TPH	88 %	82/75 %	---
Date Extracted	03.16.95	---	---
Date Analyzed	03.20.95	---	---
Purgeable Aromatics (8020)			
Benzene, ug/l	<1.0	94/96 %	2.1 %
Toluene, ug/l	<1.0	95/94 %	1.1 %
Ethylbenzene, ug/l	<1.0	---	---
Total Xylenes, ug/l	<1.0	---	---
Surrogate - a,a,a-Trifluorotoluene	26.2	27.2/26.1	---
Surrogate - Expected Value, ug/l	30	30	---
Surrogate - % Actual Recovery	87 %	91/87 %	---
Surrogate - Control Limit	77-140 %	77-140 %	---
Date Analyzed	03.22.95	---	---
Total Dissolved Solids (160.1)			
Total Dissolved Solids (160.1), mg/l	<5.0	106/107 %	0.94 %
Date Analyzed	03.16.95	---	---

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Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-11	MS % Recovery (216KMW0901)
51421-12	MSD % Recovery (216XMW0901)

PARAMETER	51421-11	51421-12
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	89 %	89 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	66 %	69 %
N-Nitrosodi-N-Propylamine	85 %	83 %
1,2,4-Trichlorobenzene	72 %	73 %
Acenaphthene	63 %	66 %
2,4-Dinitrotoluene	93 %	90 %
Pyrene	39 %	42 %
2-Chlorophenol	63 %	64 %
Phenol	69 %	68 %
4-Chloro-3-methylphenol	57 %	59 %
Pentachlorophenol	48 %	50 %
4-Nitrophenol	89 %	83 %
Surrogate-2FP	65 %	64 %
Surrogate-PHL	71 %	70 %
Surrogate-NBZ	74 %	74 %
Surrogate-2FBP	79 %	79 %
Surrogate-TBP	39 %	42 %
Surrogate-TPH	37 %	36 %

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Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-8	Method Blank
51421-9	LCS/LCS Duplicate % Recovery
51421-10	LCS % RPD

PARAMETER	51421-8	51421-9	51421-10
2,4-Dinitrotoluene, ug/l	<10	67/64 %	4.6 %
Diethylphthalate, ug/l	<10	---	---
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	---	---
Hexachlorobenzene, ug/l	<10	---	---
4-Bromophenyl phenyl ether, ug/l	<10	---	---
Phenanthrene, ug/l	<10	---	---
Anthracene, ug/l	<10	---	---
Di-n-butylphthalate, ug/l	<10	---	---
Fluoranthene, ug/l	<10	---	---
Pyrene, ug/l	<10	103/96 %	7.0 %
Benzidine, ug/l	<80	---	---
Butylbenzylphthalate, ug/l	<10	---	---
bis(2-Ethylhexyl)phthalate, ug/l	<10	---	---
Chrysene, ug/l	<10	---	---
Benzo(a)anthracene, ug/l	<10	---	---
3,3'-Dichlorobenzidine, ug/l	<20	---	---
Di-n-octylphthalate, ug/l	<10	---	---
Benzo(b)fluoranthene, ug/l	<10	---	---
Benzo(k)fluoranthene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	---	---
Indeno(1,2,3-cd)pyrene, ug/l	<10	---	---
Dibenz(a,h)anthracene, ug/l	<10	---	---

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Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-8	Method Blank
51421-9	LCS/LCS Duplicate % Recovery
51421-10	LCS % RPD

PARAMETER	51421-8	51421-9	51421-10
Benzo(g,h,i)perylene, ug/l	<10	---	---
N-Nitrosodimethylamine, ug/l	<10	---	---
2-Chlorophenol, ug/l	<10	60/56 %	6.9 %
2-Nitrophenol, ug/l	<10	---	---
Phenol, ug/l	<10	64/60 %	6.5 %
2,4-Dimethylphenol, ug/l	<10	---	---
2,4-Dichlorophenol, ug/l	<10	---	---
2,4,6-Trichlorophenol, ug/l	<10	---	---
4-Chloro-3-methylphenol, ug/l	<10	66/62 %	6.3 %
2,4-Dinitrophenol, ug/l	<50	---	---
2-Methyl-4,6-dinitrophenol, ug/l	<50	---	---
Pentachlorophenol, ug/l	<50	51/47 %	8.2 %
4-Nitrophenol, ug/l	<50	49/45 %	8.5 %
Benzyl alcohol, ug/l	<10	---	---
2-Methylphenol (o-cresol), ug/l	<10	---	---
3&4-Methylphenol (m&p-cresol), ug/l	<10	---	---
Benzoic acid, ug/l	<50	---	---
4-Chloroaniline, ug/l	<20	---	---
2-Methylnaphthalene, ug/l	<10	---	---
2,4,5-Trichlorophenol, ug/l	<10	---	---
2-Nitroaniline, ug/l	<50	---	---
3-Nitroaniline, ug/l	<50	---	---

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LOG NO: S5-51421

Received: 15 MAR 95

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Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-8	Method Blank
51421-9	LCS/LCS Duplicate % Recovery
51421-10	LCS % RPD

PARAMETER		51421-8	51421-9	51421-10
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1),	mg/l	<1.0	92/96 %	4.3 %
Date Analyzed		03.27.95	---	---

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Received: 15 MAR 95

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Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51421-8	Method Blank
51421-9	LCS/LCS Duplicate % Recovery
51421-10	LCS % RPD

PARAMETER	51421-8	51421-9	51421-10
Semivolatile Organics (8270)			
1,3-Dichlorobenzene, ug/l	<10	---	---
1,4-Dichlorobenzene, ug/l	<10	54/52 %	3.8 %
Hexachloroethane, ug/l	<10	---	---
bis(2-Chloroethyl)ether, ug/l	<10	---	---
1,2-Dichlorobenzene, ug/l	<10	---	---
bis(2-Chloroisopropyl)ether, ug/l	<10	---	---
N-Nitrosodi-N-Propylamine, ug/l	<10	72/68 %	5.7 %
Nitrobenzene, ug/l	<10	---	---
Hexachlorobutadiene, ug/l	<10	---	---
1,2,4-Trichlorobenzene, ug/l	<10	58/56 %	3.5 %
Isophorone, ug/l	<10	---	---
Naphthalene, ug/l	<10	---	---
bis(2-Chloroethoxy)methane, ug/l	<10	---	---
Hexachlorocyclopentadiene, ug/l	<10	---	---
2-Chloronaphthalene, ug/l	<10	---	---
Acenaphthylene, ug/l	<10	---	---
Acenaphthene, ug/l	<10	67/62 %	7.8 %
Dimethylphthalate, ug/l	<10	---	---
2,6-Dinitrotoluene, ug/l	<10	---	---
Fluorene, ug/l	<10	---	---
4-Chlorophenyl-phenyl ether, ug/l	<10	---	---

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LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

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Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51386-5	216TE0001	03-13-95/1330

PARAMETER	51386-5
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	23.6
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	79 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.22.95

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LOG NO: S5-51461

Received: 16 MAR 95

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Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51461-5	216TE00003	03-15-95

PARAMETER	51461-5
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.1
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	84 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.27.95

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LOG NO: S5-51421

Received: 15 MAR 95

Purchase Order: 0225/95

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Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6
Phenol, ug/l	<10
2,4-Dimethylphenol, ug/l	<10
2,4-Dichlorophenol, ug/l	<10
2,4,6-Trichlorophenol, ug/l	<10
4-Chloro-3-methylphenol, ug/l	<10
2,4-Dinitrophenol, ug/l	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50
Pentachlorophenol, ug/l	<50
4-Nitrophenol, ug/l	<50
Benzyl alcohol, ug/l	<10
2-Methylphenol (o-cresol), ug/l	<10
3&4-Methylphenol (m&p-cresol), ug/l	<10
Benzoic acid, ug/l	<50
4-Chloroaniline, ug/l	<20
2-Methylnaphthalene, ug/l	<10
2,4,5-Trichlorophenol, ug/l	<10
2-Nitroaniline, ug/l	<50
3-Nitroaniline, ug/l	<50
Dibenzofuran, ug/l	<10
4-Nitroaniline, ug/l	<50
Surrogate-2FP	58 %
Surrogate-PHL	62 %
Surrogate-NBZ	62 %
Surrogate-2FBP	64 %
Surrogate-TBP	58 %
Surrogate-TPH	71 %
Date Extracted	03.16.95
Date Analyzed	03.21.95

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Nashville, TN 37217

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Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
51421-7	216TE00002	03-14-95

PARAMETER	51421-7
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	25.4
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	85 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.24.95

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Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6
Semivolatile Organics (8270)	
1,3-Dichlorobenzene, ug/l	<10
1,4-Dichlorobenzene, ug/l	<10
Hexachloroethane, ug/l	<10
bis(2-Chloroethyl)ether, ug/l	<10
1,2-Dichlorobenzene, ug/l	<10
bis(2-Chloroisopropyl)ether, ug/l	<10
N-Nitrosodi-N-Propylamine, ug/l	<10
Nitrobenzene, ug/l	<10
Hexachlorobutadiene, ug/l	<10
1,2,4-Trichlorobenzene, ug/l	<10
Isophorone, ug/l	<10
Naphthalene, ug/l	<10
bis(2-Chloroethoxy)methane, ug/l	<10
Hexachlorocyclopentadiene, ug/l	<10
2-Chloronaphthalene, ug/l	<10
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Dimethylphthalate, ug/l	<10
2,6-Dinitrotoluene, ug/l	<10
Fluorene, ug/l	<10
4-Chlorophenyl-phenyl ether, ug/l	<10
2,4-Dinitrotoluene, ug/l	<10
Diethylphthalate, ug/l	<10

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Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6				
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10				
Hexachlorobenzene, ug/l	<10				
4-Bromophenyl phenyl ether, ug/l	<10				
Phenanthrene, ug/l	<10				
Anthracene, ug/l	<10				
Di-n-butylphthalate, ug/l	<10				
Fluoranthene, ug/l	<10				
Pyrene, ug/l	<10				
Benzidine, ug/l	<80				
Butylbenzylphthalate, ug/l	<10				
bis(2-Ethylhexyl)phthalate, ug/l	<10				
Chrysene, ug/l	<10				
Benzo(a)anthracene, ug/l	<10				
3,3'-Dichlorobenzidine, ug/l	<20				
Di-n-octylphthalate, ug/l	<10				
Benzo(b)fluoranthene, ug/l	<10				
Benzo(k)fluoranthene, ug/l	<10				
Benzo(a)pyrene, ug/l	<10				
Indeno(1,2,3-cd)pyrene, ug/l	<10				
Dibenz(a,h)anthracene, ug/l	<10				
Benzo(g,h,i)perylene, ug/l	<10				
N-Nitrosodimethylamine, ug/l	<10				
2-Chlorophenol, ug/l	<10				
2-Nitrophenol, ug/l	<10				

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Project: CTO-102 NAS Corpus Christi
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6
Purgeable Aromatics (8020)	
Benzene, ug/l	<1.0
Toluene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Total Xylenes, ug/l	<1.0
Surrogate - a,a,a-Trifluorotoluene	24.8
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	83 %
Surrogate - Control Limit	77-140 %
Date Analyzed	03.22.95
Total Dissolved Solids (160.1)	
Total Dissolved Solids (160.1), mg/l	<5.0
Date Analyzed	03.16.95

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Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
51421-6	216FE00100	03-14-95/1615

PARAMETER	51421-6
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Analyzed	03.27.95

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311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-6	Method Blank
51461-7	LCS/LCS Duplicate % Recovery
51461-8	LCS % RPD

PARAMETER		51461-6	51461-7	51461-8
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1),	mg/l	<1.0	98/95 %	3.1 %
Date Analyzed		03.30.95	---	---

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51461

Received: 16 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-6	Method Blank
51461-7	LCS/LCS Duplicate % Recovery
51461-8	LCS % RPD

PARAMETER	51461-6	51461-7	51461-8
Semivolatile Organics (8270)			
1,3-Dichlorobenzene, ug/l	<10	---	---
1,4-Dichlorobenzene, ug/l	<10	61/85 %	33 %
Hexachloroethane, ug/l	<10	---	---
bis(2-Chloroethyl)ether, ug/l	<10	---	---
1,2-Dichlorobenzene, ug/l	<10	---	---
bis(2-Chloroisopropyl)ether, ug/l	<10	---	---
N-Nitrosodi-N-Propylamine, ug/l	<10	73/105 %	36 %
Nitrobenzene, ug/l	<10	---	---
Hexachlorobutadiene, ug/l	<10	---	---
1,2,4-Trichlorobenzene, ug/l	<10	65/88 %	30 %
Isophorone, ug/l	<10	---	---
Naphthalene, ug/l	<10	---	---
bis(2-Chloroethoxy)methane, ug/l	<10	---	---
Hexachlorocyclopentadiene, ug/l	<10	---	---
2-Chloronaphthalene, ug/l	<10	---	---
Acenaphthylene, ug/l	<10	---	---
Acenaphthene, ug/l	<10	83/111 %	29 %
Dimethylphthalate, ug/l	<10	---	---
2,6-Dinitrotoluene, ug/l	<10	---	---
Fluorene, ug/l	<10	---	---
4-Chlorophenyl-phenyl ether, ug/l	<10	---	---

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LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES

51386-9 MS % Recovery (216KMW0901)
51386-10 MSD % Recovery (216XMW0901)

PARAMETER	51386-9	51386-10
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1)	89 %	89 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	66 %	69 %
N-Nitrosodi-N-Propylamine	85 %	83 %
1,2,4-Trichlorobenzene	72 %	73 %
Acenaphthene	63 %	66 %
2,4-Dinitrotoluene	93 %	90 %
Pyrene	39 %	42 %
2-Chlorophenol	63 %	64 %
Phenol	69 %	68 %
4-Chloro-3-methylphenol	57 %	59 %
Pentachlorophenol	48 %	50 %
4-Nitrophenol	89 %	83 %
Surrogate-2FP	65 %	64 %
Surrogate-PHL	71 %	70 %
Surrogate-NBZ	74 %	74 %
Surrogate-2FBP	79 %	79 %
Surrogate-TBP	39 %	42 %
Surrogate-TPH	37 %	36 %

SL SAVANNAH LABORATORIES
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LOG NO: S5-51386

Received: 14 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-9	MS % Recovery (216KMW0901)
51386-10	MSD % Recovery (216XMW0901)

PARAMETER	51386-9	51386-10
Purgeable Aromatics (8020)		
Benzene	62 %	78 %
Toluene	60 %	75 %
Surrogate - a,a,a-Trifluorotoluene	21.8	24.1
Surrogate - Expected Value	30	30
Surrogate - % Actual Recovery	73 %	80 %
Surrogate - Control Limit	77-140 %	77-140 %

Methods: EPA SW-846 and 40 CFR Part 136.

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51461

Received: 16 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-6	Method Blank
51461-7	LCS/LCS Duplicate % Recovery
51461-8	LCS % RPD

PARAMETER	51461-6	51461-7	51461-8
2,4-Dinitrotoluene, ug/l	<10	115/121 %	5.1 %
Diethylphthalate, ug/l	<10	---	---
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	---	---
Hexachlorobenzene, ug/l	<10	---	---
4-Bromophenyl phenyl ether, ug/l	<10	---	---
Phenanthrene, ug/l	<10	---	---
Anthracene, ug/l	<10	---	---
Di-n-butylphthalate, ug/l	<10	---	---
Fluoranthene, ug/l	<10	---	---
Pyrene, ug/l	<10	47/88 %	61 %
Benzidine, ug/l	<80	---	---
Butylbenzylphthalate, ug/l	<10	---	---
bis(2-Ethylhexyl)phthalate, ug/l	<10	---	---
Chrysene, ug/l	<10	---	---
Benzo(a)anthracene, ug/l	<10	---	---
3,3'-Dichlorobenzidine, ug/l	<20	---	---
Di-n-octylphthalate, ug/l	<10	---	---
Benzo(b)fluoranthene, ug/l	<10	---	---
Benzo(k)fluoranthene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	---	---
Indeno(1,2,3-cd)pyrene, ug/l	<10	---	---
Dibenz(a,h)anthracene, ug/l	<10	---	---

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LOG NO: S5-51461

Received: 16 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-6	Method Blank
51461-7	LCS/LCS Duplicate % Recovery
51461-8	LCS % RPD

PARAMETER	51461-6	51461-7	51461-8
Benzo(g,h,i)perylene, ug/l	<10	---	---
N-Nitrosodimethylamine, ug/l	<10	---	---
2-Chlorophenol, ug/l	<10	61/83 %	31 %
2-Nitrophenol, ug/l	<10	---	---
Phenol, ug/l	<10	58/81 %	33 %
2,4-Dimethylphenol, ug/l	<10	---	---
2,4-Dichlorophenol, ug/l	<10	---	---
2,4,6-Trichlorophenol, ug/l	<10	---	---
4-Chloro-3-methylphenol, ug/l	<10	66/86 %	26 %
2,4-Dinitrophenol, ug/l	<50	---	---
2-Methyl-4,6-dinitrophenol, ug/l	<50	---	---
Pentachlorophenol, ug/l	<50	67/87 %	26 %
4-Nitrophenol, ug/l	<50	75/85 %	12 %
Benzyl alcohol, ug/l	<10	---	---
2-Methylphenol (o-cresol), ug/l	<10	---	---
3&4-Methylphenol (m&p-cresol), ug/l	<10	---	---
Benzoic acid, ug/l	<50	---	---
4-Chloroaniline, ug/l	<20	---	---
2-Methylnaphthalene, ug/l	<10	---	---
2,4,5-Trichlorophenol, ug/l	<10	---	---
2-Nitroaniline, ug/l	<50	---	---
3-Nitroaniline, ug/l	<50	---	---

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LOG NO: S5-51461

Received: 16 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-6	Method Blank
51461-7	LCS/LCS Duplicate % Recovery
51461-8	LCS % RPD

PARAMETER	51461-6	51461-7	51461-8
Dibenzofuran, ug/l	<10	---	---
4-Nitroaniline, ug/l	<50	---	---
Surrogate-2FP	69 %	59/83 %	---
Surrogate-PHL	85 %	61/90 %	---
Surrogate-NBZ	82 %	72/101 %	---
Surrogate-2FBP	84 %	115/124 %	---
Surrogate-TBP	109 %	160/165 %	---
Surrogate-TPH	78 %	102/109 %	---
Date Extracted	03.17.95	---	---
Date Analyzed	03.21.95	---	---
Purgeable Aromatics (8020)			
Benzene, ug/l	<1.0	96/94 %	2.1 %
Toluene, ug/l	<1.0	97/92 %	5.3 %
Ethylbenzene, ug/l	<1.0	---	---
Total Xylenes, ug/l	<1.0	---	---
Surrogate - a,a,a-Trifluorotoluene	29.2	29.8/29.0	---
Surrogate - Expected Value, ug/l	30	30	---
Surrogate - % Actual Recovery	97 %	99/97 %	---
Surrogate - Control Limit	77-140 %	77-140 %	---
Date Analyzed	03.27.95	---	---
Total Dissolved Solids (160.1)			
Total Dissolved Solids (160.1), mg/l	<5.0	100/113 %	12 %
Date Analyzed	03.17.95	---	---

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LOG NO: S5-51461

Received: 16 MAR 95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-9	MS % Recovery (216KMW0901)
51461-10	MSD % Recovery (216XMW0901)

PARAMETER	51461-9	51461-10
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	92 %	91 %
Semivolatile Organics (8270)		
1,4-Dichlorobenzene	66 %	69 %
N-Nitrosodi-N-Propylamine	85 %	83 %
1,2,4-Trichlorobenzene	72 %	73 %
Acenaphthene	63 %	66 %
2,4-Dinitrotoluene	93 %	90 %
Pyrene	39 %	42 %
2-Chlorophenol	63 %	64 %
Phenol	69 %	68 %
4-Chloro-3-methylphenol	57 %	59 %
Pentachlorophenol	48 %	50 %
4-Nitrophenol	89 %	83 %
Surrogate-2FP	65 %	64 %
Surrogate-PHL	71 %	70 %
Surrogate-NBZ	74 %	74 %
Surrogate-2FBP	79 %	79 %
Surrogate-TBP	39 %	42 %
Surrogate-TPH	37 %	36 %

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LOG NO: S5-51461

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Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51461-9	MS % Recovery (216KMW0901)
51461-10	MSD % Recovery (216XMW0901)

PARAMETER	51461-9	51461-10
Purgeable Aromatics (8020)		
Benzene	62 %	78 %
Toluene	60 %	75 %
Surrogate - a,a,a-Trifluorotoluene	21.8	24.1
Surrogate - Expected Value	30	30
Surrogate - % Actual Recovery	73 %	80 %
Surrogate - Control Limit	77-140 %	77-140 %

Methods: EPA SW-846 and 40 CFR Part 136

Linda A. Wolfe

Linda A. Wolfe

Final Page Of Report

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51386

Received: 14 MAR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-6	Method Blank
51386-7	LCS/LCS Duplicate % Recovery
51386-8	LCS % RPD

PARAMETER	51386-6	51386-7	51386-8
Benzo(g,h,i)perylene, ug/l	<10	---	---
N-Nitrosodimethylamine, ug/l	<10	---	---
2-Chlorophenol, ug/l	<10	60/56 %	6.9 %
2-Nitrophenol, ug/l	<10	---	---
Phenol, ug/l	<10	64/60 %	6.5 %
2,4-Dimethylphenol, ug/l	<10	---	---
2,4-Dichlorophenol, ug/l	<10	---	---
2,4,6-Trichlorophenol, ug/l	<10	---	---
4-Chloro-3-methylphenol, ug/l	<10	66/62 %	6.3 %
2,4-Dinitrophenol, ug/l	<50	---	---
2-Methyl-4,6-dinitrophenol, ug/l	<50	---	---
Pentachlorophenol, ug/l	<50	51/47 %	8.2 %
4-Nitrophenol, ug/l	<50	49/45 %	8.5 %
Benzyl alcohol, ug/l	<10	---	---
2-Methylphenol (o-cresol), ug/l	<10	---	---
3&4-Methylphenol (m&p-cresol), ug/l	<10	---	---
Benzoic acid, ug/l	<50	---	---
4-Chloroaniline, ug/l	<20	---	---
2-Methylnaphthalene, ug/l	<10	---	---
2,4,5-Trichlorophenol, ug/l	<10	---	---
2-Nitroaniline, ug/l	<50	---	---
3-Nitroaniline, ug/l	<50	---	---

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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LOG NO: S5-51386

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Nashville, TN 37217

Purchase Order: 0225/95

Project: CTO-102 NAS Corpus Christi
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
51386-6	Method Blank
51386-7	LCS/LCS Duplicate % Recovery
51386-8	LCS % RPD

PARAMETER	51386-6	51386-7	51386-8
Dibenzofuran, ug/l	<10	---	---
4-Nitroaniline, ug/l	<50	---	---
Surrogate-2FP	68 %	60/57 %	---
Surrogate-PHL	72 %	63/60 %	---
Surrogate-NBZ	71 %	61/57 %	---
Surrogate-2FBP	77 %	65/61 %	---
Surrogate-TBP	62 %	64/61 %	---
Surrogate-TPH	88 %	82/75 %	---
Date Extracted	03.16.95	---	---
Date Analyzed	03.20.95	---	---
Purgeable Aromatics (8020)			
Benzene, ug/l	<1.0	88/99 %	12 %
Toluene, ug/l	<1.0	88/98 %	11 %
Ethylbenzene, ug/l	<1.0	---	---
Total Xylenes, ug/l	<1.0	---	---
Surrogate - a,a,a-Trifluorotoluene	30.6	28.4/28.0	---
Surrogate - Expected Value, ug/l	30	30	---
Surrogate - % Actual Recovery	102 %	95/93 %	---
Surrogate - Control Limit	77-140 %	77-140 %	---
Date Analyzed	03.21.95	---	---
Total Dissolved Solids (160.1)			
Total Dissolved Solids (160.1), mg/l	<5.0	106/107 %	0.94 %
Date Analyzed	03.16.95	---	---

CHAIN-OF-CUSTODY DOCUMENTATION

CHAIN OF CUSTODY RECORD

EnSafe®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 4

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO - 102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE) Shannon Anderson

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS		BTEX	TPH	8270	TDS				REMARKS
216FE00100	3-14-95	1615	H_2O	Amber 1L Plastic Amber 500ml	4°C		5		X	X	X					
216GMW0401	↓	1445	↓	↓	↓		5		X	X	X					
~~216GMW0402~~																

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE [signature]	3/14/95	Received SIGNATURE L. Bonds	3-15-95	SIGNATURE		SIGNATURE	
PRINTED JP George	TIME	PRINTED L. Bonds	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	16:50	COMPANY SS-51421	9:26	COMPANY		COMPANY	
REASON Ship to Lab		REASON		REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO - 102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	~~VOA 8240~~		PAH 8270	TPH 418.1	TDS				REMARKS
216HMW0901	3-14-95	1025	water	500 ml Amber		HCl	2			X						
↓	↓	↓	↓	1 litre Amber		–	2		X							
↓	↓	↓	↓	500 ml plastic		–	1				X					
216GMW0901	3-14-95	1020	water	500 ml Amber		HCl	2			X						
↓	↓	↓	↓	1 litre Amber		–	2		X							
↓	↓	↓	↓	500 ml plastic		–	1				X					

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE [signature]	3/13/95	SIGNATURE L. Bonds	3/15/95	SIGNATURE		SIGNATURE	
PRINTED JP George	TIME	PRINTED L. Bonds	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	830	COMPANY SS-51421	9:26 am	COMPANY		COMPANY	
REASON Ship to Lab		REASON		REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: 216 Fuel Farm
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) Water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE)

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	TDS					REMARKS
2166MW0701	3-14-95	1540	water	500 ml Amber	4°C	HCl	2	X							
↓	↓	↓	↓	1 litre Amber	4°C	–	2		X						
↓	↓	↓	↓	500 ml plastic	4°C	–	1			X					
2166MW0301	3-14-95	1205	water	500 ml Amber	4°C	HCl	2	X							
↓	↓	↓	↓	1 litre Amber	↓	–	2		X						
↓	↓	↓	↓	500 ml plastic	↓	–	1			X					

RELINQUISHED BY	DATE	TIME	RELINQUISHED BY	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME
SIGNATURE	3/14/95		Received SIGNATURE L. Bonds	3-15-95		SIGNATURE			SIGNATURE		
PRINTED JP Georger			PRINTED L. Bonds A			PRINTED			PRINTED		
COMPANY EnSafe			COMPANY 55-51421			COMPANY			COMPANY		
REASON Ship to Lab		1850	REASON		9:26 am	REASON			REASON		

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHAINCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
ADDRESS: 216 Fuel Farm
PROJECT NAME/NUMBER: CTD-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE)

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH 418.1	PAH 8270	TDS					REMARKS
216KMW0901	3-14-95	1030	water	500 ml Amber		HCl	2	X							Matrix Spike
↓	↓	↓	↓	1 litre Amber		-	2		X						
				500 ml Plastic		-	1			X					
216XMW0901	3-14-95	1035	water	500 ml Amber		HCl	2	X							matrix Spike Duplicate
↓	↓	↓	↓	1 litre Amber		-	2		X						
				500 ml plastic		-	1			X					

RELINQUISHED BY:	DATE	RECEIVED ~~RELINQUISHED~~ BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE	3/14/95	SIGNATURE L. Bonds	3/15/95	SIGNATURE		SIGNATURE	
PRINTED		PRINTED L. Bonds D		PRINTED		PRINTED	
COMPANY EnSafe	TIME 1830	COMPANY SS-51421	TIME 9:24 am	COMPANY	TIME	COMPANY	TIME
REASON Ship to lab		REASON		REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS: * NOTE: THESE ARE MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe®

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

PAGE 1 OF

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE)

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	TPH	8270	BTEX	TDS				REMARKS
216GMW1001	3-13-95	1505	W	3-40ml VOA; 2-1/2 liter Amber; 2-1 Liter Amber; 1-1/2 liter poly	4°C	On Ice	8	X	X	X	X				
216GMW0801	3-13-95	1420	↓	↓			8	X	X	X	X				
~~216GMW1201~~	~~3-13-95~~	~~1340~~					~~8~~	~~X~~	~~X~~	~~X~~	~~X~~				
216RE00100	3-13-95	1330	↓	3-40 ml VOA			3			X					
216TE0001	3-13-95	1330	↓	3-40 ml VOAs			3			X					
216GMW1201	3-13-95	1340	W	3-40ml			3			X					

RELINQUISHED BY:	DATE / TIME	~~RELINQUISHED~~ Received BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]		SIGNATURE J Baker	3/14/95	SIGNATURE		SIGNATURE	
PRINTED JP George		PRINTED L Baker		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SLES		COMPANY		COMPANY	
REASON Ship to Lab		REASON SS-51386	9:48	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EN SAFE®

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PAGE 2 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: 216 Full Farm
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	VOC 8020							REMARKS
216GMW0301	3-14-95	1205	water	40 ml vials	4°C	HCl	3	X							
216GMW0401	↓	1445	↓	↓	↓	↓		X							
216GMW0701	↓	1540	↓	↓	↓	↓		X							
216GMW0901	↓	1020	↓	↓	↓	↓		X							
216HMW0901	↓	1025	↓	↓	↓	↓		X							
216KMW0901	↓	1030	↓	↓	↓	↓		X							Matrix Spike
216XMW0901	↓	1035	↓	↓	↓	↓		X							Matrix Spike Duplicate
216FE00100	↓	1615	↓	↓	↓	↓		X							
216TE00002	3-14-95	—	water	40ml Vial	4°C	HCl	3	X							

RELINQUISHED BY:	DATE / TIME	Received ~~RELINQUISHED~~ BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/14/95	SIGNATURE L. Bonds	3-15-95	SIGNATURE		SIGNATURE	
PRINTED JP George Jr		PRINTED L. Bonds A		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY 55-51421		COMPANY		COMPANY	
REASON Ship to Lab	1830	REASON	9:26 am	REASON		REASON	

METHOD OF SHIPMENT: Fed EX
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS: * NOTE THE MATRIX SPIKE & MATRIX SPIKE DUPLICATES

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

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PAGE 1 OF _____

CLIENT NAS Corpus Christi

ADDRESS Fuel Farm 216

PROJECT NAME/NUMBER CTO-102

MEDIA STATUS: (A, B, OR C) Water

PROJECT MANAGER Larry R. Reynolds

TELEPHONE NO. 615-399-8800

FAX. NO. 615-399-7467

SAMPLERS: (SIGNATURE) Shanna Curley

ANALYSIS REQUIRED

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	PAH 8270	TPH 418.1	TDS						REMARKS
216GMW1601	3-15-95	820	H_2O	500 ml Amber	4°C	HCL	2		X							
	↓	↓	↓	1 liter Amber	↓	—	2	X								
				500 ml plastic		—	1			X						
216GMW1801	3/15/95	8900	H_2O	500 ml Amber	4°C	HCl	2		X							
				1 liter Amber	↓	—	2	X								
				500 ml plastic	↓	—	1			X						

RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME
SIGNATURE S. Curley			Received SIGNATURE L. Bonds	3-16-95		SIGNATURE			SIGNATURE		
PRINTED S. Curley			PRINTED L. Bonds			PRINTED			PRINTED		
COMPANY EnSafe			COMPANY 514 61			COMPANY			COMPANY		
REASON Ship to Lab			REASON			REASON			REASON		

METHOD OF SHIPMENT: FedEx

SHIPMENT NO.

SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

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CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	ANALYSIS REQUIRED: 8270	TDS	TPH					REMARKS
216 RE00100	3-13-95	1330	W	2-1 liter Amber 1-½ liter poly; 2-½ liter ambers	4°C	on Jars	5	X	X	X					
216 GMW1201	3-13-95	1340	W	↓	↓	↓	5	X	X	X					

RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY: Received by	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]		SIGNATURE L Baker A	3/14/95	SIGNATURE		SIGNATURE	
PRINTED JP George		PRINTED L Baker		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SLES		COMPANY		COMPANY	
REASON Ship to Lab		REASON S5-51386	9:48	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

CHAIN OF CUSTODY RECORD

EnSafe®

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PAGE 2 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: 216 Fuel Farm
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615-399-8800
FAX. NO.: 615-399-1467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	ANALYSIS REQUIRED: VOC 8020							REMARKS
216GMW1601	3-15-95	820	water	40 ml vial	4°C	HCl	3	✓							
216GMW1801	3-15-95	900	water	" " "	"	"	3	✓							
216TE00003	3-15-95	—	water	" " "	"	"	3	✓							

RELINQUISHED BY:	DATE / TIME	Received RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/15/95	SIGNATURE L. Bonds	3-16-95	SIGNATURE		SIGNATURE	
PRINTED JP George Jr		PRINTED L. Bonds B		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY 51461		COMPANY		COMPANY	
REASON ship to lab	1800	REASON	10:09 am	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

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CHAIN OF CUSTODY RECORD

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PAGE 1 OF 2

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 2116
PROJECT NAME/NUMBER: CTO-102
MEDIA STATUS: (A, B, OR C) water

PROJECT MANAGER: Larry R Reynolds
TELEPHONE NO. 615-399-8800
FAX. NO. 615-399-7467
SAMPLERS: (SIGNATURE) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	BTEX 8020	TPH 418.1	PAH 8270	TPH				REMARKS
2166MW05D1	3-15-95	1015	water	40 ml vial	4°C	HCl	3	✓							
				500 ml Amber		HCl	2		✓						
				1 litre Amber		—	2			✓					
				500 ml plastic		—	1				✓				
2166MW19D1	3-15-95	1000	water	40 ml vial	4°C	HCl	3	✓							
				500 ml Amber		HCl	2		✓						
				1 litre Amber		—	2			✓					
				500 ml plastic		—	1				✓				

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME	RELINQUISHED BY:	DATE / TIME
SIGNATURE [signature]	3/16/95	SIGNATURE L. Bonds	3-16-95	SIGNATURE		SIGNATURE	
PRINTED JP George Jr		PRINTED L. Bonds B		PRINTED		PRINTED	
COMPANY EnSafe		COMPANY SHEI		COMPANY		COMPANY	
REASON Ship to Lab	1800	REASON	10:09	REASON		REASON	

METHOD OF SHIPMENT: Fed Ex
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHAINCUST

MONITORING WELL CONSTRUCTION DIAGRAMS

APPENDIX E

FREE-PRODUCT ASSESSMENT

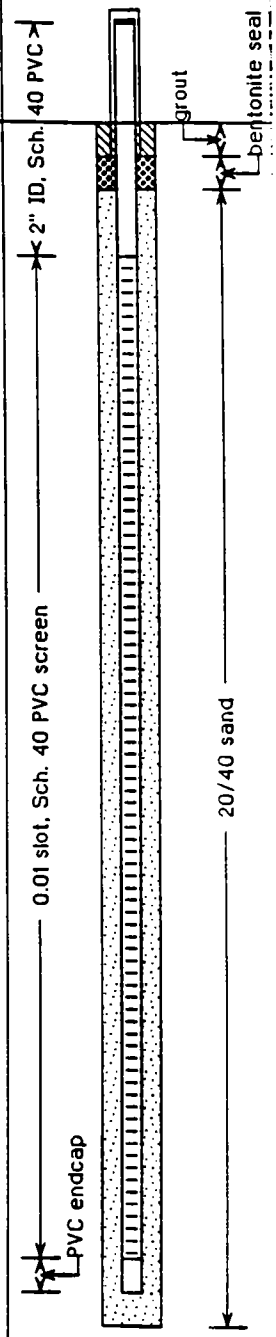
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-21

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.91 feet msl*
Started at *14:20 on 3-28-95*	TOC Elevation: *11.31 feet msl*
Completed at *16:30 on 3-28-95*	Depth to Groundwater: *10.08 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *4.40 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, somewhat degraded, 8-inches thick, minor steel rebar throughout, no odor.	
			02	100	98		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, moist, "sugar sand", HC odor.	
			04	100	33		SM	**Silt and Sand**, gray-green, stiff, dry to slightly moist to moist, moderate HC odor, crumbly, Sand is subrounded, very fine and in occasional lenses (3 and 6 feet bgs) which are soft.	
5			06	100	175				
			08	100	176				
							SP	**Sand**, very fine, gray-green, poorly graded, rounded to subrounded, moist, HC odor.	
			10	100	83		SM	**Sand and Silt**, gray-green, stiff, mottled with hydrocarbon stain, moderate HC odor, moist to wet at 8.8 feet bgs.	
10							ML	**Silt and Clay**, gray-green, stiff (hard), slightly moist, mottled with brown Clay, moderate HC odor.	
			12	75	91		CL	**Clay**, gray-green, stiff, plastic, wet, mottled with brown clay, high dilatency, vertical parting from 10.5 to 12 feet bgs, moderate HC odor.	
							SP	**Sand**, very fine, gray-green, poorly sorted, rounded to rounded, HC odor.	
			14	75	74		SM	**Silt and Sand**, gray-green, stiff to soft, slightly moist to moist, minor Clay from 14.9 to 15.2 feet bgs, Sand is very fine, subrounded, wet, occurs as lense from 14.8 to 14.9 feet bgs, HC odor throughout.	
15			16	100	160				
							SP	**Sand**, very fine, gray-green, poorly sorted, dense to slightly soft, moist, strong HC odor.	
			18	100	21		ML	**Silt and Clay**, minor Sand, gray-green, very dense (hard), vertical partings in return, moderate HC odor.	
20								*End of Boring - 18 feet: Monitoring Well 21 installed within boring.*	

WELL DIAGRAM



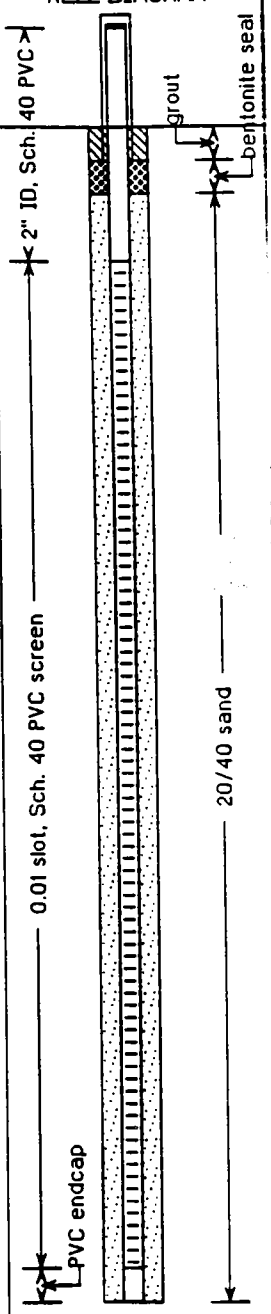
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-22

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.61 feet msl*
Started at *8:30 on 3-30-95*	TOC Elevation: *13.49 feet msl*
Completed at *10:15 on 3-30-95*	Depth to Groundwater: *10.56 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.11 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *17.5 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	0		ML / SC	**Clay and Silt**, dark brown, dense to slightly loose, crumbly, dry, roots and root tubes throughout, no odor.	
			04	75	0		SP	**Clay and Sand**, tan, very fine, poorly graded, rounded to subrounded, stiff to dense, dry to slightly moist, no odor. **Sand**, very fine, tan, poorly graded, rounded to subrounded, moist, "sugar sand", no odor.	
5			06	75	24		SM	**Silt and Sand**, minor Clay, gray-green, stiff to dense, moist, strong HC odor, crumbly, mottled green throughout, Sand is very fine and rounded to subrounded.	
			08	93	332				
			10	98	263		ML / SM / SC	**Clay and Silt**, with some Sand, gray-green, stiff (hard), wet, slightly sticky, slightly plastic, HC odor. **Sand and Silt**, gray-green, stiff, mottled with HC stain, moderate odor, wet.	
10			12	100	67		CL	**Clay and Sand**, gray-green, stiff, slightly moist, slightly plastic, mottled with brown Clay, moderate HC odor. **Clay**, gray-green, stiff, plastic, dry to wet, mottled with brown and green Clay, moderate odor, Sand lense from 11.0 to 11.1 feet, soft, strong HC odor, white caliche from 11 to 12 feet bgs.	
			14	100	209				
15			16	75	61		ML / SP / ML	**Clay and Silt** with some Sand, gray-green, wet, strong HC odor, white caliche present throughout interval. **Sand**, minor Silt, very fine, gray-green, poorly sorted, rounded to subrounded, loose, wet, strong odor.	
			18	75	29			**Silt and Clay**, with minor Sand, gray-green, stiff, brown and green mottling, moist to wet, Sand is very fine, poorly graded, strong HC odor.	
20								*End of Boring - 17.5 feet: Monitoring Well 22 installed within boring.*	

WELL DIAGRAM



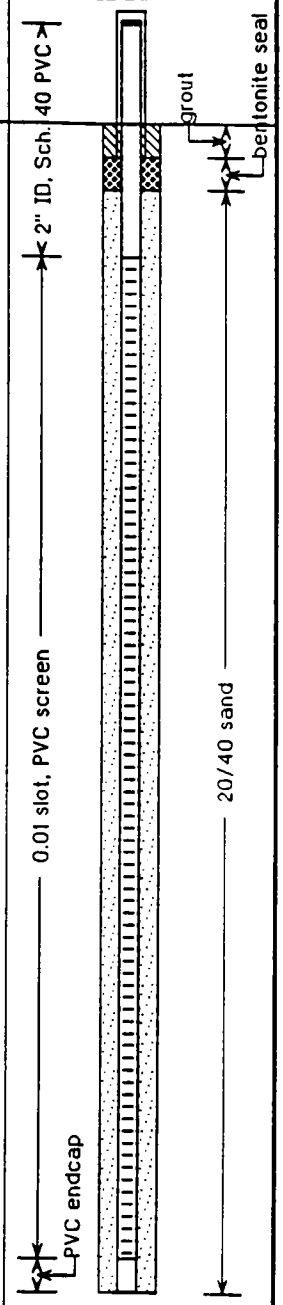
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-23

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.90 feet msl*
Started at *10:40 on 3-30-95*	TOC Elevation: *11.01 feet msl*
Completed at *15:15 on 3-30-95*	Depth to Groundwater: *7.41 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.60 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *17.5 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, somewhat degraded, 8-inches thick with occasional rebar steel, no odor.	
			02	82	19		ML	**Clay and Silt**, with some Sand, gray-green, stiff, moist, white caliche throughout, HC staining, moderate HC odor, Sand occurs as lenses from 0 to 0.25 and from 1 to 1.3 feet bgs, Sand is very fine, poorly graded, tan, moist, loose.	
			04	100	400		SP	**Sand**, very fine, dark gray, poorly graded, rounded to subrounded, "sugar sand", wet, soft, HC stained, moderate odor.	
5			06	75	180				
			08	50	152		SM	**Silt and Sand**, minor Clay, gray-green, soft, wet, loose, strong HC odor, HC staining throughout, minor shell fragments throughout.	
			10	75	307		CL	**Clay**, minor Silt, gray-green, stiff, plastic, brown mottling, slightly sticky, HC odor, slightly moist.	
10							SP	**Sand**, gray, very fine, wet, poorly graded, moderate HC odor, some HC staining, sheen in return.	
			12	100	240		CL		
							ML	**Clay**, gray-green, stiff, slightly moist, slightly plastic, crumbly, mottled with brown Clay, moderate odor.	
			14	50	117		SP	**Clay and Silt**, gray-green, slightly stiff to soft, moist, mottled with brown Clay, moderate HC odor, sheen in return.	
15			16	82	11		SC	**Sand**, minor Silt, very fine, gray-green, poorly sorted, rounded to subrounded, loose, moist, strong HC odor, sheen in return, gray mottling in HC-stained areas.	
			17	92	48			**Clay and Sand**, with minor Silt, gray-green, stiff, brown and green mottling, moist, crumbly, moderate HC odor, Sand is very fine, poorly graded, subrounded to subangular.	
20								*End of Boring - 17.5 feet: Monitoring Well 23 installed within boring.*	

WELL DIAGRAM



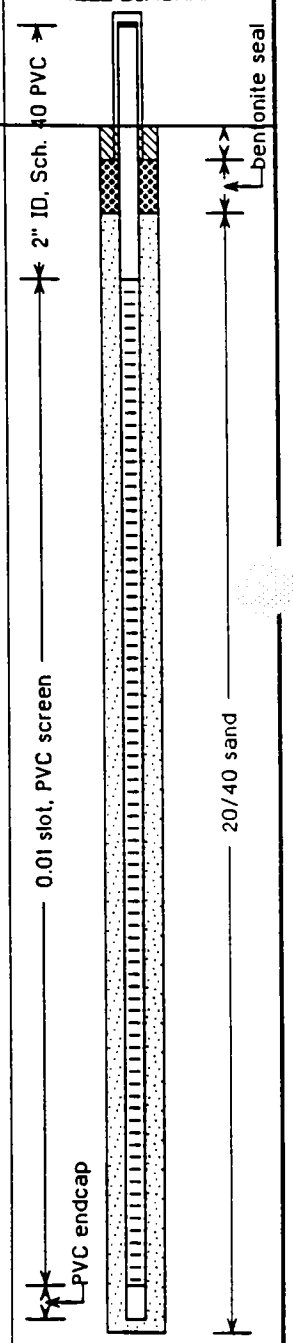
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-24

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.24 feet msl*
Started at *15:34 on 3-30-95*	TOC Elevation: *14.32 feet msl*
Completed at *17:30 on 3-30-95*	Depth to Groundwater: *10.83 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.49 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18.0 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	2		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, upper 0.1 feet dark brown with roots and root tubes, dry to slightly moist to wet after 2.25 feet bgs, no odor.	
			04	100	9				
5			06	100	208		ML	**Silt and Sand**, minor Clay, gray-green, stiff, slightly moist, wet from 4.0 to 4.3 feet bgs, slightly plastic, brown and green mottling throughout, crumbly, moderate HC odor.	
			08	100	341				
			10	96	154		SC ML ML SP	**Clay and Sand**, gray-green, dense to loose, slightly moist, mottled brown throughout, crumbly, slight odor. **Clay and Silt**, gray-green, stiff, slightly plastic, brown and green mottling, slightly sticky, slightly moist, moderate HC odor.	
10			12	100	44		ML	**Silt and Sand**, gray-green, slightly moist, slightly loose, strong HC odor.	
			14	100	36		CL	**Sand**, gray-green, very fine, moist, soft, poorly graded, strong to moderate HC odor. **Clay and Silt**, gray-green, stiff, moist, slightly plastic,	
15			16	100	178			**Clay**, gray-green, stiff, slightly moist, plastic, crumbly, white caliche from 12 to 13 feet bgs, mottled with brown Clay from 14 to 14.5 feet bgs, slight HC odor overall to strong odor in in caliche areas.	
			17	83	37		SM ML SM	**Sand, Clay and Silt**, gray-green, slightly stiff to soft, moist to wet, strong to moderate HC odor. **Sand and Silt**, very fine, gray-green, poorly sorted, rounded to subrounded, loose, soft, wet, strong HC odor.	
20								*End of Boring - 18.0 feet: Monitoring Well 24 installed within boring.*	

WELL DIAGRAM



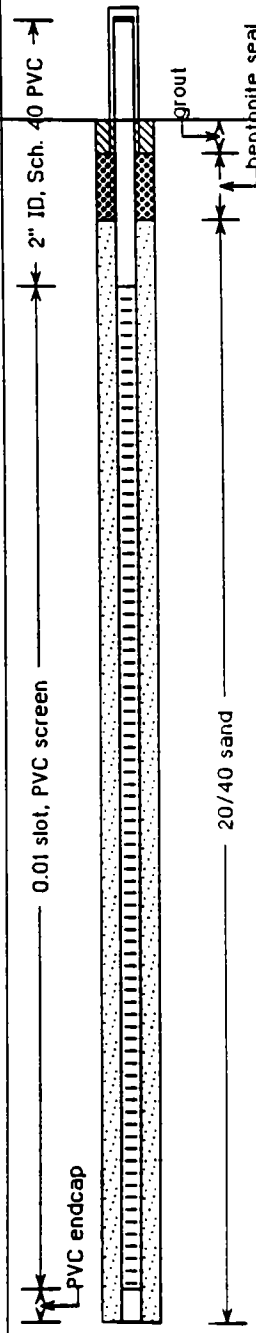
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-25

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.54 feet msl*
Started at *8:05 on 3-31-95*	TOC Elevation: *13.72 feet msl*
Completed at *10:15 on 3-31-95*	Depth to Groundwater: *10.75 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.97 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18.0 feet*
Geologist: *J. George*	Well Screen: *2 to 17 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	79	2		SM	**Silt and Sand**, dark brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.	
							SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry to moist at 2.5 to wet at 2.8 feet bgs, slight HC odor and stain where wet.	
			04	100	192		SC	**Sand and Clay**, light brown to orange-brown, dense, crumbly, slight HC odor.	
5			06	100	543		CL	**Clay**, minor Sand and Silt, gray-green, stiff, crumbly, plastic, mottled brown and green throughout, moist to slightly moist, strong to moderate HC odor.	
			08	93	147				
			10	100	258		SM	**Silt and Sand**, with Clay lenses, gray-green, wet, slightly stiff, strong HC odor.	
10			12	100	112		CL	**Clay**, gray-green, very stiff, slightly moist, plastic, crumbly, no odor until 12 feet bgs where white caliche nodules occur where odor becomes strong, caliche occurs from 12.5 to 13.8 feet bgs.	
			14	100	>1500				
							SM	**Sand and Silt**, clay content increasing with depth, gray, stiff, moist to wet, strong HC odor, Sand is very fine, poorly graded, rounded to subrounded, hydrocarbon sheen on return.	
15			16	75	235		SC		
			18	92	225		ML	**Sand and Clay**, very fine, gray-green, poorly sorted, rounded to subrounded, loose, soft, wet, strong HC odor, sheen on return.	
								Silt and Clay, minor very fine Sand, gray-green, slightly moist to moist, white caliche throughout interval, slight to moderate HC odor.	
20								*End of Boring - 18.0 feet: Monitoring Well 25 installed within boring.*	

WELL DIAGRAM



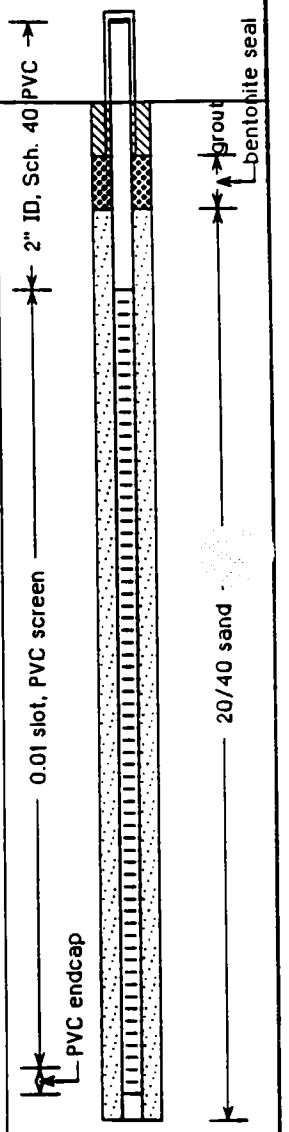
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-26

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.05 feet msl*
Started at *10:35 on 3-31-95*	TOC Elevation: *13.51 feet msl*
Completed at *12:25 on 3-31-95*	Depth to Groundwater: *10.77 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.32 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *19 feet*
Geologist: *J. George*	Well Screen: *3.5 to 18.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	20		SM / SP	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, 0.5 foot interval of white caliche from 0.5 to 1.0 feet bgs, no odor.	
			04	100	10		SM	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry, no odor.	
5			06	92	3012			**Silt and Sand**, brown to gray-brown, slightly loose, dense, slight HC odor in lower portion of interval-strong from 4 feet bgs, Sand is very fine, poorly graded, rounded to subrounded.	
			08	100	3873		ML	**Clay and Silt**, gray-green, very stiff (hard) to soft from 8 to 8.8 feet bgs, moist to wet from 8 feet bgs, strong HC odor from 8 feet bgs.	
10			10	100	3928				
			12	100	919		CL	**Clay**, gray-green, very stiff (hard), crumbly, plastic, mottled brown and green throughout, moist to slighlty moist, white caliche throughout, HC odor strong near caliche, moderate elsewhere, hydrocarbon sheen on return.	
			14	100	37				
15			16	75	42		SC	**Sand and Clay**, gray-green, very fine, soft, wet, poorly graded, dense, strong HC odor.	
			18	100	<10		ML	**Silt and Clay**, occasional very fine Sand from 18 to 20 feet bgs, brown-gray to gray-green, stiff, wet to moist in lower portion of return, moderate odor from 16 to 18 feet bgs then no odor from 18 to 20 feet bgs.	
			20	100	<10				
20								*End of Boring - 20.0 feet: Monitoring Well 26 installed within boring.*	
25									

WELL DIAGRAM



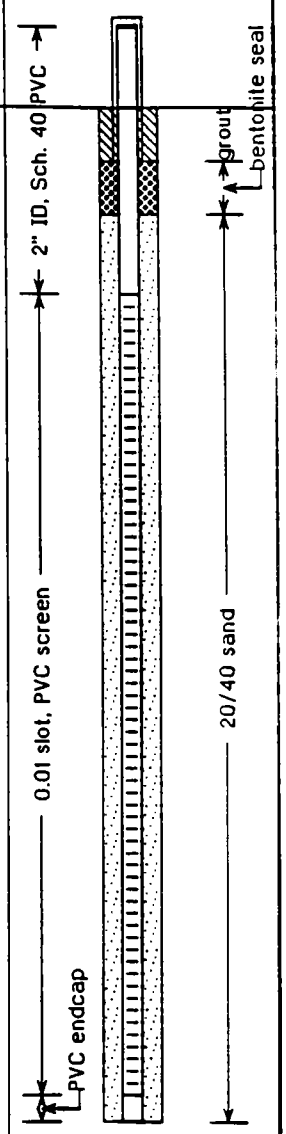
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-27

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.01 feet msl*
Started at *13:55 on 3-31-95*	TOC Elevation: *13.54 feet msl*
Completed at *16:00 on 3-31-95*	Depth to Groundwater: *9.57 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.97 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *19 feet*
Geologist: *J. George*	Well Screen: *3.5 to 18.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	75	2		SM	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.	
			04	79	2		SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry to wet at 3.8 feet bgs, no odor.	
5			06	100	2			Sand, very fine, tan, as above, with Silty Clay at 4 to 4.2 feet, no odor.	
			08	54	2			Sand, very fine, tan, wet, as above, no odor.	
			10	33	2015			Sand, very fine, wet, gray (hydrocarbon stained), soft, strong HC odor, wood fragments, sheen on return.	
10			12	67	2101		ML	**Silt and Clay**, with some Sand, gray-green, wet to moist from 14 feet bgs, white caliche nodules from 14 feet bgs on with strong HC odor, no odor from 17.5 to 18 feet bgs, Sand is very fine and poorly graded.	
			14	54	32				
15			16	71	841				
			18	71	55				
			20	100	20		CL	**Clay**, trace Sand, gray-green, stiff, green mottling throughout, trace HC staining.	
20								*End of Boring - 20.0 feet: Monitoring Well 27 installed within boring.*	
25									

WELL DIAGRAM



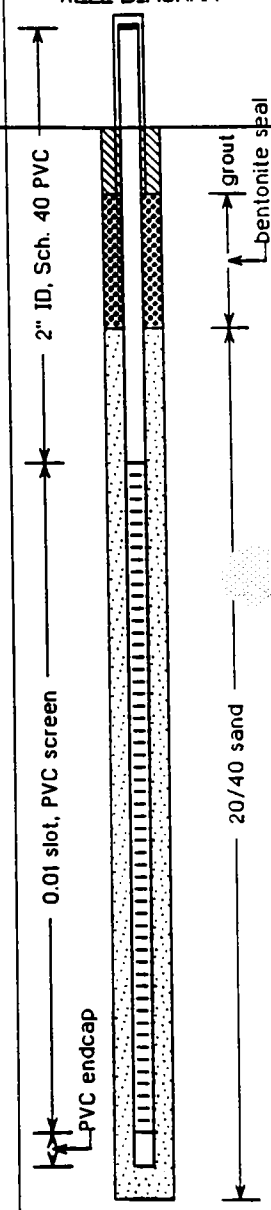
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-28

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.18 feet msl*
Started at *8:30 on 4-3-95*	TOC Elevation: *13.74 feet msl*
Completed at *10:15 on 4-3-95*	Depth to Groundwater: *9.92 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.82 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *5.0 to 15.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	0		SM	**Silt and Sand**, brown, loose, dry, well graded, subrounded to subangular, roots and root tubes, no odor.	
							SP	**Sand**, very fine, tan, poorly graded, rounded to subrounded, "sugar sand", loose, dry, no odor.	
			04	100	0		SC	**Clay and Sand**, light brown to red-brown, moist, stiff, Sand is very fine, rounded to subrounded, poorly graded, no odor.	
5			06	100	8		ML	**Silt and Clay**, gray-green, stiff, dry, slight HC odor, crumbly, brown mottling.	
							SP	**Sand**, very fine, tan, poorly graded, loose, slightly moist, slight HC odor.	
			08	100	137		CL	**Clay**, minor Silt and Sand, gray-green, stiff, moist, brown mottling, strong HC odor and dark gray staining from 7 to 7.2 feet bgs.	
			10	68	70		SP	**Sand**, very fine, tan, loose, soft, poorly graded, very moist, no odor.	
10			12	96	279		SC	**Clay and Sand**, gray-green, stiff, moist to wet, strong HC odor, slightly sticky.	
							SP	**Sand**, very fine, tan, soft, loose, as above, slight HC odor.	
			14	100	14		CL	**Clay**, gray-green, stiff, mottled with caliche nodules, moist, sticky, moderate odor.	
							ML	**Clay and Silt**, some Sand, gray-green, moist, slightly sticky, moderate HC odor, Sand is very fine, poorly graded, soft.	
15			16	83	9		CL	**Clay**, greenish- to whitish-gray, soft to stiff from 17.1 feet bgs, slightly plastic, moist to wet, sticky, small blebs of caliche throughout interval, no odor.	
			18	100	6				
								End of Boring - 18.0 feet: Monitoring Well 28 installed within boring.	
20									

WELL DIAGRAM



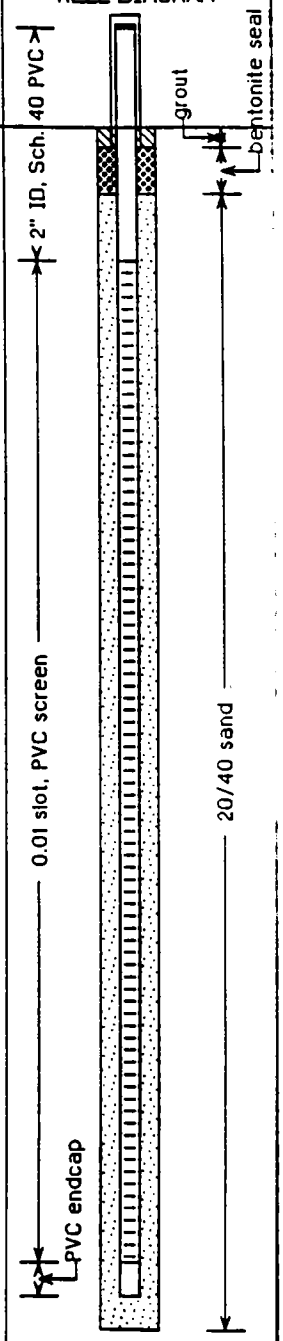
Environmental & Safety Designs, Inc.

Log of Monitoring Well MW-29

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.78 feet msl*
Started at *10:30 on 4-3-95*	TOC Elevation: *10.73 feet msl*
Completed at *12:30 on 4-3-95*	Depth to Groundwater: *8.03 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.70 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.0 to 17.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	76		GW	**Gravel**, with Fill material (concrete, bricks, wood fragments), and Sand and Silt, brown, moist, earthy odor, gravel and fill up to 3 inches in diameter.	
			04	100	279		ML	**Clay and Silt**, gray-green, stiff, slightly moist to moist, hydrocarbon staining, strong HC odor.	
							SC	**Clay and Sand**, gray-green, stiff to dense, moist, strong HC odor, Sand is very fine, poorly graded, brown mottling throughout, crumbly.	
5			06	100	421		ML	**Clay and Silt**, gray-green, stiff, moist to wet, crumbly, strong HC odor, slightly sticky.	
			08	100	233				
			10	100	400				
10			12	100	101		CL	**Clay**, gray-green, plastic stiff (hard), occasional Silt from 10 to 12 feet, bgs, brown Clay mottling, strong odor, minor dark gray hydrocarbon staining in lower portion of interval.	
			14	100	70		ML	**Clay and Silt**, with occasional Sand, gray-green, stiff to soft from 14.2 to 14.6 feet bgs, crumbly, Sand is fine, poorly graded, rounded to subrounded, strong HC odor from 12 to 14 feet then slight odor from 14 to 16 feet, earthy odor from 16 to 18 feet, dark gray HC staining from 14 to 14.6, vertical partings from 14.0 to 14.6 and from 16 to 18 feet bgs.	
15			16	100	251				
			18	83	6				
								End of Boring - 18.0 feet: Monitoring Well 29 installed within boring.	
20									

WELL DIAGRAM



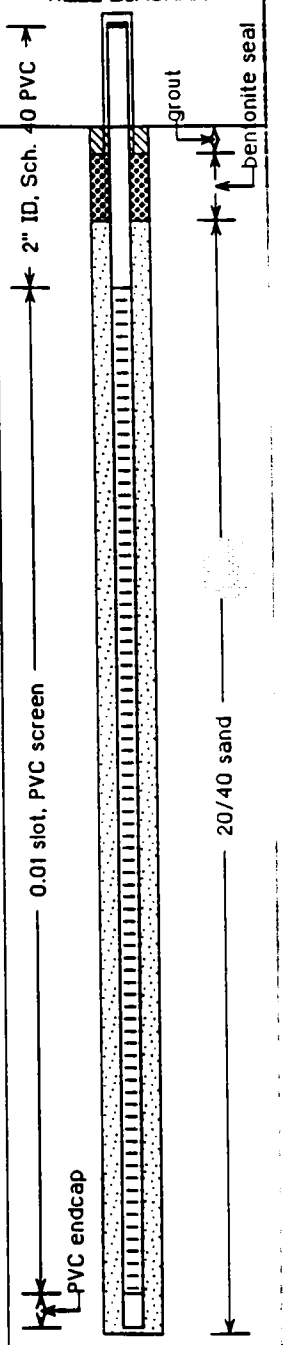
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-1

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *11.62 feet msl*
Started at *8:30 on 4-4-95*	TOC Elevation: *14.16 feet msl*
Completed at *11:40 on 4-4-95*	Depth to Groundwater: *11.05 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.11 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.4 to 17.4 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							ML	**Clay and Silt**, minor Sand, brown, stiff to slightly loose, dry to slighlty moist, roots and root tubes, no odor.	
			02	83	0		SP	**Sand**, very fine, tan, poorly graded, subrounded to subangular, dry to slightly moist, "sugar sand" appearance, no odor.	
			04	75	88		SM	**Silt and Sand**, trace Clay, gray-green, stiff, slightly moist, brown Clay mottling, strong HC odor, some dark staining throughout, crumbly.	
5			06	79	481		ML	**Clay and Silt**, gray-green, stiff, moist to wet, crumbly, strong odor, slightly sticky, minor Sand from 6 to 8 feet bgs, slightly plastic and brown mottling in lower portion of interval.	
			08	100	345				
			10	100	433				
10							SM	**Silt and Sand**, gray-green, dense, moist, strong HC odor, Sand is fine, rounded to subrounded.	
			12	96	307		ML	**Clay and Silt**, minor Sand, gray-green, stiff, moist, crumbly, brown Clay mottling throughout, strong HC odor.	
			14	100	228		CL	**Clay**, gray-green, plastic, stiff (hard), white caliche nodules throughout, brown Clay mottling, strong HC odor especially at caliche nodules, moist to slightly wet.	
15			16	92	295		ML	**Clay and Silt**, gray-green, stiff to soft, moist, strong HC odor, dark gray hydrocarbon staining.	
							CL	**Clay**, gray-green, plastic, moderate odor, as above.	
			18	100	158		ML	**Clay and Silt**, gray-green, wet, plastic, very stiff (hard), sticky, crumbly, brown Clay mottling throughout, sheen on return.	
20								*End of Boring - 18.0 feet: Well RW-1 installed within boring.*	

WELL DIAGRAM



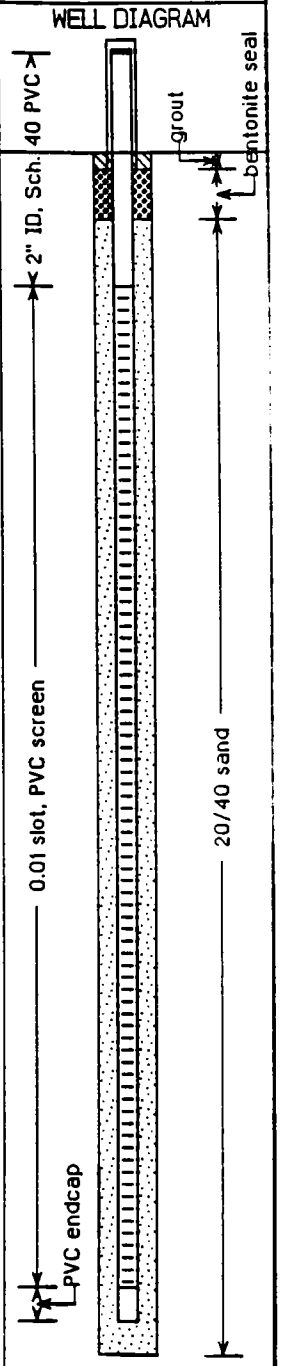
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-2

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *12.02 feet msl*
Started at *13:40 on 4-4-95*	TOC Elevation: *14.21 feet msl*
Completed at *9:00 on 4-5-95*	Depth to Groundwater: *10.63 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *3.59 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *18 feet*
Geologist: *J. George*	Well Screen: *2.0 to 17.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
			02	100	10		ML	**Silt and Sand**, brown, stiff to slightly loose, dry, roots and root tubes, no odor.	
							SP	**Sand**, very fine, tan, poorly graded, subrounded to subangular, dry, "sugar sand" appearance, no odor.	
			04	100	23		SC	**Clay and Sand**, trace Silt, brown to gray-green, stiff, moist, brown Clay mottling, strong HC odor, some dark staining throughout, crumbly, Sand is very fine, poorly graded.	
5			06	100	197				
			08	100	150		ML	**Clay and Silt**, gray-green, stiff, dry in upper section of interval to moist to wet, strong HC odor, slightly sticky, Silt lense at 9.4 to 10 feet bgs, slightly plastic and brown mottling in lower portion of interval.	
			10	100	306				
10							SM	ilt, minor Clay, gray-green, soft, wet, HC odor.	
			12	100	167				
			14	100	16		CL	**Clay**, gray-green, plastic, stiff (hard), white caliche nodules throughout, brown Clay mottling, strong odor especially near caliche nodules, moist to slightly wet.	
15			16	100	129		ML	**Silt**, with some Clay, gray-green, soft, moist, moderate odor, increasing Clay content with depth.	
			18	100	2		CL	**Clay**, gray-green to tan, plastic, stiff, white caliche nodules and stringers throughout interval, wet, crumbly, moderate HC odor especially near caliche.	
20								*End of Boring - 18.0 feet: Well RW-2 installed within boring.*	

WELL DIAGRAM



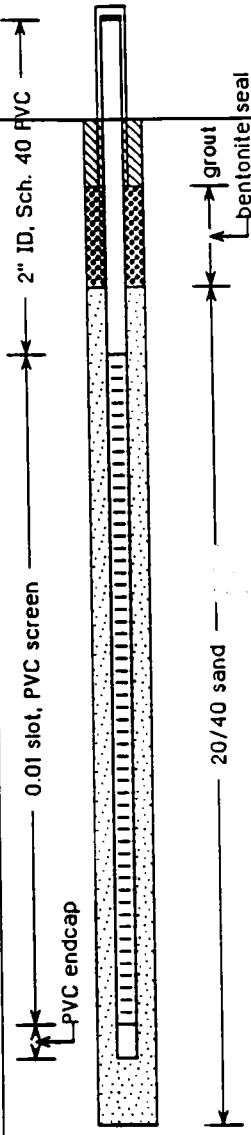
Environmental & Safety Designs, Inc.

Log of Monitoring Well RW-3

Project: *NAS CORPUS CHRISTI*	Location: *FUEL FARM 216*
Project No.: *0102-08420*	Surface Elevation: *8.89 feet msl*
Started at *10:00 on 4-5-95*	TOC Elevation: *11.21 feet msl*
Completed at *12:15 on 4-5-95*	Depth to Groundwater: *8.39 feet* Measured: *5-5-95*
Drilling Method: *HSA*	Groundwater Elevation: *2.87 feet msl*
Drilling Company: *CORE TERRA ENV. DRILLING*	Total Depth: *15 feet*
Geologist: *J. George*	Well Screen: *3.5 to 13.5 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PID (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
							CONC	**Concrete**, slightly degraded, 8-inches thick, occasional steel rebar throughout, no odor.	
			02	100	8		SC	**Clay and Sand**, gray-green, stiff, slightly plastic, brown and green mottling throughout, moderate HC odor, gray hydrocarbon staining, crumbly.	
			04	100	79		ML	**Clay and Silt**, gray-green, from 3 to 3.5 soft and wet, rest of interval is stiff (hard) and dry, brown and green mottling, crumbly, upper portion has moderate HC odor, lower portion-slight odor.	
5			06	100	52		SM	**Silt and Sand**, gray to gray-green, soft, sticky, wet, spongy, dark gray hydrocarbon staining, moderate odor.	
							ML		
							CL		
			08	100	65		ML	**Clay and Sand**, gray-green, stiff, moist, brown Clay mottling, crumbly, HC odor, Sand is very fine and poorly graded.	
							CL		
							ML		
			10	100	74		CL	**Clay**, gray-green, stiff, plastic, moist, slight HC odor.	
10								**Clay and Silt**, gray-green, stiff, dry, crumbly, slight odor.	
								Clay, gray-green, stiff, slight odor, as above.	
			12	79	176			**Clay and Silt**, gray-green stiff, dry, as above.	
			14	75	172		ML	**Clay**, gray-green, plastic, stiff (hard), minor white caliche throughout, slightly moist, brown and green Clay mottling throughout, slight HC odor to no odor from 9 to 11 feet bgs.	
15								**Silt**, with increasing Clay in lower portion of interval, gray- green to gray, soft, loose, wet, strong HC odor, stiff in lower portion of return.	
20								*End of Boring - 15.0 feet: Well RW-3 installed within boring.*	

WELL DIAGRAM



STATE OF TEXAS WATER WELL DRILLER'S REPORTS

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid # 83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-27-95 Type Well: Boring #1

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/11/95

   Reg. No. 3312M (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense Code 189 (Name) ADDRESS NAS CC, 11001-D #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St. & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well [ ] Deepening
[ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] 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) N

6) WELL LOG: SB#1
Date Drilling:
Started 3-27 19 95
Completed 3-27 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
2	Surface	12

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other Hydraulic Push

From (ft.)	To (ft.)	Description and color of formation material
0 - 6'		Tan to grey sand
6' - 12'		Tan to grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other Grout
If Gravel Packed give interval ... from _____ ft. to _____ 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 Casing Screen
		N/A			

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 12 ft. to 0 ft. No. of sacks used 1
_____ ft. to _____ ft. No. of sacks used _____
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination _____ ft.
Method of verification of above distance _____

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)] N/A
[ ] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 4 ft. below land surface Date 3/27/95
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: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata _____
Was a chemical analysis made? [X] 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX (State) 78469-9754 (Zip)

(Signed) Robert Franck (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense - Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-27-95 Type Well: Borings #2,3,4

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/11/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept. of Defense/NAS Corpus Code 189 (Name) ADDRESS 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL: County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] 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)

6) WELL LOG: SB#2,3 & 4
Date Drilling:
Started 3-27 19 95
Completed 3-27 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
2	Surface	10

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other Hydraulic Push

N

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan to grey silty sand
6'	10'	Tan to grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other Grout
If Gravel Packed give interval ... from _____ ft. to _____ 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
		N/A			

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 10 ft. to 0 ft. No. of sacks used 1
_____ ft. to _____ ft. No. of sacks used _____
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination _____ ft.
Method of verification of above distance _____

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]
N/A

11) WATER LEVEL:
Static level 4 ft. below land surface Date 3-27-95
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: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata _____
Was a chemical analysis made? [X] 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State) (Zip)

(Signed) Robert Fresik (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94) WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: _____

   Address: _____
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6

   League _____ Abstract No. _____ (See Attached)

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-28-95 Type Well: Borings #5,6,7 & 9

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/12/95

   Reg. No. 3312M (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St. & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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)

6) WELL LOG: SB#5,6,7 & 9
Date Drilling:
Started 3-28 19 95
Completed 3-28 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
2	Surface	10

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☒ Other Hydraulic Push

N

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan & grey sand
6'	10'	Tan & grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other Grouted
If Gravel Packed give interval ... from _____ ft. to _____ 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
		N/A			

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 10 ft. to 0 ft. No. of sacks used 1
_____ ft. to _____ ft. No. of sacks used _____
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination _____ ft.
Method of verification of above distance _____

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]
N/A

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-28-95
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: _____ gpm with _____ ft. drawdown after _____ hrs.

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? Hydrocarbon 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Franck (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF
UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir DRilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi, Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78469 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-28-95 Type Well: Boring #8

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/12/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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)

6) WELL LOG: SB#8
Date Drilling:
Started 3-28 19 95
Completed 3-28 19 95

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
6	Surface	14

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☒ Other HSA

N

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan & grey sand
6'	14'	Tan & grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other Grouted
If Gravel Packed give interval ... from _____ ft. to _____ 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

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 14 ft. to 0 ft. No. of sacks used 3
_____ ft. to _____ ft. No. of sacks used _____
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination _____ ft.
Method of verification of above distance _____

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]
N/A

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-28-95
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: _____ gpm with _____ ft. drawdown after _____ hrs.

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? Hydrocarbon 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Turcik (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense - Code 189

   Address: _____
   (Street or RFD) (City) (State)

3. Location of Well: County _____ ☐ See attached map Grid # 83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-28-95 Type Well: Monitor #21

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/12/95

   Reg. No. 3312M (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D,#143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216,1st St. & Ocean Dr.,CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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

4) PROPOSED USE (Check): XX 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)

6) WELL LOG: MW#21
Date Drilling:
Started 3-28 19 95
Completed 3-28 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	17

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☒ Other HSA
Bent Seal 1' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	1'	Concrete & Base
1'	10'	Tan & Grey sand
10'	17'	Grey to tan sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed XX Other Sand
If Gravel Packed give interval ... from 17 ft. to 1 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
2	N	PVC Screen	17	2	.010
2	N	PVC Riser	2	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

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

10) SURFACE COMPLETION
XX 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 3 ft. below land surface Date 3-28-95
Artesian flow gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
XX Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? XX 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX (State) 78469-9754 (Zip)

(Signed) Robert Franck (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi / Dept of Defense Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr. (Street or RFD) Corpus Christi, TX (City) 78419 (State)

3. Location of Well: County _____ ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-29-95 Type Well: Boring #11

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/12/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St. & Ocean Dr., CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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)

6) WELL LOG: SB#11
Date Drilling:
Started 3-29 19 95
Completed 3-29 19 95

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
6	Surface	12

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☒ Other HSA

N

From (ft.)	To (ft.)	Description and color of formation material
0- 6'		Tan & grey sand
6' - 12'		Tan & grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other Grouted
If Gravel Packed give interval ... from _____ ft. to _____ 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
		N/A			

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 12 ft. to 0 ft. No. of sacks used 3
_____ ft. to _____ ft. No. of sacks used _____
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination _____ ft.
Method of verification of above distance _____

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)] N/A
☐ Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 4 ft. below land surface Date 3-29-95
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: _____ gpm with _____ ft. drawdown after _____ hrs.

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? Hydrocarbon 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX (State) 78469-9754 (Zip)

(Signed) Robert Franck (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please at[illegible]ectric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert FiraSEK

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: _____ (Street or RFD) _____ (City) _____ (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW⁴, NE⁴, SW⁴, SE⁴, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-30-95 Type Well: Monitor #22

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/11/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

ATTN: J. Young/Public Works Dept.

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces
Fuel Farm 216, 1st St & Ocean Dr., CC,TX78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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)

6) WELL LOG: MW#22
Date Drilling:
Started 3-30 19 95
Completed 3-30 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	17

7) DRILLING METHOD (Check): ☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HSA
Bent Seal 1' to 5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	10'	Tan & grey sand
10'	17'	Grey & tan sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall
☐ Underreamed ☐ Gravel Packed ☒ Other Sand
If Gravel Packed give interval ... from 17 ft. to 1 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 Casing Screen
2	N	PVC Screen	16.5	1.5	.010
2	N	PVC Riser	1.5	+3	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

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]

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-30-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

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? Hydrocarbon 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Frank (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr. (Street or RFD) Corpus Christi (City) TX 78419 (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-30-95 Type Well: Monitor #23

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/11/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

ATTN: J. Young/Public Works Dept.

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216,1st St. & ocean Dr.,CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: MW#23
Date Drilling:
Started 3-30 19 95
Completed 3-30 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	17

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA
Bent Seal 1' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	8'	Tan to grey sand
8'	17'	Tan & grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17 ft. to 1 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
2	N	PVC Screen	17	2	.010
2	N	PVC Riser	2	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-30-95
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: gpm with ft. drawdown after hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 Corpus Christi, TX 78469-9754 (Street or RFD) (City) (State) (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, CC, TX (Street or RFD) (City) 78419 (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-30-95 Type Well: Monitor #24

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/11/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL: County Nueces Fuel Farm 216, 1st St. & Ocean Dr, CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: MW #24
Date Drilling:
Started 3-30-95
Completed 3-30 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	18

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA
Bent SEal 1.5' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	8'	Tan to grey sand
8'	18'	Tan & grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17.5 ft. to 1.5 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
2	N	PVC Screen	17.5	2.5	.010
2	N	PVC Riser	2.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-30-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir. Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Ferrante (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-31-95 Type Well: Monitor #25

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/13/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

ATTN: J. Young/Public Works Dept.

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL: County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: MW #25
Date Drilling:
Started 3-31 19 95
Completed 3-31 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	18

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA
Bent Seal 1' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	8'	Tan & Grey sand
8'	18'	Tan & grey silty clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17 ft. to 1 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
2	N	PVC Screen	17	2	.010
2	N	PVC Riser	2	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 3 ft. below land surface Date 3-31-95
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: gpm with ft. drawdown after hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 Corpus Christi, TX 78469-9754 (Street or RFD) (City) (State) (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St. & Ocean Dr. Corpus Christi, TX 78419
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-31-95 Type Well: Monitor #26

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/13/95

   Reg. No. 3312M (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept. of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County ~~Nueces~~ Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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) N

6) WELL LOG: MW #26
Date Drilling:
Started 3-31 19 95
Completed 3-31 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA
Bent Seal 2' to 1'

From (ft.)	To (ft.)	Description and color of formation material
0	8'	Tan & Grey Sand
8'	20'	Tan & sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [XX] Other Sand
If Gravel Packed give interval ... from 18.5 ft. to 2 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
2	N	PVC Screen	18.5	3.5	.010
2	N	PVC Riser	3.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 1 ft. to 0 ft. No. of sacks used 1
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

10) SURFACE COMPLETION
[XX] 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]

11) WATER LEVEL:
Static level 5 ft. below land surface Date 3-31-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir. Driling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Frank (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX (City) 78469-9754 (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 3-31-95 Type Well: Monitor #27

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4-13-95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

ATTN: J. Young/Public Works Dept.

1) OWNER Dept. of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well [ ] Deepening
[ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: MW #27
Date Drilling:
Started 3-31 19 95
Completed 3-31 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20

7) DRILLING METHOD (Check): [ ] Driven
[ ] Air Rotary [ ] Mud Rotary [ ] Bored
[ ] Air Hammer [ ] Cable Tool [ ] Jetted
[X] Other HSA
Bent Seal 2' to 1'

N

From (ft.)	To (ft.)	Description and color of formation material
0	8'	Tan & Grey sand
8'	20'	Tan & sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall
[ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 18.5 ft. to 2 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
2	N	PVC Screen	18.5	3.5	.010
2	N	PVC Riser	3.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 1 ft. to 0 ft. No. of sacks used 1
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 5 ft. below land surface Date 3-31-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Fusink (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF
UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 4-3-95 Type Well: Monitor #28

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4-13-95

   Reg. No. 3312M (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

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) N

6) WELL LOG: MW #28
Date Drilling:
Started 4-3 19 95
Completed 4-3 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	Surface	16

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☒ Other HSA
Bent Seal 4' to 3'

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan Sand
6'	16'	Tan & grey silty clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed ☒ Other Sand
If Gravel Packed give interval ... from 15 ft. to 4 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
2	N	PVC Screen	15	5	.010
2	N	PVC Riser	5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 3 ft. to 0 ft. No. of sacks used 1
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

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]

11) WATER LEVEL:
Static level 3 ft. below land surface Date 4-3-95
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: gpm with ft. drawdown after hrs.

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? Hydrocarbon 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX (State) 78469-9754 (Zip)

(Signed) Robert Ferarek (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94) WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 4-3-95 Type Well: Monitor #29

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/14/95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well [ ] Deepening
[ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: MW 29
Date Drilling:
Started 4-3 19 95
Completed 4-3 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7	Surface	17

7) DRILLING METHOD (Check): [ ] Driven
[ ] Air Rotary [ ] Mud Rotary [ ] Bored
[ ] Air Hammer [ ] Cable Tool [ ] Jetted
[X] Other HSA
Bent Seal 1' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	1'	Gravel Fill Mat
1'	6'	Tan sand
6'	17'	Tan to grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall
[ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17 ft. to 1 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
2	N	PVC Screen	17	2	.010
2	N	PVC Riser	2	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

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

10) SURFACE COMPLETION
[X] 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 3 ft. below land surface Date 4-3-95
Artesian flow ____ gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Franke (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF
UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 4-4-95 Type Well: Monitor #30

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4-4-95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC,TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): [X] 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) N

6) WELL LOG: RW#30
Date Drilling:
Started 4-4 19 95
Completed 4-4 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
12	Surface	17.5

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted [X] Other HSA
Bent Seal 1' to .5'

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan sand
6'	18'	Tan & Grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17.5 ft. to 1 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
4	N	PVC Screen	17.5	2.5	.010
4	N	PVC Riser	2.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/.
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 4 ft. below land surface Date 4-4-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi (City) TX (State) 78469-9754 (Zip)

(Signed) Robert Franek (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 Corpus Christi, TX 78469-9754
   (Street or RFD) (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi/Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419
   (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (See Attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ direction.
   (NE, SW, etc.)

   from _____
   (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 4-5-95 Type Well: Monitor #31

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4/17/95

   Reg. No. 33121 (Signed) Robert Firasek
   (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

TWC-0072 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State) (Zi

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] 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)

6) WELL LOG: RW#31
Date Drilling:
Started 4-4- 19 95
Completed 4-5 19 95

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
12	Surface	18

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA
Bent Seal 1.5' to .5'

N

From (ft.)	To (ft.)	Description and color of formation material
0	6'	Tan & Grey sand
6'	18'	Tan & Grey sand clay

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [X] Other Sand
If Gravel Packed give interval ... from 17.5 ft. to 1.5 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
4	N	PVC Screen	17.5	2.5	.010
4	N	PVC Riser	2.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] 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]

11) WATER LEVEL:
Static level 4 ft. below land surface Date 4-5-95
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: gpm with ft. drawdown after hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[X] Yes [ ] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

(Signed) Robert Franek (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

State of Texas

REPORT OF UNDESIRABLE WATER OR CONSTITUENTS

To be completed by Well Driller. (Type or print.)

1. Well Driller: Robert Firasek

   Company Name: Core Terra Envir Drilling, Inc.

   Address: P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State)

2. Landowner or Person Having Well Drilled: NAS Corpus Christi, Dept of Defense-Code 189

   Address: Fuel Farm 216, 1st St & Ocean Dr, Corpus Christi, TX 78419 (Street or RFD) (City) (State)

3. Location of Well: County Nueces ☐ See attached map Grid #83-22-6 (see attached)

   League _____ Abstract No. _____

   NW¼, NE¼, SW¼, SE¼, of Section _____ Block _____

   Survey _____

   _____ miles in _____ (NE, SW, etc.) direction.

   from _____ (Town)

4. Reason why Report was submitted:

   ☐ Naturally-occurring, poor-quality groundwater encountered;

   ☒ Hydrocarbon contamination encountered (includes gasoline, diesel, etc.);

   ☐ Hazardous material/hazardous waste contamination encountered;

   ☐ Other; describe _____

5. Date Well Drilled: 4-5-95 Type Well: Monitor #32

6. Has a Water Well Report form relating to this well been forwarded to the Texas Water Commission?

   ☒ Yes ☐ No Date Attached

7. I do hereby certify that in drilling, deepening, or otherwise altering the above described well, undesirable water or constituents has been encountered and the landowner or person having the well drilled has been informed by certified mail that such well must be completed or plugged in such a manner as to avoid injury or pollution.

   Date 4-17-95

   Reg. No. 3312M (Signed) Robert Firasek (Well Driller)

Send *White Copy* by Certified Mail to: TEXAS WATER COMMISSION, P.O. Box 13087, Austin, Texas 78711
Send *Yellow Copy* by Certified Mail to: LANDOWNER or PERSON HAVING WELL DRILLED
Pink Copy to be retained by: WELL DRILLER

WWD-015 (Rev. 07-20-90)

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

ATTN: J. Young/Public Works Dept.

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Dept of Defense - Code 189 (Name) ADDRESS NAS Corpus Christi 11001-D, #143, Corpus Christi, TX 78419 (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL:
County Nueces Fuel Farm 216, 1st St & Ocean Dr, CC, TX 78419 (Street, RFD or other) (City) (State) (Zip) GRID # 83-22-6

3) TYPE OF WORK (Check):
[X] New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): [X] 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) N

6) WELL LOG: RW#32
Date Drilling:
Started 4-5 19 95
Completed 4-5 19 95

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
12	Surface	13.5

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☐ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted
XX Other HSA
Bent Seal 2.5' to .5'

From (ft.)	To (ft.)	Description and color of formation material
0	1'	Concrete & Base
1'	12'	Tan to greyish green clay
12'	13.5'	Grey sandy clay

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☐ Gravel Packed XX Other Sand
If Gravel Packed give interval ... from 13.5 ft. to 2.5 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
4	N	PVC Screen	13.5	3.5	.010
4	N	PVC Riser	3.5	+2	

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from .5 ft. to 0 ft. No. of sacks used 1/2
ft. to ft. No. of sacks used
Method used Hand
Cemented by Core Terra
Distance to septic system field lines or other concentrated contamination ____ ft.
Method of verification of above distance

10) SURFACE COMPLETION
XX 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]

11) WATER LEVEL:
Static level 6' ft. below land surface Date 4-5-95
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: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
XX Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Hydrocarbon Depth of strata
Was a chemical analysis made? [X] 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 Core Terra Envir Drilling, Inc. (Type or print) WELL DRILLER'S LICENSE NO. 3312M

ADDRESS P.O. Box 9754 (Street or RFD) Corpus Christi, TX 78469-9754 (City) (State) (Zip)

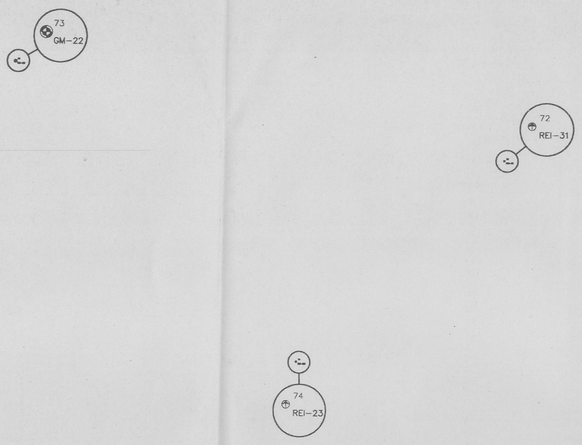
(Signed) Robert Frank (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

WELL OWNER'S COPY

SURVEY DATA



ELEVATIONS ON MONITOR WELLS AT NAS – CCTX					
NORTH	EAST	POINT #	ID	DESCRIPTION	ELEVATION
17146702.33	1378329.16	28	MW- 2	TOP OF CAP TOP OF 2" PVC PIPE TOP CONC PAD GROUND	10.80 10.37 9.25 9.11
17146303.48	1378287.36	40	MW-20	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	13.96 13.57 12.47 12.17
17146651.68	1378413.86	30	MW-21	TOP OF CAP TOP OF 2" PVC PIPE TOP CONC PAD TOP OF ADJ. CONCRETE	11.62 11.31 9.25 8.91
17146559.09	1378579.63	32	MW-22	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	13.82 13.49 11.68 11.61
17146642.39	1378498.33	31	MW-23	TOP OF CAP TOP OF 2" PVC PIPE TOP CONC PAD TOP OF ADJ. CONCRETE	11.35 11.01 9.22 8.90
17146395.76	1378412.45	38	MW-24	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	14.57 14.32 12.42 12.24
17146569.71	1378308.26	45	MW-25	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	14.05 13.72 11.78 11.54
17146522.10	1378755.31	35	MW-26	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	13.88 13.51 12.26 12.05
17146457.88	1378260.30	49	MW-27	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	13.94 13.54 12.22 12.01
17146265.29	1378056.53	47	MW-28	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	14.07 13.74 12.32 12.18
17146706.69	1378254.43	26	MW-29	TOP OF CAP TOP OF 2" PVC PIPE TOP OF CONC GROUND	11.07 10.73 9.05 8.78
17146507.28	1378365.69	43	RW- 1	TOP OF CAP TOP OF 4" PVC PIPE TOP CONC GROUND	14.43 14.16 11.97 11.62
17146353.08	1378305.05	41	RW- 2	TOP OF CAP TOP OF 4" PVC PIPE TOP CONC GROUND	14.55 14.21 12.25 12.02
17146637.31	1378409.17	29	RW- 3	TOP OF CAP TOP OF 4" PVC PIPE TOP CONC TOP OF ADJ. CONCRETE	11.41 11.21 9.18 8.89
17146778.79	1375533.78	72	REI-31	TOP OF CAP TOP 4" PVC PIPE TOP OF CONCRETE GROUND	7.91 7.61 5.22 4.87
17147054.68	1374139.55	73	GM-22	TOP OF CAP TOP 2" PVC PIPE TOP OF CONCRETE GROUND	6.17 5.95 4.72 4.43
17146200.61	1374948.21	74	REI-23	TOP OF CAP TOP 4" PVC PIPE TOP OF CONCRETE GROUND	9.15 8.73 6.21 5.82
17146518.63	1378771.74	36	SB- 1	GROUND	11.76
17146579.02	1378566.96	33	SB- 2	GROUND	10.95
17146498.20	1378592.58	34	SB- 3	GROUND	11.94
17146500.75	1378403.16	42	SB- 4	GROUND	11.81
17146528.02	1378295.71	44	SB- 5	GROUND	11.75
17146401.00	1378242.58	60	SB- 6	GROUND	12.29
17146340.75	1378413.96	37	SB- 7	GROUND	12.67
17146240.58	1378268.62	39	SB- 8	GROUND	12.21
17146167.19	1378135.29	61	SB- 9	GROUND	12.17
17146475.23	1378072.75	48	SB-11	GROUND	11.73
17146606.06	1378295.28	46	SB-12	GROUND	10.09
17146741.68	1378206.61	27	SB-13	GROUND	8.87

NOTE: BENCHMARK ELEVATION OF 8.927 FEET ESTABLISHED IN 1945 (NGS DATUM) USCGS B-910.

Horizontal Coordinates are based on a control traverse performed on the ground on April 14 and 18, 1995. NGS triangulation stations (Second Order) "CALLO 2" and "GAUGE" were used for a basis of horizontal control. Data for each station is as follows:

STATION	NORTHING	EASTING	SCALE FACTOR	CONVERG.
CALLO 2	17,149,202.854	1,368,180.548	0.99997139	+0° 32' 19.4"
GAUGE	17,147,220.704	1,378,904.119	0.99997015	+0° 33' 13.5"

An average project scale factor of 0.9999690 was used for this project. Coordinates are referenced to the North American Datum of 1983.

Vertical Datum is based on a NGS monument "B-910" and located on concrete bulkhead adjacent to the project limits. Elevation of benchmark is 8.93 feet (North American Vertical Datum of 1988).

This map represents a location survey of existing monitoring wells, recovery wells and soil boring locations made on the ground on April 14, 18, 24, and 25, 1995, under my supervision. Coordinates and Elevations are shown to the nearest 0.01 feet.

Raul A. Castillo, R.P.L.S. 5061

STATE OF TEXAS REGISTERED RAUL A. CASTILLO 5061 PROFESSIONAL LAND SURVEYOR

LEGEND

- MW-22 — EXISTING MONITORING WELL
- SB-2 — EXISTING BORING LOCATION
- RW-3 — EXISTING RECOVERY WELL

200 100 0 200 400
GRAPHIC SCALE IN FEET

DETAIL

REV.	REVISIONS	APPR.	DATE

Drawn By : WPA
Checked By :
Approved By:
Project No. : 4403
Scale : 1"=200'
Date : 5/1995
Revision : 0

OFFICE LOCATION :
4501 Gollihar Rd.
Corpus Christi, Texas 78411
P.O. Box 3099
Corpus Christi, Texas 78463
(512)-814-9900

NAISMITH ENGINEERING, INC.
ENGINEERING • ENVIRONMENTAL • SURVEYING

MONITORING WELLS, BORING LOCATIONS AND RECOVERY WELLS

NAVAL AIR STATION - CORPUS CHRISTI

NUECES COUNTY, TEXAS

Dwg. No. 4403-MW

1

Sheet 1 Of 1

APPENDIX F

WASTE MANIFEST AND DISPOSITION

WASTE MANIFEST/RECEIPT

WASTE MANAGEMENT AND DISPOSITION

On behalf of the Navy and NAS Corpus Christi, E/A&H coordinated with Chemical Waste Management, Inc. of Baytown, Texas to remove and properly dispose of Investigation Derived Waste (IDW) generated during the field investigation activities performed at Fuel Farm 216. Chemical Waste Management currently provides waste disposal services for NAS Corpus Christi. The IDW was removed from the site and properly disposed of at the Chemical Waste Management facility during July 1995. Activity personnel supervised the IDW removal from the Fuel Farm 216 site. Manifests, signed by the Activity Environmental Coordinator, are included.

JUL-31-1995 14:54

CONSERVATION COMMISSION
P.O. Box 13087
Austin, Texas 78711-3087

N62467-95-Q-7555

JUL 06 1995

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 09/30/95

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. TX7170022787 Manifest Document No. 95168

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address Commanding Officer (189)
Naval Air Station - Corpus Christi, Tx.
11001 "D" Ste. 143., Corpus Christi, Tx. 78419

4. Generator's Phone (512) 939-3776 After hrs: 512/939-2383

5. Transporter 1 Company Name: Environmental Transportation Svcs.

6. US EPA ID Number: OKD981605363

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address
C.S.C. Republic Landfill
101 Republic Way
Avalon, Texas 76623

10. US EPA ID Number: TXD000836585

11A HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. Non DOT/RCRA regulated ~~material~~ spent material Sampling debris.	006	DM	600	P
	b. Non DOT/RCRA regulated ~~material~~ spent material Drilling mud, soil borings.	021	DM	10500	P
	c. Non DOT/RCRA regulated ~~material~~ spent material Rinse water	021	DM	5880	P
	d.				

15. Special Handling Instructions and Additional Information Emergency Response # 1800-765-8713
Bill CLM Tech Svcs ~~[illegible]~~ 92051

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, packed, marked, and labeled, 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: J. A. Young | Signature: [signature] | Month Day Year: 06 21 95

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: BILLY NEAL | Signature: Billy Neal | Date: Month Day Year: 06 21 95

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: | Signature: | Date: Month Day Year:

19. Discrepancy Indication Space

CSC DISPOSAL, INC.
P.O. BOX 236
AVALON, TX 76623
(214) 627-3413
HERMIT #1209

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: DISPOSAL | Signature: McDean | Date: Month Day Year: 6 30 95

TNRCC-0311 (Rev. 07/13/94) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

TOTAL P.02

CSC DISPOSAL & LAN

For additional information, see site map maintained in the C.S.C. Disposal office in Avalon, Ellis County, Texas.

Coordinates, Bearings & Distances are GRID, Texas, North Central Zone, 1983 Datum
Bench Mark N.G.S.—M-953-1946 Elev. 450.32

y = north = _____
x = east = _____
z = elev. = _____

P.O. Box 338
Avalon, TX 76023

214-627-3
1-800-256-8
Fax 214-627-3

			101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117						DD
		136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120	119	118					KK
		137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155					LL
		174	173	172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156					
		175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193					MM
		212	211	210	209	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194					
		213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231					NN
			249	248	247	246	245	244	243	242	241	240	239	238	237	236	235	234	233						
	1	2		3		4		5		6		7		8		9		10		11					OO

Site Map
Industrial Cell
C.S.C. Disposal Inc.
Avalon Ellis County Texas
Scale 1"=100'
Date 11-1994
Mar 1992

M M

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

# of pages ▶

To Shawn Gurley	From
Dept./Agency Enforcement	Phone 512-939-3776
Fax # 615-344-7467	Fax # 512-939-3798

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

INVESTIGATION-DERIVED WASTE LABORATORY ANALYTICAL DATA

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-1	216SIDW001	04-06-95/1445	ENC05
51960-2	216SIDW002	04-06-95/1500	ENC05

PARAMETER	51960-1	51960-2
Purgeable Aromatics (8020)		
Benzene, ug/kg dw	3100	3800
Toluene, ug/kg dw	1500	3200
Ethylbenzene, ug/kg dw	190	500
Total Xylenes, ug/kg dw	1400	3500
Surrogate - a,a,a-Trifluorotoluene	2830	4969
Surrogate - Expected Value, ug/kg dw	2490	2460
Surrogate - % Actual Recovery	114 %	202 %*F36
Surrogate - Control Limit	67-137 %	67-137 %
Date Analyzed	04.19.95	04.19.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-1	216SIDW001	04-06-95/1445	ENC05
51960-2	216SIDW002	04-06-95/1500	ENC05

PARAMETER	51960-1	51960-2
Semivolatile Organics (8270)		
Naphthalene, ug/kg dw	450	2200
Acenaphthylene, ug/kg dw	<400	<400
Acenaphthene, ug/kg dw	<400	<400
Fluorene, ug/kg dw	<400	<400
Phenanthrene, ug/kg dw	<400	<400
Anthracene, ug/kg dw	<400	<400
Fluoranthene, ug/kg dw	<400	<400
Pyrene, ug/kg dw	<400	<400
Chrysene, ug/kg dw	<400	<400
Benzo(a)anthracene, ug/kg dw	<400	<400
Benzo(b)fluoranthene, ug/kg dw	<400	<400
Benzo(k)fluoranthene, ug/kg dw	<400	<400
Benzo(a)pyrene, ug/kg dw	<400	<400
Indeno(1,2,3-cd)pyrene, ug/kg dw	<400	<400
Dibenz(a,h)anthracene, ug/kg dw	<400	<400
Benzo(g,h,i)perylene, ug/kg dw	<400	<400
2-Methylnaphthalene, ug/kg dw	1100	2800
1-Methylnaphthalene, ug/kg dw	920	2100
Surrogate-NBZ	56 %	62 %
Surrogate-2FBP	88 %	84 %
Surrogate-TPH	65 %	67 %
Date Extracted	04.10.95	04.10.95
Date Analyzed	05.01.95	05.01.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-1	216SIDW001	04-06-95/1445	ENC05
51960-2	216SIDW002	04-06-95/1500	ENC05

PARAMETER	51960-1	51960-2
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	140	170
Date Analyzed	05.01.95	05.01.95
Total Organic Halogen (9020)		
Total Organic Halogen, mg/kg dw	<12	<12
Date Analyzed	04.11.95	04.11.95
Ignitability - Flash Point		
Ignitability-flash point (ASTM D4982-89), Degree F	*F6	*F6
Date Analyzed	04.19.95	04.19.95
Cyanide		
Total Releasable Cyanide, mgHCN/kg	<1.0	<1.0
Date Analyzed	04.13.95	04.13.95
Sulfide		
Total Releasable Sulfide, mgH2S/kg	<10	<10
Date Analyzed	04.12.95	04.12.95
Arsenic (7060)		
Arsenic (7060), mg/kg dw	2.0	2.3
Date Analyzed	04.17.95	04.17.95
Barium (6010)		
Barium (6010), mg/kg dw	53	31
Date Analyzed	04.18.95	04.18.95
Cadmium (6010)		
Cadmium (6010), mg/kg dw	0.32B	<0.61
Date Analyzed	04.18.95	04.18.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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Nashville, TN 37217

Purchase Order: 0225/95

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-1	216SIDW001	04-06-95/1445	ENC05
51960-2	216SIDW002	04-06-95/1500	ENC05

PARAMETER	51960-1	51960-2
Chromium (6010)		
Chromium (6010), mg/kg dw	4.6	3.7
Date Analyzed	04.18.95	04.18.95
Lead		
Lead (7421), mg/kg dw	7.8	28
Date Analyzed	04.17.95	04.17.95
Silver (6010)		
Silver (6010), mg/kg dw	0.56B	<1.2
Date Analyzed	04.18.95	04.18.95
Selenium (7740)		
Selenium (7740), mg/kg dw	<1.2	<1.2
Date Analyzed	04.17.95	04.17.95
Mercury		
Mercury (7470/7471), mg/kg dw	0.028	<0.012
Date Analyzed	04.11.95	04.11.95
pH (150.1)		
Corrosivity-pH, units	7.52	7.88
Date Analyzed	04.10.95	04.10.95
Moisture		
Moisture (% Loss on drying @ 105 C), %	17	18
Date Analyzed	04.11.95	04.11.95
Percent Solids (160.3), %	83	82

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-3	216GIDW003	04-06-95/1530	ENC05

PARAMETER	51960-3
Purgeable Aromatics (8020)	
Benzene, ug/l	3600
Toluene, ug/l	<100
Ethylbenzene, ug/l	240
Total Xylenes, ug/l	540
Surrogate - a,a,a-Trifluorotoluene	24.8
Surrogate - Expected Value, ug/l	30
Surrogate - % Actual Recovery	83 %
Surrogate - Control Limit	77-140 %
Date Analyzed	04.17.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51960

Received: 07 APR 95

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311 Plus Park Blvd.
Nashville, TN 37217

Purchase Order: 0225/95

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-3	216GIDW003	04-06-95/1530	ENC05

PARAMETER	51960-3
Semivolatile Organics (8270)	
Naphthalene, ug/l	84
Acenaphthylene, ug/l	<10
Acenaphthene, ug/l	<10
Fluorene, ug/l	<10
Phenanthrene, ug/l	<10
Anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Pyrene, ug/l	<10
Chrysene, ug/l	<10
Benzo(a)anthracene, ug/l	<10
Benzo(b)fluoranthene, ug/l	<10
Benzo(k)fluoranthene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10
Dibenz(a,h)anthracene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
2-Methylnaphthalene, ug/l	73
1-Methylnaphthalene, ug/l	63
Surrogate-NBZ	50 %
Surrogate-2FBP	56 %
Surrogate-TPH	50 %
Date Extracted	04.10.95
Date Analyzed	05.02.95

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-3	216GIDW003	04-06-95/1530	ENC05

PARAMETER	51960-3
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	8.2
Date Analyzed	04.18.95
Total Organic Halogen (9020)	
Total Organic Halogen, mg/l	0.26
Date Analyzed	04.10.95
Cyanide	
Total Releasable Cyanide, mgHCN/l	<0.010
Date Analyzed	04.13.95
Sulfide	
Total Releasable Sulfide, mgH2S/l	<0.40
Date Analyzed	04.12.95
pH	
pH, units	7.3
Date Analyzed	04.07.95
Arsenic (7060)	
Arsenic (7060), mg/l	0.042
Date Analyzed	04.17.95
Barium (6010)	
Barium (6010), mg/l	0.29
Date Analyzed	04.17.95
Cadmium (6010)	
Cadmium (6010), mg/l	<0.0050
Date Analyzed	04.17.95

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& ENVIRONMENTAL SERVICES, INC.

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LOG NO: S5-51960

Received: 07 APR 95

Purchase Order: 0225/95

Mr. Larry Reynolds
Ensafe/Allen & Hoshall
311 Plus Park Blvd.
Nashville, TN 37217

Project: NAS Corpus Christi (ENC05)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
51960-3	216GIDW003	04-06-95/1530	ENC05

PARAMETER	51960-3
Chromium (6010)	
Chromium (6010), mg/l	<0.010
Date Analyzed	04.17.95
Lead	
Lead (7421), mg/l	0.0053
Date Analyzed	04.17.95
Silver (6010)	
Silver (6010), mg/l	<0.010
Date Analyzed	04.17.95
Selenium (7740)	
Selenium (7740), mg/l	<0.010
Date Analyzed	04.17.95
Mercury	
Mercury (7470/7471), mg/l	<0.00020
Date Analyzed	04.10.95

CHAIN-OF-CUSTODY DOCUMENTATION

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
PROJECT MANAGER: Larry Reynolds
ADDRESS: Fuel Farm 216
TELEPHONE NO.: 615 399 8800
PROJECT NAME/NUMBER: 0102 08420
FAX. NO.: 615 399 7467
MEDIA STATUS: (A, B, OR C) H_2O
SAMPLERS: (SIGNATURE) S Lama Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8270	Total metals	Reactive CN	TPH	Tox	Reactive H_2S	HG	REMARKS
216GIDW003	4-6-95	1530	H_2O	L Glass	4°C	None	2	X							
				500ml plastic		Nitric	1		X						
				500ml plastic		NaOH	1			X					
				500ml Amber		HCl	2				X				
				500 Amber		Sulfuric	1					X			
				~~Reac~~ Zinc 250 plastic		Zinc Acetate	1						X		
				100 plastic		None	1								PH Analysis
				40ml VIAGS		HCl	3								—8020
				250 Amber		Nitric	1							X	
216TE000116	4-6-95		H_2O	40 ml VIAGS		HCl	3								—8020 TRP

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE: S Curley	4-6-95	SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED: SERGEY		PRINTED:		PRINTED:		PRINTED:	
COMPANY: EnSafe	TIME	COMPANY:	TIME	COMPANY:	TIME	COMPANY:	TIME
REASON: Analysis	1645	REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: Fedex
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
A. Campbell 35-51900	4/7/95	9:41

CHANCUST

EN SAFE®

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT NAS Corpus Christi
ADDRESS Fuel FARM 216
PROJECT NAME/NUMBER 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER Cherry Reynolds
TELEPHONE NO. 615 399 8800
FAX. NO. 615 399 7467
SAMPLERS: (SIGNATURE) Shanna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8270	TPH	TOX	IGNITABILITY	CORROSIVITY	RCRA metals	8020	REMARKS
216SIDW001	4-6-95	1445	Soil	500 ml Glass	4°C	None	1	X							
↓				500 ml Glass	↓	↓	1		X	X	X	X			
				250 ml plastic			1						X		
				125 Amber glass			1							X	
216SIDW002	4-6-95	1500	Soil	500 ml Glass	4°C	None	1	X							
↓				500 ml Glass	↓	↓	1		X	X	X	X			
				250 ml plastic			1						X		
				125 Amber			1							X	

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE S Curley	4-6-95	SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED S Curley	TIME	PRINTED	TIME	PRINTED	TIME	PRINTED	TIME
COMPANY EnSafe	1630	COMPANY		COMPANY		COMPANY	
REASON Analysis		REASON		REASON		REASON	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.
SPECIAL INSTRUCTION:

COMMENTS: 4/1 per Shanna Curley Soil samples also need reactivity + pH

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

RECEIVED By: (Signature)	DATE	TIME
A. Campbell 51960	4/7/95	9:41

CHANCUST

APR-10-1998 14:04 ENSAFE NASA

CHAIN OF CUSTODY RECORD

EnSafe®

PAGE 1 OF 1

311 Plus Park Blvd., Suite 130, Nashville, TN 37217 - 615/399-8800

CLIENT: NAS Corpus Christi
ADDRESS: Fuel Farm 216
PROJECT NAME/NUMBER: 0102 08420
MEDIA STATUS: (A, B, OR C) Soil

PROJECT MANAGER: Larry Reynolds
TELEPHONE NO.: 615 399 8800
FAX. NO.: 615 399 1467
SAMPLERS: (SIGNATURE) Shawna Curley

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION TEMP.	PRESERVATION CHEMICAL	NO. OF CONTAINERS	8270	TPH	TOX	Ignitability	Corrosivity	Reactivity	8020	REMARKS
216S IDW001	4-6-98	1445	Soil	500 ml Glass	4°C	None	1	X							
↓				500 ml Glass	↓	↓	1		X	X	X	X			Analyze
				250 ml plastic			1						X		Soils for
				125 Amber glass			1							X	Moisture
															Content
216S IDW002	4-6-98	1500	Soil	500 ml Glass	4°C	None	1	X							and
↓				500 ml Glass	↓	↓	1		X	X	X	X			Reactivity
				250 ml plastic			1						X		Also
				125 Amber			1							X	SMC

RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE	RELINQUISHED BY:	DATE
SIGNATURE: S Curley	4-6-98	SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED: S Curley	TIME	PRINTED:	TIME	PRINTED:	TIME	PRINTED:	TIME
COMPANY: EnSafe	1630	COMPANY:		COMPANY:		COMPANY:	
REASON: Analysis		REASON:		REASON:		REASON:	

METHOD OF SHIPMENT: FedEx
SHIPMENT NO.:
SPECIAL INSTRUCTION:

COMMENTS:

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

CHANCUST

APPENDIX G

DATA VALIDATION PROCEDURES AND CONCLUSIONS AND QUALITY ASSURANCE PLAN

DATA VALIDATION PROCEDURES AND CONCLUSIONS

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1.1 Organic Evaluation Criteria G-5
1.1.1 Holding Times G-6
1.1.2 Surrogate Spike Recoveries G-7
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1.0 INTRODUCTION

This report presents the analytical data collected at the NAS Corpus Christi Fuel Farm 216 site and the quality assurance/quality control (QA/QC) evaluation of those data. The purpose of the data evaluation is to verify that the QC requirements of the data set have been met and to characterize the weakness of questionable data.

Soil and groundwater samples were collected at the Fuel Farm 216 site during March and April 1995. The samples were analyzed by Savannah Laboratories in Savannah, Georgia, for various analytical methods summarized in Table 1.

Table 1
Analytical Methods

Analytical Method	Method Reference
Contamination Assessment and Groundwater Monitoring	
Purgeable Aromatic Hydrocarbons (BTEX)	SW-846 8020
Polynuclear Aromatic Hydrocarbons (PAHs)	SW-846 8270
Total Petroleum Hydrocarbons (TPH)	USEPA 418.1 - Infrared Spectroscopy
Total Petroleum Hydrocarbons (TPH) - Purgeable	SW-846 8015 (modified) - Gas Chromatography Gasoline Range
Total Petroleum Hydrocarbons (TPH) - Extractable	SW-846 8015 (modified) - Gas Chromatography Diesel Range
Total Dissolved Solids (TDS)	USEPA 160.1
Investigative-Derived Waste Characterization	
Purgeable Aromatic Hydrocarbons (BTEX)	SW-846 8020
Polynuclear Aromatic Hydrocarbons (PAHs)	SW-846 8270
Total Petroleum Hydrocarbons (TPH)	USEPA 418.1 - Infrared Spectroscopy
Total Petroleum Hydrocarbons (TPH) - Purgeable	SW-846 8015 (modified) - Gas Chromatography Gasoline Range
Total Petroleum Hydrocarbons (TPH) - Extractable	SW-846 8015 (modified) - Gas Chromatography Diesel Range
Total Organic Halogen (TOX)	SW-846 9020
Reactive Cyanide (HCN)	SW-846 Sec. 8.3
Reactive Sulfide (H_2S)	SW-846 Sec. 8.3
Ignitability	ASTM D 4982-89
Corrosivity (pH)	USEPA 150.1
Percent Solids	160.3
8 RCRA Metals	SW-846 6010 (Ba, Cd, Cr, Pb, Ag) 7060 (As) 7421 (Pb) 7740 (Se) 7470/7471 (Hg)

The references for the analytical methods listed in Table 1 were obtained from the following sources:

- USEPA Office of Solid Waste and Emergency Response (OSWER), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), 3rd Edition, revised July 1992.

- USEPA Environmental Monitoring and Support Laboratory, *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020, revised March 1983).

- USEPA *40 Code of Federal Regulations Part 264, Appendix IX* [*52 Federal Register 25947,* July 1987]

- *American Society for Testing Materials* (ASTM) Annual Manuals, 1993

All samples were placed into sample delivery groups (SDGs) by the laboratory. The samples collected at Fuel Farm 216, requested analysis, and associated SDGs are identified in Tables 2, 3, and 4.

Table 2
Contamination Assessment Samples Analyzed

SDG	Sample ID	Matrix	Sample Date	BTEX	PAH	TPH 418.1	TPH 8015 Purgeables	TPH 8015 Extractables
ENC01	216SB00408	soil	3/27/95	X	X	X		
	216HB00410	soil	3/27/95	X	X	X		
	216SB00410	soil	3/27/95	X	X	X		
	216SB00404	soil	3/27/95	X	X	X		
	216TE00005	trip blank	3/27/95	X				
	216SB00208	soil	3/27/95	X	X	X		
	216SB00108	soil	3/27/95	X	X	X	X	X
	216SB00310	soil	3/27/95	X	X	X		
	216SB00210	soil	3/27/95	X	X	X	X	X
	216SB00112	soil	3/27/95	X	X	X		
	216SB00308	soil	3/27/95	X	X	X		
	216TE00004	trip blank	3/27/95	X				

Table 2
Contamination Assessment Samples Analyzed

SDG	Sample ID	Matrix	Sample Date	BTEX	PAH	TPH 418.1	TPH 8015 Purgeables	TPH 8015 Extractables
ENC01/02	216SB00812	soil	3/28/95	X	X	X		
	216KB00910	soil	3/28/95	X	X	X		
	216SB00908	soil	3/28/95	X	X	X		
	216SB00910	soil	3/28/95	X	X	X		
	216SB01008	soil	3/28/95	X	X	X		
	216SB01016	soil	3/28/95	X	X	X		
	216SB01002	soil	3/28/95	X	X	X		
	216TE00006	trip blank	3/28/95	X				
	216SB00506	soil	3/28/95	X	X	X		
	216SB00510	soil	3/28/95	X	X	X	X	X
	216SB00606	soil	3/28/95	X	X	X		
	216SB00610	soil	3/28/95	X	X	X		
	216SB00706	soil	3/28/95	X	X	X		
	216SB00710	soil	3/28/95	X	X	X		
	216SB00804	soil	3/28/95	X	X	X		
	216SB00806	soil	3/28/95	X	X	X		
	216SB00806	soil	3/28/95	X	X	X		
ENC02/1	216SB01104	soil	3/29/95	X	X	X		
	216SB01112	soil	3/29/95	X	X	X	X	X
	216SB01206	soil	3/29/95	X	X	X		
	216SB01210	soil	3/29/95	X	X	X		
	216SB01302	soil	3/29/95	X	X	X		
	216SB01310	soil	3/29/95	X	X	X		
	216TE00008	trip blank	3/29/95	X				
ENC01/02/03	216P000010	potable blank	3/30/95	X	X	X	X	X
	216E000010	equipment	3/30/95	X	X	X	X	X
	216TE00010	blank	3/30/95	X				
	216SMW2208	trip blank	3/30/95	X	X	X		
	216SMW2214	soil	3/30/95	X	X	X		
	216SMW2217	soil	3/30/95	X	X	X		
	216SMW2304	soil	3/30/95	X	X	X		
	216SMW2312	soil	3/30/95	X	X	X		
	216SMW2418	soil	3/30/95	X	X	X		
	216SMW2418	soil	3/30/95	X	X	X		
	216SMW2404	soil	3/30/95	X	X	X	X	X
	216SMW2408	soil	3/30/95	X	X	X		
	216TE00009	soil	3/30/95	X				
		trip blank						
ENC03/1	216SMW2502	soil	3/31/95	X	X	X		
	216SMW2514	soil	3/31/95	X	X	X		
	216SMW2518	soil	3/31/95	X	X	X		
	216SMW2604	soil	3/31/95	X	X	X		
	216SMW2610	soil	3/31/95	X	X	X		
	216SMW2618	soil	3/31/95	X	X	X	X	X
	216SMW2712	soil	3/31/95	X	X	X		
	216SMW2720	soil	3/31/95	X	X	X		
	216TE00012	trip blank	3/31/95	X				
	216TE00011	trip blank	3/31/95	X				
	216F000010	field blank	3/31/95	X	X	X		

Table 2
Contamination Assessment Samples Analyzed

SDG	Sample ID	Matrix	Sample Date	BTEX	PAH	TPH 418.1	TPH 8015 Purgeables	TPH 8015 Extractables
ENC01/04	216P000020	potable blank	4/3/95	X	X	X	X	X
	216E000020	equipment	4/3/95	X	X	X	X	X
	216TE00014	blank	4/3/95	X				
	216SMW2802	trip blank	4/3/95	X	X	X		
	216SMW2812	soil	4/3/95	X	X	X	X	X
	216SMW2816	soil	4/3/95	X	X	X		
	216SMW2906	soil	4/3/95	X	X	X		
	216SMW2918	soil	4/3/95	X	X	X		
	216HMW2918	soil	4/3/95	X	X	X		
	216TE00013	soil	4/3/95	X	X	X		
		soil	4/3/95	X	X	X		
		soil	4/3/95	X	X	X		
		soil	4/3/95	X	X	X		
		soil	4/3/95	X	X	X		
		soil	4/3/95	X				
		trip blank						
ENC04/01	216SRW1006	soil	4/4/95	X	X	X		
	216SRW1018	soil	4/4/95	X	X	X		
	216SRW2010	soil	4/4/95	X	X	X		
	216SRW2002	soil	4/4/95	X	X	X		
	216TE00015	trip blank	4/4/95	X				

Table 3
Groundwater Monitoring Samples Analyzed

SDG	Sample ID	Matrix	Sample Date	BTEX	PAH	TPH 418.1	TDS
51386	216GMW1001	groundwater	3/13/95	X	X	X	X
	216GMW0801	groundwater	3/13/95	X	X	X	X
	216RE00100	equipment blank	3/13/95	X	X	X	X
	216TE00001	trip blank	3/13/95	X			
	216GMW1201	groundwater	3/13/95	X	X	X	X
51421	216GMW0301	groundwater	3/14/95	X	X	X	X
	216GMW0401	groundwater	3/14/95	X	X	X	X
	216GMW0701	groundwater	3/14/95	X	X	X	X
	216GMW0901	groundwater	3/14/95	X	X	X	X
	216HMW0901	groundwater	3/14/95	X	X	X	X
	216TE00002	trip blank	3/14/95	X			
	216FE00100	equipment blank	3/14/95	X	X	X	X

Table 4
Investigative-Derived Waste Samples Analyzed

SDG	Sample ID	Matrix	Sample Date	BTEX	PAH	TPH 418.1	RCRA Metals	TOX	HCN	H_2S	ignit.	pH
ENC05	216GIDW003	water	4/6/95	X	X	X	X	X	X	X		X
	216TE00016	trip blank	4/6/95	X								
	216SIDW001	soil	4/6/95	X	X	X	X	X	X	X	X	X
	216SIDW002	soil	4/6/95	X	X	X	X	X	X	X	X	X

1.1 Organic Evaluation Criteria

The USEPA methods described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, and *Methods for Chemical Analysis of Water and Wastes*, define quality control criteria that the laboratory must meet but the methods do not address data evaluation from a user's perspective. Evaluation criteria are available in *USEPA Contract Laboratory National Functional Guidelines for Organic Data Review* (Functional Guidelines), February 1994. Functional Guidelines was used throughout the data evaluation process when the analytical methods did not address data usability.

Data evaluation for samples collected at Fuel Farm 216, NAS Corpus Christi included the following parameters:

- Holding times
- Surrogate spike recoveries
- Matrix spike and matrix spike duplicates (MS/MSD)
- Laboratory Control Samples (LCS)
- Blank analysis
- Field duplicate precision

According to Functional Guidelines, when the QC parameters do not fall within the specific method guidelines, the data evaluator annotates or "flags" the corresponding compounds where

deficiencies were found. The data from the site were evaluated using this approach. The following flags were used to annotate data exhibiting laboratory and/or field deficiencies or problems:

U/< **Undetected** — The analyte was analyzed for but not detected or was also found in an associated blank, but at a concentration less than 10 times the blank concentration for common constituents or five times the blank concentration for other constituents; the associated value shown is the quantitation limit.

J **Estimated Value** — One or more QC parameters were outside control limits.

UJ **Undetected and Estimated** — The analyte was analyzed for but not detected above the listed estimated quantitation limit; the quantitation limit is estimated because one or more QC parameters was outside control limits.

R/UR **Unusable Data** — One or more QC parameters grossly exceeded control limits.

These validation flags were applied to data where data deficiencies were noted. Attachment A includes tables of all qualified data.

1.1.1 Holding Times

Acceptable technical holding times are specified in the analytical methods. The sample holding time depends on the type of analysis and whether the sample was preserved. For water samples, the holding time for preserved VOC and purgeable TPH analysis is 14 days from the collection date. PAHs must be extracted within seven days and analyzed within 40 days after extraction. Extractable TPH must be extracted within 14 days and analyzed within 40 days after extraction. Holding times for total petroleum hydrocarbons (by USEPA method 418.1) are 28 days from the day of collection for water samples that are preserved. TDS and TOX have a holding time

of 28 days. HCN, H_2S, and ignitability have a holding time of 14 days. Percent solids and TDS have holding times of 7 days and 48 hours, respectively. The holding time for metals is 6 months, except for mercury which has a holding time of 13 days if collected in a plastic jar.

Holding times for soil matrices are not specified in SW-846. Therefore, it is at the discretion of the data reviewer to apply the water sample holding times criteria to soil.

1.1.2 Surrogate Spike Recoveries

Surrogate compounds are added to samples and laboratory blanks before extraction and sample preparation to evaluate the effect of the sample matrix on extraction and measurement procedures. Surrogates are organic compounds which are chemically similar to analytes of interest but not normally found in environmental samples. Percent recovery of the surrogates is calculated by comparing the amount of the compound recovered by the analysis to the amount added to the sample.

1.1.3 MS/MSD

A matrix spike is used to determine the accuracy of the analysis for a given matrix. A matrix spike consists of a known quantity of stock solution added to the sample before its preparation and analysis. Evaluating the matrix spike data involves two calculations. First, the percent recovery (%R) is calculated by comparing the amount of the compound recovered by the analysis to the amount added to the sample. In addition, the relative percent difference (RPD) between the MS and the MSD samples is calculated and assessed. No specific requirements have been established for qualifying MS/MSD data. However, guidelines to aid in applying professional judgment are discussed in the Functional Guidelines.

1.1.4 Laboratory Control Samples

Laboratory Control Samples (LCS) and LCS duplicates (LCSD) were analyzed by Savannah Labs with each sample delivery group. The LCS monitors the overall performance of each step

during analysis, including sample preparation. The LCS/LCSD is similar to the MS/MSD except for the fact that they are analyzed in a clean matrix. All aqueous LCS percent recovery results must fall within the control limits established by the laboratory. In addition, the RPD between the LCS and the LCSD samples is calculated and assessed. The RPD between the LCS and LCSD is also calculated and must fall within the laboratory's control limits.

1.1.5 Blank Analysis

Laboratory method blanks are used to assess the existence and magnitude of potential contamination introduced during analysis. Additionally, *field blanks* may be collected to assess any contamination introduced while collecting samples. When chemicals are found both in samples and laboratory blanks analyzed within the same 12-hour period and/or field-derived blanks, the usability of the data depends on the reviewer's judgment and the blank's origin. According to the Functional Guidelines, a sample result should not be considered positive unless the concentration of the compound in the sample exceeds 10 times the amount in any blank for common laboratory contaminants (i.e., methylene chloride, acetone, 2-butanone, and phthalate esters), or five times the amount for other constituents. These amounts are referred to as *action levels*. Because blank samples may not be prepared using the same weight of sample, volume of sample, or dilution, these factors should be also taken into consideration when using these blank criteria. The specific actions to be taken are as follows:

- If a chemical is found in the blank but not the sample, no action is taken.

- If the sample concentration is less than the quantitation limit and less than the action level, the quantitation limit is reported.

- If the sample concentration is between the quantitation limit and the action level, the concentration is reported as nondetect "U."

- If the sample concentration is greater than the action level, the concentration may be used unqualified.

Field-Derived Blanks

For this project, three types of field-derived blanks were collected: the *field blank*, the *equipment rinsate blank* (also called a *rinsate blank*), and the *trip blank*. The field blank is a sample of the source water used onsite, primarily to decontaminate equipment. The equipment rinsate blank is a sample of runoff water from one or more pieces of the decontaminated equipment used to collect samples. The trip blank is a 40-milliliter (ml) volatile organic analysis (VOA) vial filled with laboratory-certified water used to assess cross-contamination during VOC sample shipment.

For data validation purposes, each trip blank is associated only with the samples from the same shipment/cooler. The field blanks and the rinsate blanks apply to a larger amount of samples because only one is collected per week or sampling event. Because field-derived blanks are used with method blanks to assess potential cross-contamination of field investigative samples, no action was taken if contamination was detected in the method blanks associated with the field-derived blanks.

1.1.6 Field Duplicates

Field duplicate samples are analyzed to evaluate data precision, a measure of the reproducibilty of the sample collection. The RPD between the sample and the duplicate sample is calculated. Control limits of 20% RPD for water and 50% for soil are guidelines for field duplicate precision.

1.2 Inorganic Evaluation Criteria

The USEPA methods described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* define quality control criteria that the laboratory must meet but the methods do not address data evaluation from a user's perspective. Evaluation criteria are available in *USEPA*

Contract Laboratory National Functional Guidelines for Inorganic Data Review (Functional Guidelines), February 1994. These Functional Guidelines were used throughout the data evaluation process when the analytical methods did not address data usability.

Data evaluation for samples collected at Fuel Farm 216 included the following parameters:

- Holding times
- Matrix spike results
- Laboratory duplicates
- Blank analysis
- Laboratory control sample results
- Field duplicate precision

According to the Functional Guidelines, when the QC parameters do not fall within the specific method guidelines, the data evaluator flags the corresponding compounds where deficiencies were found. The data from the site were evaluated using this approach. The following flags were used to annotate data exhibiting laboratory and/or field deficiencies or problems:

U/< **Undetected** — The analyte was analyzed for but not detected above the instrument detection limit (IDL) or was also found in an associated blank at a concentration less than 5 times the blank concentration.

J **Estimated Value** — One or more QC parameters were outside control limits.

UJ **Undetected and Estimated** — The analyte was analyzed for but not detected above the estimated IDL; the IDL was estimated because one or more QC parameters was outside control limits.

R/UR **Unusable Data** — One or more QC parameters grossly exceeded control limits.

1.2.1 Holding Times

Acceptable technical holding times are specified in the analytical methods. For aqueous samples, the holding time for metals analysis is six months, except for mercury, which is 28 days from the date of collection. For aqueous samples, cyanide analysis has a sample holding time of 14 days from the date of collection. Holding times for soil matrices are not specified in the methods. Therefore, it is at the discretion of the data reviewer to apply the water sample holding times criteria to soil.

1.2.2 Matrix Spike Analysis

Samples are spiked with known quantities of analytes to evaluate the effect of the sample matrix on digestion and measurement procedures. The %R should be within 75 to 125 percent. However, when the sample concentration exceeds the spike concentration by a factor of four or more, spike recovery criteria is not applicable.

1.2.3 Laboratory Duplicates

Laboratory duplicate samples are analyzed to evaluate data precision, a measure of the reproducibilty of the analysis. The RPD between the sample and the duplicate sample is calculated. A control limit of 20% RPD should not be exceeded for analyte values greater than 100 times the IDL.

1.2.4 Blank Analysis

Laboratory method blanks are used to assess the presence and magnitude of potential contamination introduced during analysis. Additionally, *field blanks* may be collected to assess the potential contamination introduced during sample collection. When chemicals are found in samples and laboratory blanks, the usability of the data depends on the judgment of the reviewer and the origin of the blank. According to Functional Guidelines, a sample result should not be considered positive unless the concentration of the compound in the sample exceeds 5 times the amount in <u>any</u> blank. These amounts are referred to as *action levels*. Because blank samples

may not be prepared using the same weight of sample, volume of sample, or dilution, these factors should be also taken into consideration when using these blank criteria. The specific actions to be taken are as follows:

- If a chemical is found in the blank but not the sample, no action is taken.
- If the sample concentration is between the IDL, and less than five times the amount found in any blank, the concentration is reported as "U."
- If the sample concentration is greater than 5 times the amount in any blank, the concentration may be used unqualified.

1.2.5 Laboratory Control Samples

LCS are used to monitor the overall performance of steps in the analysis, including the sample preparation. All aqueous LCS percent recovery results must fall within the control limits of 80 to 120 percent, except for antimony and silver for which control limits have not been established. .Soil LCS standards are generally provided by the USEPA (or state agency or private laboratory). Control limits are established for each soil LCS standard prepared.

1.2.6 Field Duplicates

Field duplicate samples are analyzed to evaluate data precision, a measure of the reproducibilty of the sample collection. The RPD between the sample and the duplicate sample is calculated. Control limits of 20% RPD for water and 50% for soil are guidelines for field duplicate precision.

2.0 VALIDATION RESULTS—CONTAMINATION ASSESSMENT SOIL SAMPLES

All soil samples were received by the laboratory intact and with the proper documentation. The following subsections summarize the data validation results.

Purgeable Aromatic Hydrocarbons (BTEX) Fraction

All holding times, MS/MSDs, LCSs, laboratory blanks, trip blanks, and equipment blanks were acceptable.

Surrogate a,a,a-trifluorotoluene exceeded the upper control window in samples 216SMW2610 (640%), 216SMW2514 (159%), 216SMW2712 (1200%), 216SMW2304 (140%), 216SB00408 (233%). All positive values were flagged as estimated "J" indicating a possible high bias. In sample 216SRW1006, the surrogate recovery was 7.3%. Because the recovery was less than 10%, positive results were flagged as estimated "J" and nondetected results were rejected "R."

Field duplicates 216SB00410 and 216HB00410 were examined for precision and the RPD was calculated for all detected compounds. Total xylene had a RPD of 87%. Xylene was flagged "J" in the sample and duplicate indicating poor duplicate precision.

Field duplicates 216SMW2418 and 216HMW2418 were examined for precision and the RPD was calculated for all detected compounds. Below is a comparison of field duplicates that had high RPDs. Results are in μg/kg.

Compound	Sample Concentration	Duplicate Concentration	RPD
Benzene	18	< 12	200%
Ethylbenzene	41	< 12	200%
Xylenes	100	< 12	200%

All positive compounds listed above were flagged "J" and all undetected compounds were flagged "UJ" in samples 216SMW2418 and 216HMW2418 indicating poor duplicate precision.

Polynuclear Aromatic Hydrocarbons (PAHs) Fraction

All holding times, surrogates, MS/MSDs, LCSs, laboratory blanks, trip blanks, field blanks, and equipment blanks were acceptable.

Field duplicates 216SB00410 and 216HB00410 were examined for precision and the RPD was calculated for all detected compounds. Below is a comparison of field duplicates that had high RPDs. Results are in μg/kg.

Compound	Sample Concentration	Duplicate Concentration	RPD
Naphthalene	1700	< 410	200%
2-Methylnaphthalene	2600	< 600	200%
1-Methnaphthalene	1700	< 410	200%

All positive compounds listed above were flagged "J" and all undetected compounds were flagged "UJ" in samples 216SB00410 and 216HB00410 indicating poor duplicate precision.

Total Petroleum Hydrocarbon (TPH) USEPA 418.1—Infrared Spectroscopy

All holding times, surrogates, MS/MSDs, LCSs, laboratory blanks, trip blanks, field blanks, and equipment blanks were acceptable.

Field duplicates 216SB00410 and 216HB00410 were examined for precision and the RPD was calculated for all detected compounds. TPH had a RPD of 157. TPH was flagged "J" in the sample and duplicate indicating poor duplicate precision.

Field duplicates 216SMW2418 and 216HMW2418 were examined for precision and the RPD was calculated for all detected compounds. TPH had a RPD of 73%. TPH was flagged "J" in the sample and duplicate indicating poor duplicate precision.

TPH—Purgeable SW-846 8015 (modified)

All holding times, surrogates, MS/MSDs, LCSs, laboratory blanks, trip blanks, field blanks, equipment blanks, and field duplicate precision were acceptable.

TPH—Extractable SW-846 8015 (modified)

All holding times, surrogates, MS/MSDs, LCSs, laboratory blanks, trip blanks, field blanks, equipment blanks, and field duplicate precision were acceptable.

In samples 216SB00812, 216SB00510, and 216SB00210, the percent difference between the two gas chromatography columns for kerosene was greater than 35%. The kerosene concentrations were flagged as estimated "J" indicating poor reproducibility of sample results between the two analytical columns.

3.0 VALIDATION RESULTS-GROUNDWATER MONITORING SAMPLES

All groundwater samples were received by the laboratory intact and with the proper documentation. All holding times, surrogates, MS/MSDs, LCSs, laboratory blanks, trip blanks, field blanks, equipment blanks, and field duplicate precision were acceptable for all groundwater methods.

4.0 VALIDATION RESULTS-INVESTIGATIVE-DERIVED WASTE SAMPLES

All investigative-derived waste samples were received by the laboratory intact and with the proper documentation. All QA/QC criterion were met for PAH, TPH, TOX, HCN, H2S, and corrosivity. The subsections below summarize methods where QA/QC criterion were not met.

Purgeable Aromatic Hydrocarbons (BTEX) Fraction

All holding times, MS/MSDs, LCSs, laboratory blanks, trip blanks, and equipment blanks were acceptable.

Surrogate a,a,a-trifluorotoluene exceeded the upper control window in sample 216SIDW002 (202%). All positive BTEX values were flagged as estimated "J" indicating a possible high bias. Equipment blanks and field duplicate precision were acceptable.

Ignitability (Flash Point)

All holding times were met. MS/MSDs, LCS, and laboratory blanks do not apply to this method and were not reviewed. No field blanks were collected for ignitability analysis.

The soil in samples 216SIDW001 and 216SIDW002 was very hard and prohibited continual stirring required by the analytical method. Therefore, the sample was heated to greater than 140°F without continual stirring and the test flame was applied to the sample surface. No apparent ignition or vapors over the sample was observed by the laboratory. Because the stirring could not be maintained as required by the method, it is uncertain whether the sample would have ignited if stirring took place. Therefore, further sampling and analysis may confirm the reported flashpoint >140°F in both samples.

RCRA Metals

All QA/QC criteria were met for metals. In sample 216SIDW001, cadmium and silver were reported above the laboratories instrument detection limit but below their reporting limit. As a result, both values were flagged "B" by the laboratory. The "B" qualifiers were changed to "J" during the validation process indicating the values are estimated at the lower end of the calibration curve.

QUALITY ASSURANCE PLAN

Comprehensive Long-Term Environmental Action Navy
Naval Air Station Corpus Christi
CTO-0102

Appendix A
Quality Assurance Plan for Final Contamination Assessment Plan

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina

SouthDiv Contract No.:
N62467-89-D-0318

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1.0 INTRODUCTION

This document presents policies, project organization and objectives, functional activities, and quality assurance/quality control (QA/QC) measures intended to achieve data quality goals of field investigation to be performed by EnSafe/Allen & Hoshall (E/A&H) at Fuel Farm 216 at Naval Air Station (NAS) Corpus Christi in Corpus Christi, Texas. The fuel farm is identified by the Texas Natural Resource Conservation Commission (TNRCC) as LPST ID 91734.

This document is intended to fulfill requirements for ensuring that all work will be conducted in accordance with QA/QC protocols and field procedural protocols for environmental monitoring and measurement data as established in:

- Naval Energy and Environmental Support Activity (June 1988). (NEESA 20.2-047B) *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program*, Port Hueneme, California.
- Naval Energy and Environmental Support Activity (February 1985). (NEESA 20.2-031A) *Ground-Water Monitoring Guide*, Port Hueneme, California.
- Southern Division Engineering Command, Revision 4 (March 1989). *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation*, Charleston, South Carolina.

Where specific NEESA guidelines do not exist, applicable EPA and/or Texas Natural Resource Conservation Commission (TNRCC) guidelines and methods will be applied. These regulations are referenced in specific sections of this document (where applicable).

2.0 QA/QC OBJECTIVES

In general, QA objectives as part of the Navy technical services contract assess and document the precision, accuracy, representativeness, completeness, and comparability of all sampling and analyses performed. Quality criteria are outlined here to assure data obtained during projects is suitable for its intended use, and to meet goals established by NEESA. At a minimum, soil,

surface water, sediment, groundwater, and contaminant quantification investigations will be conducted at NEESA DQO Level C protocol (U.S. Environmental Protection Agency (EPA) Level III). The following discussion presents the project specific level of effort for quality assurance and data quality criteria. Quality control sample collection will follow the frequency presented in Table 2-1.

Table 2-1
Quality Control Sample Collection Frequencies

Duplicates:	One per 20 water, soil, and soil-gas samples collected
Field Blank:	One per sampling event (week) per source. (Potable Water and Reagent Grade Water—distilled)
Trip Blank:	One per sample shipping cooler containing volatile organic compound (VOC) samples
Rinsate Blank:	One per week per media; one per 20 soil-gas samples collected
MS/MSD:	One per 20 water and soil samples collected; MS/MSD are to be the same sample used for duplicate analysis
Equipment/Material Blanks:	One sample each of filter pack sand, drilling mud, grout, bentonite pellets, or powder used in well construction per material source/site

Note:
Trip blanks are for volatile organic analysis only.

2.1 Precision

Precision is a measure of the reproducibility of measurements and methods, and is defined for qualitative data as a group of values' variability compared to its average value. To assess the precision of the measurement systems used in this project, duplicates will be obtained and analyzed with the samples collected. Precision, to be used as a criterion for data classification, is calculated as a relative percent difference in analytical outcome between a given sample and corresponding duplicate.

The type of duplicates used will depend on the part of the measurement system to be evaluated for precision. Field-duplicated samples analyzed by the same laboratory will yield information about sampling method precision and matrix homogeneity. Laboratory-duplicated samples indicate sample preparation and analytical method precision.

A field **duplicate** is a sample collected in the field from the exact location as another sample and sent to the laboratory for analysis with the original sample. A laboratory duplicate is prepared in the laboratory and consists of a split from a sample sent there from the field.

2.2 Accuracy

The accuracy of an entire measurement system, which is an indication of any bias, is difficult to measure in environmental measurement systems. Sources of error are the sampling process, field and laboratory contamination, preservation, handling, sample matrix, and analysis. The accuracy of a method is an estimate of the difference between the true value and the determined mean value. In the field, methods used for detecting false positive results include the preparation of trip blanks, field blanks, and equipment rinsate blanks. In the laboratory, MS/MSD samples and surrogate spike solutions are used to detect positive and negative bias.

Per NEESA definitions, a **field blank** consists of sample containers filled in the field with water from each source used for decontamination. Field blanks are prepared, preserved, and stored in the same manner as the samples. The field blank is analyzed along with the field samples for the constituents of interest to check for contamination imparted to the samples by the water source. Samples of the distilled water and tap water will be collected weekly.

Trip blanks will be used to measure volatile constituents. A trip blank consists of a volatile organic aromatic (VOA) sample vial that is filled with organic-free water in the laboratory and travels unopened with the sample bottles to the field. Trip blanks will be stored unopened with the sample bottles in a contaminant-free area. The trip blank is then shipped back to the

laboratory with volatile samples collected in the field. It is opened in the laboratory and analyzed along with the field samples for the volatile constituents of interest. Trip blanks will be submitted to the laboratory with samples for volatile analysis at a frequency of one per shipping container containing VOA samples. If trip blanks are received from the laboratory containing air bubbles (pinhead size or larger), the trip blanks will be discarded and the laboratory contacted.

An **equipment rinsate blank** is made by taking distilled water and placing it in contact with the field sampling apparatus (e.g., bailer, pump, stainless-steel split-spoon sampler) after decontaminating equipment. The water will be collected in the same type of containers as the other samples, preserved in the same manner, and analyzed for the same parameters of interest. One equipment rinsate blank will be collected per sampling event per sampling media. If sampling occurs in the same sample media using different equipment in the same sampling event (e.g., if soil samples are collected with split-spoon sampler and hand auger) a separate rinsate blank will be collected for each piece of sampling apparatus.

MS/MSD samples prepared by the laboratory are useful in assessing the accuracy of the analytical methods, and can detect matrix effects where other sample components interfere with analyzing the contaminant of concern (COC). The method of measuring analytical accuracy is percent recovery.

Analytical MS and MSD samples will be performed by the laboratory, typically at a frequency of one MS/MSD pair per 20 samples per matrix. Control limits for laboratory matrix spike recovery are published by EPA or determined by historical laboratory results. Surrogate spikes, typically prepared from deuterated isomers of selected target compounds and added to each sample, provide an added measure of method accuracy in organic analyses. To provide the additional volume needed by the lab for MS and MSD analysis, double the volume for the first sample of each 20 soil, water, and sediment samples.

An **equipment/materials blank** shall be collected from the materials and liquids to be used in monitoring well construction at each investigation site. These blanks will be analyzed at DQO Level IV.

2.3 Representativeness

The goal of this investigation is to delineate the extent of any soil and groundwater contamination and to determine the most appropriate remedial option. Soil and groundwater samples will be properly collected and monitoring well parameters will be measured in accordance with NEESA and EPA protocols to ensure that samples collected during the investigation are representative of the site.

2.4 Completeness

Completeness goals for this project are set at 90 percent for laboratory analyses. Data completeness is the percentage of total valid tests conducted and the percentage of the total valid tests required in the scope of work.

Completeness goals of field measurements reflect the ability to re-sample immediately, before declaring well stability, and obtaining samples for laboratory analysis. The completeness goals consider unavoidable non-attainment of QA goals during the course of an investigation. Efforts will be made; however, to maintain soil and groundwater data completeness levels above 90 percent for field measurements, if possible.

2.5 Comparability

Comparability is assured by using established methods of field sampling by experienced field personnel and laboratory analyses as specified by NEESA regulations.

3.0 ORGANIZATION AND RESPONSIBILITIES

Overall responsibility for projects conducted in accordance with NEESA regulations will be vested in NEESA (or its approved representatives). Therefore, project coordination responsibilities lie with the Southern Division Naval Facilities Engineering Command Engineer in Charge (SOUTHNAVFACENGCOM EIC). The components of the project chain-of-command will be performed as established in NEESA 20.2-047B. Project oversight will be organized along the following lines of authority.

3.1 Naval Energy and Environmental Support Activity

NEESA is responsible for ensuring the quality of laboratory analyses performed during the various phases of the Comprehensive Long-Term Environmental Action Navy (CLEAN) is acceptable. NEESA is also responsible for managing the NEESA contract representative (NCR).

3.2 Engineer in Charge

The EIC at the engineering field division provides the site information and history, provides logistical assistance, specifies the sites requiring investigation, and reviews results and recommendations.

The EIC is responsible for coordinating procurement, finance, and reports; for ensuring that all documents are reviewed by the NCR; for communicating comments from the NCR and other technical reviewers to the subcontractors; and for ensuring that the subcontractors address all the comments submitted and take appropriate corrective actions.

3.3 NEESA Contract Representative

The NCR is responsible for ensuring that each project has appropriate overall QA. The NCR reviews laboratory QA plans and work plans, submits performance sample data, provides field and laboratory audits, and reviews data from the site. The questions from subcontractors and

the EIC regarding specific field and laboratory QC practices are directed to the NCR, who also evaluates referee samples.

3.4 State or Local Oversight

The TNRCC will also serve in an oversight capacity for this investigation. The Contamination Assessment Plan will be prepared in accordance with TNRCC requirements and guidelines. The investigation results will be presented to the TNRCC in the form of a Contamination Assessment Report.

3.5 Investigation Performance

The following individuals or firms will be responsible for the implementing of all work activities:

Engineering Contractor: E/A&H will serve as the engineering contractor for this project. As the engineering contractor, E/A&H is responsible for designing and implementing the Remedial Investigation/Feasibility Study (RI/FS) and preliminary site characterization activities.

Analytical Laboratory: The laboratory to be used will be NEESA-approved. The laboratory must adhere to the laboratory requirements in NEESA 20.2-047B . The laboratory must prepare and submit a laboratory QA plan, analyze and submit the results of proficiency testing, submit to an onsite inspection, and correct any deficiencies cited during the inspection by the NCR.

The laboratory is required to identify a Laboratory QA Coordinator (LQAC) responsible for overall quality assurance. The LQAC must not be responsible for schedule, costs, or personnel other than QA assistants. It is preferred the LQAC report to the laboratory director. The LQAC must have the authority to stop work on projects if QC problems arise affecting the quality of the data produced.

3.6 Applicable Regulations

In addition to conforming to all NEESA regulations, all work shall be performed in a manner consistent with the regulations listed below:

- The Texas Natural Resource Conservation Commission Underground and Aboveground Storage Tanks Regulations, 31 TAC Chapter 334.
- Other appropriate federal, state, and local guidelines, rules, regulations, and criteria (where applicable).

4.0 FIELD ACTIVITIES

4.1 Soil Borings and Sampling

4.1.1 Soil Sampling Procedures

All soil samples will be collected in accordance with *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation* and NEESA 20.2-031A, Chapter 4 — Monitor Well Drilling. The specific sampling method is discussed in Section 4.2.3.3 — Split Spoon Samples.

Continuous soil samples will be collected through the center of the hollow-stem augers using a CME continuous sampler or a minimum 24-inch long split-spoon sampler to the terminating depth of the boring. At least two soil samples will be collected from each boring for laboratory analysis. Soil boring logs will be prepared for each boring that will be sampled.

The TNRCC requires that one sample be collected at the point of highest contamination as determined by field screening. Screening will be accomplished by splitting each soil sample (from each interval) in two. The first subsample will be placed in the appropriate containers for subsequent laboratory analysis. The second subsample will be placed in a plastic bag with enough headspace to allow for contaminant volatilization. After allowing a sufficient time for volatilization of headspace samples, readings will be made with a photoionization detector (PID). Based upon highest readings, one sample per boring will be selected for benzene, toluene,

ethylbenzene, and total xylene (BTEX), total petroleum hydrocarbon (TPH), and polynuclear aromatic hydrocarbon (PAH) analysis.

The second sample for analysis will be collected from either immediately above the water table or below the water table if a high level of soil contamination is indicated. The selected samples will then be shipped at 4 °C (± 2 °C) under chain-of-custody via overnight courier to the laboratory for analysis.

4.1.2 Soil Sample Analyses

The TNRCC has established that for all petroleum hydrocarbon releases involving jet fuel, soil samples should be analyzed for BTEX using EPA Method 8020 with EPA Method 5030 (Purge and Trap). Soil samples should also be analyzed for TPH using EPA Method 418.1 with EPA Method 3540 (Soxhlet) or 3550 (Sonication) extraction and PAH using EPA Method 8310 as described in SW-846. Soil samples will also be analyzed for TPH using EPA 8015 Modified to support the potential need for a risk assessment in preparation of the followup report.

4.1.3 Soil Sample Documentation

All soil samples will be documented in accordance with *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation*, Parts 3 and 4 and NEESA 20.2-031A, Chapter 6 — Monitoring Well Data Record Requirements, and as discussed in Section 5 of this Quality Assurance Plan (QAP). E/A&H personnel will use site-specific, bound logbooks for the maintenance of all field records pertaining to the investigation. These records will document all visual observations, calculations, and equipment calibrations. Every entry will be dated and the time for each entry noted. The logbooks are accountable documents that will be properly maintained and retained as part of the project files. In addition, soil boring logs will be produced for all soil borings advanced onsite. Information to be included on boring logs includes total depth of boring, lithologic descriptions of each geologic formation encountered, blow counts for split-spoon sampler penetration, water-bearing zones, and any subsurface obstructions encountered during

boring advancement (with explanations, if available). All field logs will be retained in their original condition in the E/A&H project file.

4.1.4 Soil Sampling Equipment Decontamination

Equipment used in collection of soil samples (e.g., split-spoon samplers, sampling rods, hollow-stem auger flights) will be high pressure, steam cleaned before onsite activities begin. Decontamination of all augers and downhole equipment (e.g., auger flights, sampling rods) will be performed between each boring through steam cleaning detergent wash and potable water rinse. Continuous or split-spoon samplers will be decontaminated between samples using a detergent wash, potable water rinse, and final distilled water rinse. This procedure will be followed to minimize the potential for cross-contamination of soil samples. Disposable gloves will be worn during all sampling phases which require handling of samples. A new pair of gloves will be donned before handling each sample. These procedures are in accordance with *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation*, Part 3.5 and NEESA 20.2-031A Chapter 3.3.2.1.

4.2 Groundwater Well Installation and Sampling

4.2.1 Well Installation

Wells installed in the field will be logged by a field geologist during soil sampling. Each well will be constructed using 0.01-inch slot size, Schedule 40 PVC screen attached to Schedule 40 PVC riser. The wells will be screened to intercept the groundwater table.

At least 6 inches of filter pack material will be placed under the bottom of the well screen, and will extend 1 foot above the screened section. The filter pack will consist of clean, washed, 20/40 silica sand. The sand is intended to prevent clogging of the screen slots. It will be tremied through the annulus of the hollow-stem augers.

A bentonite seal (bentonite pellets hydrated with distilled water) at least 2 feet thick, will be placed on top of the sand pack to prevent infiltration of surface water down the outside of the well casing. During introduction of the sand pack and the bentonite seal, accurate measurements (± 0.2 feet) will be made to the top of the pack and the seal with a weighted steel measuring tape or the tremie pipe itself. After allowing the bentonite seal to cure at least 12 hours, the remaining annulus of the borehole will be filled with concrete.

To facilitate groundwater monitoring procedures and protect the integrity of wells in unpaved areas, approximately 2.5 feet of stickup will be left above the ground surface at each well site. A 4-foot by 4-foot by 4-foot outwardly sloping concrete platform will surround the ground surface of each well casing. Four-inch diameter steel posts will be placed at each corner of the pad to protect the well. A steel casing with a locking cap will also be installed to preserve the integrity of the well. Wells in paved areas will be finished at ground level, capped with a locking cap, and secured by a flush-mount (manhole-style) protective covering.

After completion of well construction, all new and previously existing monitoring wells will be surveyed by a State of Texas Registered Land Surveyor to the nearest 0.01 foot incorporating the closest USGS bench mark or the base coordinate system. A permanent mark will be located at the top of each well casing to aid in generating accurate and consistent groundwater elevation data.

All well installation notes, calculations, descriptions, and observations will be recorded in the project field logbook. In addition, well installation logs will be produced for each well installed. The following information will be included: total depth of boring, depth of well, screen interval, filter pack depth to top and construction materials depth to top of bentonite plug and type of bentonite, riser and screen materials and specifications, annular seal type and length of stickup.

4.2.2 Static Water Level Measurement

Static water level measurements will be made on all monitoring wells prior to purging and in accordance with NEESA 20.2-031A, Chapter 6.1.5.6, and the *Southern Division Specifications for Groundwater Monitoring Well Installation and Sampling*. Static water level measurements will be used to determine groundwater flow direction and to construct a potentiometric surface diagram of the area of investigation.

The procedure is as follows:

1. Test water level meter before use to ensure proper operation.
2. Decontaminate probe before each measurement with a deionized or distilled water rinse.
3. Lower probe into the monitoring well until the buzzer indicates the probe has intersected the groundwater surface.
4. Measure depth to the water to the nearest 0.01 foot relative to the permanent mark established at the wellhead. The depth to water will be recorded in a bound field notebook and the date and time will be noted.

4.2.3 Oil-Water Interface Measurement

Measurements for oil-water interface will be made on all wells suspected of having free product. These measurements will be used to determine the amount and location of free product at the site.

The procedure is as follows:

1. Test interface probe before use to ensure proper operation.
2. Decontamiante probe before each measurement with a deionized or distilled water rinse.
3. Lower probe into the well until the buzzer indicates the probe has intersected a liquid surface. The sound of the probe will indicate whether it has intersected free product or groundwater.

4. Measure depth to the free product/water to the nearest 0.01 foot relative to the permanent mark established at the wellhead. Record depth to free product/water in a bound field notebook, along with date and time.
5. If the probe indicates that it has intersected free product, continue to lower the probe until it indicates that it has intersected groundwater.
6. Measure depth to water to the nearest 0.01 foot relative to the permanent mark established at the wellhead. Record depth to water in a bound field notebook, along with date and time.

4.2.4 Monitoring Well Purging

Before samples are collected, each well will be purged of standing water. Purging will continue until at least three casing volumes (as calculated from static water level) have been purged from each well and water quality conditions have stabilized. If a well pumps to dryness before three casing volumes are removed, the purged volume will be noted and an explanation will be given. Well purging will be performed using a bailer, an electric submersible pump, a PVC tri-loc hand pump, or a pneumatic pump. If the well is pumped dry, it will be sampled as soon as possible after recovery. The well purging process will be used to ensure that groundwater samples representative of the aquifer under investigation are obtained.

4.2.5 Groundwater Sampling Procedures

A groundwater sample will be collected from each of the existing and proposed monitoring wells in accordance with NEESA 20.2-031A, Chapter 7 — Ground-Water Sampling. After the wells have been purged, samples will be collected using a disposable Teflon bailer and nylon bailing rope. The bailer will be slowly lowered into the water column to minimize water column disturbance and possible loss of volatile parameters. The bailer will be manually retrieved and the samples will be immediately transferred to appropriate sample containers.

4.2.6 Groundwater Sample Analyses

The TNRCC has approved the use of EPA Method 8020 with 5030 (Purge and Trap) for BTEX analyses of groundwater samples, EPA Method 418.1 for TPH analyses, and EPA Method 8310 for PAH analyses. Groundwater samples will also be analyzed for Total Dissolved Solids (TDS) utilizing EPA Method 160.1. In addition, pH, temperature, and conductivity will be measured in the field for each sample collected.

4.2.7 Groundwater Sample Documentation

Groundwater samples will be documented in accordance with NEESA 20.2-047B, Chapter 3 — Site-Specific QC Requirements, and NEESA 20.2-031A, Chapter 6 — Monitoring Well Data Record Requirements, and as discussed in Section 5 of this QAP. E/A&H personnel will use site-specific, bound logbooks for all field records pertaining to the investigation. These records will document all visual observations, calculations, and equipment calibrations. Every entry will be dated and the time for each entry noted. The logbooks are record documents that will be properly maintained and retained as part of the project files.

4.2.8 Groundwater Sampling Equipment Decontamination

Equipment used in measuring and sampling groundwater monitoring wells will be decontaminated in accordance with *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation*, Part 3.5 and NEESA 20.2-031A, Chapter 3.3 — Aquifer Protection requirements. Before site activities begin, it will be necessary for all bailers, pumps, and the water level indicator to be decontaminated using a potable water/detergent wash, followed by a potable water rinse, and a final distilled water rinse. Sampling and pumping equipment will be decontaminated in the same manner between samples. This procedure will be followed to minimize the potential for cross-contamination of samples between sampling locations. Disposable gloves will be worn during all measurement and sampling activities. A new pair of disposable gloves will be donned for each water sample and/or measurement.

5.0 FIELD DOCUMENTATION

The field project manager will be thoroughly familiar with appropriate documentation procedures. He or she will perform or directly oversee completion of the documents accompanying this investigation. Documentation tasks will be performed on a sample-by-sample or item-by-item basis throughout the day. Sample container labels and chain-of-custody forms will be prepared as completely as possible in advance.

General Field Documentation Procedures

1. Complete all documentation in waterproof black ink.
2. Mark through corrections with a single line, then date and initial the correction.
3. Do not destroy or discard serialized documents, even if they are illegible or inaccurate.
4. Maintain voided entries within project files.

Field documentation consists of a site-specific field logbooks, field forms, photographs, sample labels, and chain-of-custody records. This allows detailed data to be recorded in various field logbooks and/or forms and cross-referenced.

5.1 Logbooks

Logbooks provide a daily handwritten record of all field activities at an investigation site. All logbooks must be permanently bound and have a hard cover. Field logbooks must be waterproof. The logbooks are detailed daily records kept in real time. Additionally, a sample logbook will be prepared detailing the samples collected each day, but in less detail than the chain-of-custody.

Field Logbooks: A logbook should be dedicated to an individual project. The name of the field sampling team leader and that of all team members, as well as the project name and project code should be entered on the inside of the front cover of the logbook. All entries should be dated and recorded. At the end of each day's activity, or entry of a particular event if appropriate,

a sampling team member should draw a diagonal line at the conclusion of the entry and initial the entry to indicate the conclusion of the entry or the day's activity. Copies of field logbooks will be made regularly to act as a backup.

All aspects of sample collection and handling as well as visual observations shall be documented in the field logbooks. Sample collection equipment (where appropriate), field analytical equipment, and equipment used to make physical measurements shall be identified in the field logbooks. Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment shall also be recorded in the field logbooks. Field analyses and measurements must be traceable to the specific piece of field equipment used and to the field sampling team member(s) collecting the sample, making the measurement, or analyses. Well abandonment procedures, where necessary, will be recorded and documented.

Entries in field logbooks shall be dated, legible, and contain accurate and inclusive documentation of an individual's project activities. Because field records are the basis for later written reports, language should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. Once completed, these field logbooks become accountable documents and must be maintained as part of project files.

Sample Logbook: A sample logbook will compile a record of samples collected and shipped (including QA/QC samples), analyses requested, the airbill number of the shipment, and any pertinent information concerning sample status.

5.2 Field Data Record Forms

Forms to be used during this investigation include subsurface boring logs, monitoring well construction diagrams, monitoring well development forms, sample records, and additional data as appropriate. Do not leave blank spaces on completed forms. If information on a form does not apply, mark the space "N/A." Complete all forms in the field as the task is performed.

Copy forms regularly for backup. Field forms to be used during this investigation are discussed below.

5.2.1 Sample Labels

Attach completed sample labels to each sample container immediately after sample collection. Refer to Section 6.4 of this plan for labeling instructions. Sample label information (at least sample identification number and time of collection) will be recorded in the field logbook as a cross-reference at the time of collection.

5.2.2 Chain-of-Custody Records

The chain-of-custody record will summarize the contents of the shipment, dates, times, sample numbers, number and volume of sample containers; its purpose is to document the transfer of sample custody. See Section 6.6 of this QAP for chain-of-custody transfer instructions.

5.2.3 Subsurface Boring Logs

Soil boring logs will be prepared by a qualified E/A&H geologist. Lithology will be described from split-spoon samples and auger cuttings using the Unified Soil Classification System (USCS). Subsurface boring logs will be completed as the boring is advanced. Items to be recorded include materials encountered, depth to water, obvious contamination, and any other necessary
information.

5.2.4 Well Construction Diagrams

A monitoring well construction diagram will summarize the monitoring well construction. Data to be completed includes location, date drilled, drilling method, well depth, screen location, and general construction data. A general log will also be recorded in the field logbook as a cross-reference.

5.3 Photographs

Photographs will be taken of all pertinent field activities as directed by the Field Project Manager. The information listed below will be recorded in the field logbook:

- Date, time, location, and name of photographer.
- Description of photograph and orientation.
- Number of photographs on film roll.

After the film is developed, this information will be written to the back of each photograph.

6.0 MANAGING SAMPLES

This section describes the types of sample containers, methods of sample preservation and packaging procedures to be used.

6.1 Sample Containers, Preservatives, Holding Times

Table 6-1 provides information on sample container type and size, preservation requirements, and holding times. The appropriate number of pre-cleaned sample containers, preservatives, and trip blank samples will be obtained from a NEESA-approved laboratory.

Table 6-1
Sample Containers, Preservation and Holding Times

Analytical Method	Sample Matrix	Container Size/ Material	Sample Preservation	Holding Time
BTEX EPA Method 8020	Water	(3) 40-ml glass vials with Teflon lined septa	pH<2 with HCL, Chill (4 °C, ± 2 °C)	14 days until sample analysis
TPH EPA Method 418.1	Water	(1) 1-liter glass jar with Teflon lined lid	pH<2 with HCL, Chill (4 °C, ± 2 °C)	28 days until sample analysis

Table 6-1
Sample Containers, Preservation and Holding Times

Analytical Method	Sample Matrix	Container Size/ Material	Sample Preservation	Holding Time
PAH EPA Method 8310	Water	(1) 1-liter glass jar with Teflon lined lid	Chill (4 °C, ± 2 °C)	Extract within 7 days/ Analyze within 40 days
TDS EPA Method 160.1	Water	(1) 250-ml glass bottle with Teflon lined lid	Chill (4 °C, ± 2 °C)	7 days until sample analysis
BTEX EPA Method 8020	Soil	(1) 4-oz glass jar with Teflon lined lid	Chill, 4 °C (± 2 °C)	14 days until sample analysis
TPH EPA Method 418.1 and 8015 (Modified)	Soil	(1) 4-oz glass jar with Teflon lined lid	Chill, 4 °C (± 2 °C)	28 days until sample analysis
PAH EPA Method 8310	Soil	(1) 4-oz glass jar with Teflon lined lid	Chill, 4 °C (± 2 °C)	Extract within 14 days/ Analyze within 40 days

6.2 Sample Preservation

Samples will be chemically preserved as described in Table 6-1. All samples requiring chemical preservation will be prepreserved either before sample collection or immediately after collection in the field.

Procedures

1. Ensure that the samples are not over-preserved because courier services may consider them dangerous goods requiring shipment in accordance with International Air Transport Association (IATA) Dangerous Goods Regulations. As a general rule, four drops of acid will preserve a 40-ml VOA sample and 40 drops of acid will preserve a 1-liter bottle.

2. When testing sample pH, use a disposable pipette to withdraw an aliquot of sample and place in a separate container. Place the pH paper into the separate container to determine the pH.

6.3 Packaging Samples for Shipment

All samples will be packed for shipment according to the steps listed below to avoid breakage and prevent cross-contamination.

Before Packaging Samples

1. Select a cooler in good condition. Seal the drain plug on the inside and outside of the cooler with tape to prevent leakage.
2. Line the cooler with a large plastic bag.

While Packaging Samples

1. Place one sample container in one sealable plastic bag. VOA vials may be bagged together.
2. To prevent breakage, either:
   - Wrap samples in bubble-wrap packing material. Seal bubble wrap around the containers with tape. Bubble wrap is not required for plastic containers, but take care when packing the coolers so containers do not directly touch each other;

     Or
   - Place 2 to 4 inches of inert packing material (i.e., vermiculite or cellulose insulation) on bottom of the cooler. Place the bagged containers inside the cooler so the bottles do not touch. Completely fill any remaining space with inert packing material.
3. Fasten the top of the large plastic bag with tape.
4. Include a temperature strip in each sample cooler.
4. Place double-bagged ice inside cooler to preserve the samples to 4°C.

5. Place a chain-of-custody record describing the contents of each cooler in a sealable plastic bag and place it inside each cooler.
6. Seal the cooler with tape and custody seals so it cannot be opened without breaking the seal.

Labeling the Package

1. Clearly print "This End Up" or "This Side Up" on top of the cooler, and place upward pointing arrows on sides of the cooler.
2. Mark cooler with the addresses of both shipper and receiver.
3. If more than one cooler is to be shipped, mark with the sequential cooler number and the total number of coolers (e.g., 1 of 3, 2 of 3, and 3 of 3).

6.4 Sample Labeling

Labels will be affixed to each sample container. A sample label is provided in Figure 6-1. Labels will include site, sample identification, collection time and date, method of preservation, sampler identification, and the analyses to be conducted.

Figure 6-1
Sample Label

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EnSafe/Allen & Hoshall
(901) 383-9115

Site:	NAS Corpus Christi
Sample Number:	
Preservative:	4°C
Analysis:	
Date:	
Time:	
Sampler:	

6.5 Sample Custody

Sample custody or possession will be traceable from the time the sample is collected to its delivery at the analytical laboratory. This section provides general instructions on maintaining chain-of-custody. Exceptions are outlined below.

Maintaining Field Custody

1. After collecting samples, label and seal the sample jar with a custody seal (Figure 6-2).
2. Affix the seal so that samples cannot be opened without breaking.
3. Sign and date the seal (sampler).

Chain-of-Custody Record

The chain-of-custody form will be used to record custody of the samples. An example of the chain-of-custody form is provided in Figure 6-3. Record the necessary information on the chain-of-custody clearly in non-erasable, waterproof, black ink. Use zeros and sevens with slashes through them to avoid confusion with Os and Is. Correct errors on the chain-of-custody by marking through with a single line. Initial the error and then record the correct information. The following information will be recorded in the appropriate spaces on the form.

Information about EnSafe/Allen & Hoshall:

- Client name (E/A&H) and address.
- Project Name/Number (NAS Corpus Christi/Control Task Order [CTO] Number).
- Project Manager's Name.
- Signature of Sampler(s).

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5724 SUMMER TREES DR. MEMPHIS, TN. 38134 •(901)372-7962
NASHVILLE, TN., PENSACOLA, FL., AND RALEIGH, NC.

OFFICIAL SAMPLE SEAL

SAMPLE #	DATE:	SEAL BROKEN BY:
SIGNATURE:		DATE:
PRINT NAME & TITLE:		

QUALITY ASSURANCE PLAN
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 6-2
CUSTODY SEAL

DWG DATE: 1/25/95 | DWG NAME: 0502161H

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QUALITY ASSURANCE PLAN
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 6-3
CHAIN OF CUSTODY RECORD

PAGE _____ OF _____

CLIENT _____ PROJECT MANAGER _____

ADDRESS _____ TELEPHONE NO. _____

PROJECT NAME/NUMBER _____ FAX. NO. _____

MEDIA STATUS: (A, B, OR C) _____ SAMPLERS: (SIGNATURE) _____

FIELD SAMPLE NUMBER	DATE	TIME	SAMPLE TYPE	TYPE/SIZE OF CONTAINER	PRESERVATION		NO. OF CONTAINERS	ANALYSIS REQUIRED							REMARKS
					TEMP.	CHEMICAL									

RELINQUISHED BY:	DATE	RECEIVED BY	DATE	RELINQUISHED BY:	DATE	RECEIVED BY	DATE
SIGNATURE _____		SIGNATURE _____		SIGNATURE _____		SIGNATURE _____	
PRINTED _____	TIME	PRINTED _____	TIME	PRINTED _____	TIME	PRINTED _____	TIME
COMPANY _____		COMPANY _____		COMPANY _____		COMPANY _____	
REASON _____		REASON _____		REASON _____		REASON _____	

METHOD OF SHIPMENT: _____
SHIPMENT NO. _____
SPECIAL INSTRUCTION: _____

COMMENTS: _____

AFTER ANALYSIS, SAMPLES ARE TO BE:
- ☐ DISPOSED OF (ADDITIONAL FEE)
- ☐ STORED (90 DAYS MAX)
- ☐ STORED OVER 90 DAYS (ADDITIONAL FEE)
- ☐ RETURNED TO CUSTOMER

05021610

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Information about the Sample:

- Field sample identification (as described in previous section).
- Date and time of collection (24-hour clock).
- Type of sample.
- Type and size of sample containers.
- Preservation temperature and chemical.
- Number of sample containers per sample.
- Type of laboratory analysis required.
- Comments such as "strong odor" etc., go in the remarks section.
- Samples to be used for MS/MSD will be indicated in the "Remarks" section.

Information about Transfer, Shipment and Disposal:

- When sample custody is transferred, document it in the appropriate section of the form.
- The person relinquishing custody must print his or her name, company name, reason for the transfer, date, time, and signature on the form.
- Note the method of shipment and the air-bill number of the shipment on the chain-of-custody form.
- During shipment, seal the chain-of-custody form in a plastic bag and secure inside the shipping cooler.
- Note any special instructions (e.g., priority turnaround) or comments in the appropriate section of the chain-of-custody and discuss them with the laboratory before collection and shipment.
- Note sample disposal or storage instructions after completing laboratory analysis.

6.6 Chain-of-Custody Transfer

General instructions for transferring custody and shipping of samples are listed below.

Transferring Custody

1. Record the air-bill number in the appropriate section on the chain-of-custody record and in the field notebook. Seal the chain-of-custody form in a plastic bag and place it inside the shipping cooler before closing.
2. Secure shipping coolers with tape and place a custody seal on each side of the cooler's exterior to prevent opening without breaking the seal.
3. Ship samples overnight to the selected analytical laboratory.
4. When relinquishing custody to a shipper, advise the laboratory of any time constraints on analysis. Notify the laboratory as early in the week as possible regarding samples intended for Saturday delivery.

Laboratory Sample Receipt Procedures

1. A sample custodian accepts custody of the shipped samples from the carrier and enters data about the package into a receipt log, including the status of the custody seals on the coolers.
2. The laboratory sample custodian opens the shipping coolers, checks the contents, logs in the samples, and verifies that the information on the chain-of-custody agrees with samples received.
3. The custodian records information such as shipment, pickup, and courier on the "Remarks" section of the chain-of-custody record. The custodian also documents temperature of the cooler by checking the temperature strip, as well as the general condition of sample containers.
4. The analyst verifies sample preservation before extraction, digestion, or analysis and records pH.
5. If samples are improperly preserved, the LQAC records this fact, along with the sample identification and other pertinent information, and notifies the task order manager and site manager. All other QA/QC discrepancies are handled similarly and must be documented as an out-of-control event with the corrective action taken.

7.0 DECONTAMINATION

Specific details on decontamination procedures have been specified in Sections 4.1.4 and 4.2.7 of this QAP. General guidance is provided in this section to support the previously outlined decontamination activities.

The detergent for use on this project will be Liquinox because it contains powerful chelating agents to bind and remove trace metals from sampling equipment. When available, hot water will be used for field decontamination. A stainless-steel bowl, sink, or bucket will be used to contain the clean water wash solution. PVC well construction materials will not be solvent-rinsed or washed with hot water. Field reagent grade water will be distilled water. The steam cleaner and/or high-pressure hot water washer will be capable of generating adequate pressure and producing hot water and/or steam. All wastes generated during decontamination will be containerized in designated drums for disposal.

7.1 Decontamination Area Setup

Decontamination generally will occur at a designated area downgradient and downwind of the clean equipment storage area. Liquids contained within the decontamination area will be pumped regularly into designated drums. All equipment will be cleaned on saw horses or auger racks above the concrete surface. If field cleaning is necessary, place plastic sheeting on the ground designated as the decontamination area to contain any spills.

7.2 Cross-Contamination Prevention

Follow procedures below to reduce cross-contamination risk during decontamination.

1. Don a new pair of disposable outer gloves before handling sampling equipment.
2. Use only Teflon, glass, or stainless-steel spray bottles/pressurized containers to apply decontamination rinsates. Keep each solution in a separate container.
3. Transport all necessary decontaminated field equipment to each designated location to minimize the need for field cleaning.

7.3 Non-sampling Equipment

Non-sampling equipment includes drill rigs and backhoes. Any paint or coatings (e.g., rust) potentially touching a sample will be removed from the equipment by sandblasting before the equipment is brought to the site.

1. Decontaminate with high-pressure steam.
2. If necessary, scrub with a laboratory-grade detergent and clean water wash solution.
3. Rinse with clean water as necessary.

7.4 Sampling Equipment

Sampling equipment includes any downhole equipment (e.g., augers, drill pipe, split-spoon samplers, bailers) and any sampling utensils (e.g., stainless-steel spoons, stainless-steel spatulas, stainless-steel bowls, pumps) not dedicated to the sample location. Hollow downhole equipment or equipment with holes potentially transmitting water or drilling fluids will be cleaned on the inside and outside.

1. Don protective gloves before decontaminating the equipment.
2. Wash and scrub with a laboratory-grade detergent and clean water wash solution or decontaminate with high-pressure steam.
3. Rinse with clean water.
4. Rinse with distilled water.
5. Rinse twice with pesticide-grade isopropyl alcohol.
6. Rinse with distilled water.
7. Air dry. If weather prohibits air drying, repeat the isopropyl alcohol rinse and final distilled water rinse twice.
8. Wrap in aluminum foil or plastic sheeting for storage if the sampling equipment is to be stored or transported.
9. Augers and drill rods will be covered in clean plastic after decontamination.

Pump Decontamination

Pump decontamination differs from decontaminating most sampling equipment. The pump exterior and interior both require decontamination. The procedures for decontaminating the interior and exterior of the pump are outlined below:

1. Don protective gloves before decontaminating the equipment.
2. Immerse pump head in a detergent solution with the effluent hose prepared to discharge into a liquid investigation-derived waste (IDW) drum. A stainless-steel bucket or closed 4-inch pipe can be used to contain the pump head and pump solutions. All pump effluent will be containerized IDW.
3. Using a brush, scrub the exterior of the pump and hose with the detergent solution. Rinse the exterior of the hose with a clean water rinse solution followed by a distilled water rinse. Recoil the hose onto the spool.
4. Pump distilled water through the hose to purge the clean water rinse solution. Purge additional distilled water through the hose with the pump in reverse.
5. Rinse the outside of the pump housing and hose with deionized water.
6. Wrap the pump in plastic sheeting for transport to the field or for storage to prevent cross-contamination.

7.5 Personal Decontamination

Personal decontamination procedures are outlined in the Health and Safety Plan associated with this site.

8.0 ANALYTICAL PROCEDURES

This investigation will follow the analytical procedures described below.

8.1 Field Analyses

Soil sample screening will be performed as outlined in Section 4.1.1 of this QAP. Static water will be measured on all monitoring wells after the wells are developed and after adequate time has been allowed for well recharge. In addition, pH, temperature, and conductivity will be measured in the field for each water sample collected.

Monitoring well casing (tops) will be surveyed (spatial and horizontal orientation) by a State of Texas registered land surveyor. The survey measurements will be recorded relative to the USGS closest USGS bench mark or the base coordinate grid system.

Field measurements will be recorded in a dedicated field logbook and/or appropriate E/A&H field activity log (e.g., boring log, well construction log).

8.2 Laboratory Analyses

Selected soil samples collected during the course of this investigation will be analyzed for BTEX using EPA Method 8020 with EPA Method 5030 (Purge and Trap). The soil samples will also be analyzed for TPH using EPA Method 418.1 after preparation with EPA Method 3540 (Soxhlet extraction) or 3550 (Sonication extraction), and using EPA Method 8015 (Modified). Soil samples will also be analyzed for PAH using EPA Method 8310 as described in SW-846.

All groundwater samples collected during this investigation will be analyzed using EPA Method 8020 with 5030 (Purge and Trap) for BTEX, EPA Method 418.1 for TPH, and EPA Method 8310 for PAH analyses. Groundwater samples will also be analyzed for TDS in accordance with EPA Method 160.1.

9.0 DATA PACKAGES

9.1 Field Data Package

The field data package will include all field records and measurements obtained at a site by E/A&H personnel in accordance with *SOUTHDIV Guidelines for Groundwater Monitoring Well Installation*, Parts 3.4 and 4.0 and NEESA 20.2-047B, Chapter 7.2 — Deliverables and NEESA 20.2-031A, Chapter 6 — Monitoring Well Data Record Requirements. The package, including all field records and measurements obtained at the site by E/A&H sampling personnel, is validated by conducting the following:

- A review of field data contained on water and soil sampling logs for completeness. Failure in this area may result in the data being invalidated for litigation or regulatory purposes.
- A verification that field blanks, sampling equipment rinsate blanks, and trip blanks were properly prepared, identified, and analyzed. Failure in this area may compromise the analytical data package and result in some data being considered qualitative or invalid.
- A check on field analyses for equipment calibration and condition. Failure in this area may result in the field measurements being invalidated.
- A review of chain-of-custody forms for proper completion, signatures of field personnel and the laboratory sample custodian, and dates. Failure in this area may result in the data being invalidated for litigation or regulatory purposes.

The field data package will be reviewed by the project QA Officer for completeness and accuracy.

9.2 Analytical Data Package

Validation of the analytical data package will be performed by the project QA Officer before submittal to the NCR. The validation steps will be performed by applying applicable EPA Laboratory Data Validation Functional Guidelines for Evaluating Organics and Inorganics

Analyses (Technical Directive Document No. HQ-8410-01) and EPA precision and accuracy statements for the analytical methods employed. NEESA 20.2-047B, Chapter 7.3 guidelines will be applied to all Level C data validation procedures.

The analytical data package validation procedure includes review of the following:

1. Compare the data package to the reporting level requirements designated for the project, to confirm completeness.
2. Compare sampling dates, sample extraction dates, and analysis dates to check that samples were extracted and/or analyzed within the proper holding times. Failure in this area may render the data unusable.
3. Review analytical methods and required detection limits to verify that they agree with the QAP and the laboratory contract. Failure in this area may render the data unusable.
4. Review field and laboratory blanks to evaluate possible contamination sources. The preparation techniques, frequencies, and analytical results (if appropriate) will be considered.
5. Evaluation of all blanks (rinsate blanks, field blanks, trip blanks, reagent blanks, method blanks, and extraction blanks) to confirm freedom from contamination at the specified detection limit. All blank contaminants must be explained or the data applicable to those blanks labeled suspect and sufficient only for qualitative purposes.

10.0 ANALYSIS

10.1 Field Parameters

The QA/QC objectives for parameters to be measured in the filed are presented in Table 10-1. QA/QC targets for other measurements are based on the manufacturer's specifications pertaining to precision and accuracy of the instrument.

Table 10-1
Field Measurements

Field Measurements	Matrix	Precision	Accuracy	Completeness
pH	Water	± 0.5 Std. Units.	± 0.2 Std. Units	90%
Temperature	Water	± 1.0° C	± 0.2° C	90%
Specific Conductivity	Water	± 10%	± 1% of full scale	90%
PID/FID	Air	± 10 ppm	± 2 ppm	90%
Static Water Level	Water	± 0.01 ft.	± 0.05 ft.	90%
Wellhead Points	Spatial	± 5%	± 0.1 ft.	90%
	Vertical	± 0.05 feet	± 0.01 ft.	90%

Field Measurement References:

- **pH, Temperature, and Specific Conductivity:** Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, Revised March 1983.
- **PID/FID:** Manufacturer's Standard Operating Procedures (SOP) for operation of Photovac MicroTIP, Foxboro OVA, and HNu.
- **Wellhead Points:** Standard Land Surveying Methods in accordance with National Geodetic Survey.

10.2 Calibrating and Standardizing Equipment

Field measurement instruments will be calibrated at least twice daily (before use and at the end of the day) according to the manufacturer's specifications. Instruments also may be calibrated during the day if field personnel consider it necessary. Tracing each standard to National Institute of Standards and Technology (NIST) will be based upon the forms and product-specific information provided by the standard manufacturer/supplier. Instrument calibration will be recorded in the field logbook or calibration forms, and calibration procedures and calculations will be recorded on the calibration log forms in Figures 10-1 to 10-3.

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Figure 10-1
Calibration Log — pH Meter

pH Meter:

Model: _____ Date/Time: _____

Serial Number: _____ Checked by: _____

Instrument Checklist:

	YES	NO
Is the instrument clean and in good condition?	___	___
Is the battery charge acceptable?	___	___
Is the liquid crystal display (LCD) functioning properly?	___	___
Is the probe filled with proper solution?	___	___
Are there any visible cracks or problems with the probe?	___	___

Two- or Three-point Calibration

	Reading	Lot #	Expiration Date
Buffer 4.0:	_____	_____	_____
Buffer 7.0:	_____	_____	_____
Buffer 10.0:	_____	_____	_____
Initial Slope:	_____		

Remarks:

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Figure 10-2
Calibration Log — Conductivity Meter

Conductivity Meter

Model: _____ Date/Time: _____

Serial Number: _____ Checked by: _____

Instrument Checklist:

	YES	NO
Is the instrument clean and in good condition?	_____	_____
Is the battery charge acceptable?	_____	_____
Is the liquid crystal display (LCD) functioning properly?	_____	_____
Is the conductivity cell clean?	_____	_____
Are there any visible cracks or problems with the probe?	_____	_____

Conductivity Calibration Standards:

Source:_____ Date of Receipt:_____ Lot #/Expiration:_____

Two-point Calibration

	NIST Lot #	
100 μmhos/cm Solution:	_____	_____
1000 μmhos/cm Solution:	_____	_____

Temperature: _____ Instrument internal calibration: _____

Remarks:

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Figure 10-3
Calibration Log — PID/FID/OVA Meter

PID/FID/OVA Meter:

Model: _____ Date/Time: _____

Serial Number: _____ Checked by: _____

Instrument Checklist:

	YES	NO
Is the instrument clean and in good condition?	_____	_____
Is the battery charge acceptable?	_____	_____
Is the readout display functioning properly?	_____	_____
Are there any visible cracks or problems with the meter?	_____	_____
Does ultraviolet lamp window or dust filter need cleaning?	_____	_____

PID/FID/OVA Calibration Standards:

Span Gas Type/Source: _____

Date of Receipt: _____

Lot #/Expiration: _____

Remarks:

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Calibrating and Standardizing Temperature Probes

1. Initially, calibrate all thermometers against a NIST-certified thermometer or one traced to National Bureau of Standards (NBS) certification. Do not use glass mercury-filled thermometers.
2. Test temperature probes for calibration quarterly by checking the unit against a NIST-certified thermometer. If values do not fall within specified ranges listed in Table 10-1, do not use the probe; return it to the manufacturer for service.

Calibrating and Standardizing pH Meters

1. Check the pH meter before use for any mechanical or electrical failures, weak batteries, and cracked or fouled electrodes.
2. Standardize the pH meter before use each day in the field using a 2-point calibration. The meter slope will be checked initially using pH 4, 7, or 10 buffer solutions, depending on the expected pH value of the samples to be analyzed. A meter slope outside the range of 85 to 115 percent indicates meter or probe failure or that a temperature correction is needed (it is possible that the temperature of the probe is different from the temperature of the sample). The calibration check process will be repeated between sampling locations using one of two initial buffer solutions. Record the calibration in the field logbook, and all calibration procedures and calculations on the calibration log in Figure 10-1.

Calibrating and Standardizing Specific Conductivity

1. Refer to the designated cell constant of the conductivity cell in the manufacturer's instruction book. Determine the actual cell constant each day before use.
2. Use a conductivity calibration solution to check the cell constant. If the values obtained during the check are within specification, any measured deviation will be used to extrapolate a more accurate sample reading as outlined in the manufacturer's instructions.

If the check values are out of specification, the cell will be returned to the manufacturer for repair.

3. Check each conductivity meter before use to ensure that the probe is intact, the batteries are sufficiently charged, and the cell is clean. Calibration procedures entail checking the conductivity cell with one potassium chloride standard in the expected range of the sample(s) to be collected.
4. If the conductivity meter does not automatically compensate for temperature, manually recalibrate it to account for temperature.
5. Record the calibration in the field logbook, and all calibration procedures and calculations on the calibration log in Figure 10-2.

Calibrating and Standardizing Photo/Flame Ionization Detectors (PID/FID) and Organic Vapor Analyzers (OVA)

1. Calibrate the PID/FID/OVA quarterly using the kit provided by the manufacturer. Alternatively, rented instruments will be returned to the manufacturer/rental company for quarterly calibration.
2. Calibrate each PID/FID/OVA both before use and at the end of the day with the calibration span gas specified by the manufacturer.
3. Record background readings at the site.
4. Clean the instrument's exterior quarterly by wiping with a damp cloth, using a mild detergent when necessary.
5. Correct all field readings for ambient background readings by subtracting the measured background reading from the field reading. ***Under no circumstances will the meter be zeroed based on ambient conditions at the site.***
6. Recharge the instrument's battery when the low-battery indicator appears. The instrument should be allowed to fully discharge before fully recharging. This will maximize its operating time.

7. Record the calibration in the field logbook, and all calibration procedures and calculations on the calibration log in Figure 10-3.

Quality Assurance Targets for Precision and Accuracy in the Field

Precision and accuracy targets for pH, temperature, and specific conductivity measurements are specified in Table 10-1. QA targets for other measurements are based on manufacturer's information pertaining to the precision and accuracy of the associated instruments.

10.3 Laboratory Analysis

Parameters and Analytical Methods to be Used:

Parameters and analytical methods are presented in Table 6-1. Samples will be analyzed in accordance with the applicable methods as outlined in *Test Methods for Evaluation of Solid Waste (Physical/Chemical Methods), SW-846*, Third Edition, September 1986. Additional analytical methods for potentially analyzed parameters not included in the SW-846 analyses are listed below.

Additional Methods for Laboratory Analysis:

- *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater*, 40 Code of Federal Regulations (CFR) Appendix A to Part 136, July 1987.
- *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, Revised March 1983.

The analytical laboratory will calibrate instruments according to protocols of the specified method to be performed.

10.4 QA Targets for Laboratory Precision and Accuracy

Project QA objectives for analytical parameters for soil and groundwater are stipulated in the respective analytical methods and as determined by the analytical laboratory's historical data

quality evaluation for these methods. The NEESA laboratory approval process ensures laboratory method QA/QC standards are appropriate to meet goals for intended data uses. General QA goals for these methods are presented in Tables 10-2.

Table 10-2
Laboratory Measurements

Measurement Parameter	References	Matrix	Precision[c] (%)	Accuracy[c] %Recovery	Completeness (%)
BTEX	EPA 8020[a]	Water	± 25%	± 40%	90
Total Petroleum Hydrocarbons	EPA 418.1[b]	Water	± 35%	± 55%	90
Polycyclic Aromatic Hydrocarbons (PAH)	EPA 8310[a]	Water	± 35%	± 45%	90
BTEX	EPA 8020[a]	Soil	± 35%	± 40%	90
Total Petroleum Hydrocarbons	EPA 418.1[b] and 8013[a]	Soil	± 35%	± 55%	90
Polycyclic Aromatic Hydrocarbons (PAH)	EPA 8310[a]	Soil	± 35%	± 45%	90

Notes:
[a] - SW-846
[b] - Methods for Chemical Analysis of Water and Wastes, EPA-600/4/79-020, Revised March 1983
[c] - Precision and Accuracy goals are subject to change based upon specific method data quality history for the analytical laboratory chosen.

Precision is an estimate of the reproducibility of a method, and is estimated by several statistical tests: the Standard Deviation of the error distribution, the Coefficient of Variation and the Relative Percent Difference between replicate (duplicate) samples. E/A&H will determine the precision of a method by analyzing replicate data.

Precision is then defined by the Coefficient of Variation (CV), which expresses the Standard Deviation as a percentage of the mean. An indicator of CV, Relative Percent Difference will

serve as quality criterion for classification of data resulting from this investigation. Specific statistical comparison of duplicate samples (field and laboratory), as a measure of precision evaluating both sample collection procedures and laboratory instrument performance, may be accomplished by first comparing the obtained duplicate results with the published EPA criteria for method precision (Relative Percent Difference).

The accuracy of a method is an estimate of the difference between the true value and the determined mean value. Specific statistical comparison of Percent Recovery values reported by the laboratory as a measure of method accuracy will be compared with the published EPA (or other appropriate regulatory entity) criteria for the accuracy of an individual method.

Data completeness will be expressed both as the percentage of total tests conducted and required in the scope of work that are deemed valid. Methods for assessing data precision, accuracy, and completeness by the laboratory will be outlined in the approved laboratory QA Plan.

11.0 PERFORMANCE AND SYSTEM AUDITS

Audits will be performed before and during the work to evaluate the capability and performance of the entire system of measurement and reporting, i.e., experimental design, sampling (or data collection), analysis, and attendant quality control activities.

11.1 Field System Audits

The Site Project Manager is responsible for evaluating the performance of field personnel and general field operations and progress. The Site Project Manager will observe the performance of the field operations personnel during each kind of activity such as water-level readings and sampling rounds. A formal systems audit of field operations personnel by the corporate QA officer will be performed on a biannual basis (for all projects) and a field audit report of each sampling team member will be maintained on file by E/A&H. Where applicable, these audits

will ensure that field operations are being conducted in accordance with NEESA 20.2-031A guidelines.

11.2 Laboratory Systems Audit

A laboratory systems audit is routinely conducted at least annually by E/A&H. These audits test methodology and assure that systems and operational capability is maintained. They also verify that quality control measures are being followed as specified in the laboratory written standard operating procedures and Quality Assurance Plan. The Systems Audit Checklist used by the EPA Contract Laboratory Program (CLP) forms the procedural basis for conducting these audits.

Laboratory initiated audits will be conducted in accordance with guidelines set forth in NEESA 20.2-047B, and the laboratory QA Plan as approved by the NCR. Under NEESA 20.2-047B guidelines, the project NCR is also responsible for laboratory inspections to ensure compliance with NEESA laboratory requirements.

11.3 Performance Evaluation Audits

A performance evaluation (PE) audit evaluates a laboratory's ability to obtain an accurate and precise answer in the analysis of known check samples by a specific analytical method. Following the analytical data validation described in Section 9.2, a performance evaluation audit of the laboratory may be conducted by E/A&H. This audit may be conducted if it is determined that the quality assurance data provided are outside acceptance criteria control limits. PE audits may include a review of all raw data developed by the laboratory and not reported (laboratory non-reportables) and the submission of blind spiked check sample for the analysis of the parameters in question. These check samples may be submitted disguised as field samples (the laboratory will not know the purpose of the samples), or the samples may be obvious (known) check samples that are EPA or National Bureau of Standards (NBS) traceable. PE audits may also be conducted by reviewing the laboratory's results from round-robin certification testing and/or EPA CLP evaluation samples. An additional component of PE audits includes the review

and evaluation of raw data generated from the analysis of PE samples and actual field samples that may be in question.

11.4 Regulatory Audits

It is understood that E/A&H field personnel and subcontract laboratories are also subject to quality assurance audits by the EPA and the NCR. The NCR (under NEESA guidelines) will conduct laboratory inspections prior to approval for participation in any NEESA project, and will provide performance samples to the laboratory for approval purposes.

APPENDIX H

SITE HEALTH AND SAFETY PLAN

Comprehensive Long-Term
Environmental Action Navy
Naval Air Station
Corpus Christi
CTO-0102

Appendix B
Site-Specific Health and Safety Plan for Final Contamination Assessment

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina

SouthDiv Contract No.:
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Attachment D	Material Safety Data Sheets

1.0 INTRODUCTION

The following is designed to assure the safety and health of site workers throughout the completion of activities related to the U.S. Navy CLEAN Program field investigation for Fuel Farm 216 at Naval Air Station (NAS) Corpus Christi. The Navy project contract number with EnSafe/Allen & Hoshall (E/A&H) is *N62467-89-D-0318.*

This document is organized to provide site workers concise discussions of site conditions and expected hazards. Section 4.0, Chemical Hazards and Section 5.0, Physical Hazards, will identify each of the hazards expected to be encountered throughout the Fuel Farm 216 investigation and will specify the procedures and controls to abate those hazards. Copies of this SHASP should be onsite during all field operations.

The provisions of this plan are mandatory for E/A&H personnel, who must read this plan and sign the acceptance form (see Attachment A) before starting site activities. In addition, personnel will adhere to the most current requirements of Title 29 Code of Federal Regulations (CFR) 1910.120, Standards for Hazardous Waste Operations and Emergency Response (HAZWOPER), as specified for workers involved with corrective actions under RCRA.

All non-E/A&H personnel present in E/A&H work areas shall either adopt and abide by this SHASP or shall have their own safety plan which, at a minimum, meets the requirements of E/A&H's plan. Subcontractors who adopt the provisions of this plan will be wholly responsible for enforcing the requirements with their employees and shall provide each employee with personal protective equipment (PPE) and implement controls as specified in the SHASP.

This SHASP applies to specific planned activities and procedures such as invasive tank closure verification, soil boring, installing groundwater wells, surveying, and collecting soil, groundwater, surface water, and sediment samples. Non-routine procedures and tasks involving non-routine hazards are not adequately addressed in this plan. Examples of such procedures are:

- Confined space entry
- Trenching
- Sampling, handling, or removing unidentified drums

Should it be necessary to conduct these or other high-risk tasks, specific health and safety procedures must be developed, approved, and implemented before proceeding.

2.0 SITE CHARACTERIZATION

2.1 Work Zones

Site control for all work zones will be established and maintained according to the recommendations in the U.S. Environmental Protection Agency's (EPA's) *Occupational Safety & Health Guidance Manual for Hazardous Waste Site Workers*, October 1985. Accordingly, three zones of operation, described below, will be established to reduce chemical exposures to E/A&H personnel , the general public, and to reduce the potential for contaminant migration. The three zones are identified as the:

- Exclusion zone (EZ) or hot zone;
- Contamination reduction zone (CRZ); and
- Support Zone (SZ).

Field personnel shall enter the SZ and don their personal protective equipment (PPE), then they will move through the CRZ and into the EZ. After completing their work, or when taking a break, they will leave the EZ through the CRZ. In the CRZ they will decontaminate themselves and their equipment and leave the work area through the SZ.

The exclusion zone is the area being investigated, sampled or otherwise of interest. It is where chemical contamination is known or suspected to exist. The EZ includes the work area except for areas set aside as either the CRZ or SZ. The EZ will be defined and demarcated in the

field. In the case of drilling, the EZ is typically about 50 feet in diameter with the borehole located in the middle.

Only authorized personnel that meet the training requirements of the Occupational Safety and Health Act (OSHA) 29 CFR 1910.120 (40 hour HAZWOPER course with an annual 8-hour refresher course or equivalent training) are permitted within the exclusion and contamination reduction zones. Prior to entering the EZ, and at all times when in the EZ, all personnel shall be outfitted in and properly use all required PPE. A checkpoint may be established at the edge of the EZ to regulate the flow of personnel and equipment in and out of the area.

When using Level A, B, or C PPE, all personnel entering the EZ must use the "buddy system." Under these conditions, all persons entering the EZ must be able to:

- Provide his or her partner with assistance.
- Observe his or her partner for signs of chemical exposure and heat stress.
- Periodically check the integrity of his or her partner's protective clothing.
- Notify the support personnel (in the SZ), or others if emergency help is needed.

Additionally, at least one person shall remain outside the EZ and have available at least the same level of PPE as those who entered the EZ. The person outside the EZ will provide logistical and safety support as needed. At least one E/A&H employee currently certified in first aid will be onsite during site activities.

The contamination reduction zone serves as a buffer between the EZ and the SZ and is intended to prevent the spread of contaminants from the work areas. All decontamination procedures will be conducted in this area. The CRZ shall be adjacent to and upwind of the EZ and includes all decontamination stations. When leaving the SZ and entering the CRZ, personnel must be wearing the prescribed PPE. Exiting the CRZ requires the removal of all

contaminants through compliance with established decontamination procedures as contained herein.

The support zone is the outermost area and is considered a non-contaminated or clean area. The support area will be equipped with an appropriate first-aid station and equipment to support activities occurring in the EZ and CRZ. The SZ is located adjacent to and upwind of the CRZ. The actual boundary of work zones will be determined and demarcated in the field. Existing site conditions such as wind direction, location of utilities, roads, security, etc. shall be considered when determining zone locations.

Changes in meteorologic conditions or site conditions may necessitate relocating the CRZ or SZ.

These work zones will be established and used during field work covered under this SHASP.

2.2 Work Area Access

Authorized personnel will be allowed access to work areas as long as they follow the requirements of this SHASP.

A file will be maintained onsite that includes copies of initial HAZWOPER training certificates and up-to-date refresher certificates for all employees involved in field activities. Employees who are unsure that a copy of their certificate is onsite shall bring a copy with them and present it to the Site Health and Safety Officer (SHSO) before beginning field work. Personnel who fail to meet or abide by the criteria established in this SHASP shall be restricted from entering work areas.

Subcontractors, Department of Defense (DOD) oversight personnel, and other site visitors must provide the SHSO or Site Supervisor documentation showing that their HAZWOPER training

is current, and must agree to comply with the SHASP, or equivalent health & safety requirements prior to site entry.

The SHSO may suspend site work and may instruct personnel to evacuate the area. Examples of situations when this may happen are:

- Severe weather conditions such as thunder, lightening, tornado warnings or other extreme weather conditions.
- Site conditions have changed, for whatever reason, such that the SHASP does not adequately address the current situation.
- Safety precautions being used are inadequate for the situation.
- Personnel including E/A&H, subcontractors, visitors, or DOD personnel are or may be exposed to an immediate health hazard.
- Fire, explosion and/or emergency situation in the work area or in the vicinity of the work area.

2.3 Site Description

NAS Corpus Christi is located on the Gulf of Mexico approximately 8 miles southeast of the city of Corpus Christi. Located on the Encinal Peninsula, the facility occupies 2340 acres and is bound by Corpus Christi Bay on the north, Laguna Madre on to the east, and Cayo del Oso Bay on the west.

Fuel Farm 216 was installed in the early 1940s and abandoned in the late 1980s. The fuel farm consists of thirty-six 25,000-gallon underground storage tanks (USTs). It is at the northern portion of the air station, approximately 150 feet from Corpus Christi Bay (see Figure 2-1 of the Contamination Assessment Plan).

Twelve of the tanks were part of an aqua drive system. They were permanently taken out of use and filled with inert material before 1974. The remaining 24 tanks were last used in 1986 or 1987. Tanks 216-1 through 216-16 reportedly last contained JP-5 while tanks 216-17 through 216-24 last contained aviation gas. All of these tanks have been permanently removed from service and filled with inert material.

In the early 1980s, a layer of fuel was discovered floating on top of the groundwater near Fuel Farm 216. Audits of fuel management records indicate that approximately 20 million gallons of fuel are unaccounted for in the 40-year life of the facility.

In 1982, an investigation was performed at the site that included installation of 15 groundwater monitoring wells to identify the extent of the fuel plume. The investigation concluded that approximately 77,000 gallons of fuel were present in the subsurface under the fuel farm, but that only 20,000 gallons of the fuel was recoverable. Recommendations from the investigation resulted in the installation of a pilot oil recovery system. This system was installed in 1986, and resulted in recovery of 1086 gallons of fuel in a 15-month period.

In 1987, an evaluation of the pilot oil recovery system was evaluated to determine the system's effectiveness. The evaluation concluded that the pilot oil recovery well system did remove fuel from the subsurface, but that it would take approximately 22 years to remove the estimated 20,000 gallons of removable fuel.

To date approximately 3,089 gallons of fuel have been recovered from the subsurface under Fuel Farm 216. The site is presently under a consent decree from the State of Texas.

2.4 Employee Protection

Employee protection for the work to be completed under the CAP for Fuel Farm 216 was determined through research of site conditions and planned activities and identification of

site-specific physical and chemical hazards. The following section will identify the chemical and physical hazards that are to be expected by site workers throughout completion of investigative activities. The site hazards and hazard abatement procedures are discussed in general in the following sections.

- Section 2.5: Work Limitations
- Section 5.0: Physical Hazards
- Section 4.0: Chemical Hazards
- Section 6.1: Selection of Personal Protective Equipment
- Section 6.2: Air Monitoring

2.5 Work Limitations

All site activities will be conducted during daylight only. E/A&H is also assuming that air station activities will continue during completion of the work specified in the Fuel Farm 216 Work Plan. The SHSO will coordinate all activities with the E/A&H Site Supervisor to assure that neither air station nor CAP activities are impacted negatively.

3.0 SITE ACTIVITIES

Site activities will include soil borings, soil sampling, the installation of wells, and ground exposure for tank closure verifications. Subsequent activities will include well purging, and sampling as required. Field work is described in the E/A&H Contamination Assessment Plan for Fuel Farm 216.

4.0 CHEMICAL HAZARDS

4.1 Selecting Chemicals of Potential Concern

The Chemicals of Potential Concern (COPC) for this investigative site are petroleum hydrocarbons, based on information regarding the storage and use of aviation and jet fuels at Fuel Farm 216. Table 4-1 lists the specific COPCs associated with Fuel Farm 216.

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Table 4-1
Fuel Farm 216 Chemical Hazards
Exposure Information

Compound	Ionization Potential (ev)[1]	Odor Threshold (ppm)[2]	OSHA PEL[3]	ACGIH TLV[4]	NIOSH REL[1]	Action Level
Fuels						
Benzene	9.25	4.7	1 ppm 5 pp, - STEL	10 ppm Suspected Human Carcinogen	0.1 ppm 1 ppm - Ceiling Potential Occupational Carcinogen	0.5 ppm
Toluene	8.8	40	100 ppm 150 STEL	500 ppm - Skin	100 ppm 200 ppm - Ceiling	225 ppm
Ethyl Benzene	8.8	140	100 ppm 125 ppm - STEL	100 ppm 125 ppm - STEL	Not Listed	50 ppm
Xylene	8.6	0.05	100 ppm 150 ppm - STEL	100 ppm 150 - STEL	100 ppm 200 ppm - Ceiling	50 ppm
Tetraethyl Lead	11.1	Not Listed	0.075 mg/m^3 - Skin	0.1 mg/m^3 - Skin	<0.1 mg/m^3	0.037 mg/m^3
Kerosene	6.8	1	Not Listed	Not Listed	100 mg/m^3	50 mg/m^3

Notes:

[1] = NIOSH Pocket Guide to Chemical Hazards, June 1990.
[2] = Odor Thresholds for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989, Range of All Reference Values.
[3] = 29 CFR 1910.1000, Table Z-1-A. Limits For Air Contaminants.
[4] = 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, ACGIH.

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4.2 Selection of Personal Protective Equipment

It is important that specified PPE protects against known and suspected site hazards. Protective equipment is selected based on the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, and greater emphasis is placed on experience and sound safety practices. As is discussed above, PPE for site workers will be based on previous site history and on the activities to be performed there. For further guidelines regarding PPE, see Section 6.1.

5.0 PHYSICAL HAZARDS

Field personnel should be aware of, and act in a manner to minimize, the dangers associated with physical hazards typically encountered during environmental investigations. These hazards include heat- and cold-related illnesses, severe weather, aboveground and underground utilities, working with and around drill rigs and heavy equipment, uneven terrain, slippery surfaces, and lifting. Poisonous flora and fauna such as poison ivy and snakes may be expected within work areas of Fuel Farm 216.

In addition to physical hazards listed above, there are additional and significant physical hazards which site workers need to be aware of. These known, suspected and potential physical hazards include: underground fuel, electrical, natural gas, sewer, potable water, storm water, steam, and compressed-air lines.

5.1 Underground Utilities

A major safety concern throughout the work area is the network of underground utilities. Due to the industrial nature of the Fuel Farm 216, most of the work area is traversed by many different subsurface utilities. These utilities may include but are not limited to: fuel lines, fresh water, steam, sanitary sewer, storm sewer, electric, natural gas, and high-pressure air. Proposed

groundwater monitoring well and subsurface sampling locations shown in this CAP have been chosen based on a number of variables including: the suspected direction of groundwater and surface water flow, proximity to the investigated unit, suspected location of subsurface utilities, and above-ground improvements such as buildings or other facilities.

To assure site worker's safety during intrusive activities, a subcontractor specializing in utility location may assist the field teams in clearing locations for subsurface sampling points. When required, a coring subcontractor may core the asphalt or concrete surface before drilling or hand-augering. All subsurface borings will be advanced with a posthole digger or hand auger to 5 feet below ground surface to ensure that the drilling rig will not encounter a subsurface utility. If a subsurface obstruction is encountered, the boring will be terminated and relocated.

5.2 Procedures and Equipment for Extreme Hot or Cold Weather

The Site Supervisor and the SHSO shall be aware of the potential for temperature related and other environmental illnesses. When environmental or work conditions dictate, work regimens shall be implemented to minimize the potential for employee illness. Field staff will be responsible for monitoring co-workers for signs or symptoms of heat- or cold-induced illness. Heat stress or heat-related illness occurs when the combined metabolic and environmental heat to which an individual is exposed exceeds the body's ability to cool. The manifestations of heat stress are the adjustments made by an individual in response to increased body temperature. The three most important categories of heat-induced illness are: heat exhaustion, heat cramps, and heat stroke. These disorders can occur when the normal responses to increased internal heating are not adequate to meet the needs for heat loss or when the body's temperature regulating mechanisms fail to function properly.

Heat-Related Illness

Due to impervious protective clothing, heat stress can result even when the temperatures are moderate. Various levels of personal protection may require wearing low permeability

disposable suits, gloves and boots. These prevent cooling and create discomfort but increasing perspiration and elevating body temperature (heat stress).

Heat cramps result when the working muscles go into painful spasms. This may occur in people who perspire profusely, even when drinking large quantities of water if they fail to replenish spent electrolytes (salt). The abdominal muscles as well as the muscles of the arms and legs are most commonly affected. The cramps may appear during work or up to several hours later. Persons on a low sodium diet should consult their physician and should not be given supplemental salt.

Heat exhaustion is a state of collapse brought about by an insufficient blood supply to the cerebral cortex portion of the brain. the cause of heat exhaustion is low blood pressure created by inadequate heart output and widespread expansion of the blood vessels.

Heat Exhaustion Factors — Factors which can lead to heat exhaustion are as follows:

- Increased expansion of blood vessels causing a decreased capacity of the circulatory system to meet the demands for giving off heat generated by ambient conditions, exercise, and metabolic activities.
- Decreased blood volume due to dehydration.
- Reduced blood volume due to lack of physical conditioning, infection, intoxication, or heart failure.

Heat Exhaustion Symptoms — The symptoms include extreme weakness, fatigue, dizziness, nausea, and headache. Most severe cases may also involve vomiting and unconsciousness. The skin becomes clammy and moist, the complexion becomes pale, and the core body temperature becomes elevated (99.5 °F to 101.3°F). Workers who are unacclimated run the highest risk.

Heat Exhaustion Treatment — In most cases, treatment of heat exhaustion is fairly simple. The victim should be moved to a cool place and cool liquids or electrolyte-fortified drinks should be provided. If the victim is semiconscious or unconscious nothing should be given by mouth and emergency medical assistance requested immediately. Left untreated, heat exhaustion may progress to heat stroke.

Heat stroke is the most serious of the health problems that arise while working in hot environments. It is caused by the breakdown of the body's thermo-regulatory system. When this happens, perspiration stops and the body can no longer regulate its temperature.

Heat Stroke Symptoms — A heat stroke victim may be identified by hot, dry skin. Late stages of heat stroke may result in red or mottled skin. The core body temperature may reach or exceed 105°F. Mental confusion, irritability and chills are common early signs of heat stroke. Without rapid intervention, unconsciousness, delirium, convulsions and death may occur.

Heat Stroke Treatment — Heat stroke is a life-threatening medical emergency. Emergency medical assistance should be requested immediately. The individual should be placed in a cool area, clothing removed, and rapid body cooling with cool water and fanning, or immersion. The victim should be treated for shock, and artificial respiration or CPR performed if required.

Prevention of Heat Related Illnesses

To reduce the potential for heat related illnesses:

- Drink plenty of fluids (alternate between water and electrolyte-fortified fluids).
- Wear cotton undergarments to wick away moisture.
- Provide adequate shade or shelter for rest breaks.
- Adjust work-rest regimens to prevent overheating.
- Wear cooling vests when needed.

- Coordinate work schedules (early morning/late afternoon) to avoid the mid-day heat.
- Rotate work crews frequently when elevated levels of PPE are employed.

Cold-Related Illness

Persons working outdoors in temperatures at or below freezing may experience frostbite or hypothermia. Extreme cold for a short time may cause severe injury to the surface of the body. Areas of the body that have a high surface area to volume ratio, such as fingers, toes, and ears are the most susceptible.

Two factors influence the development of cold injury: Ambient temperature and wind velocity. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 miles per hour (mph) increases to 10 mph. Additionally, water conducts heat 240 times faster than air, thus on a cold day the body can cool quickly when PPE is removed and a person has wet clothing on underneath.

Frostbite is a condition in which the cold forms ice crystals within the cells and tissues, dehydrating protoplasm and killing tissues. At the same time, circulation of the blood is blocked. Frostbite could lead to gangrene and amputation.

Frostbite damage occurs in progressive degrees:

- Frost nip, or incipient frostbite, is characterized by sudden whitening of the skin.
- When superficial frostbite occurs, the skin has a waxy or whitish look and is firm to the touch; however, the tissue underneath has retained its resiliency.
- In deep frostbite, the tissues are cold, pale, and solid.

In addition to frostbite, other physiological reactions to cold may be experienced. Trench foot, for example, may result from prolonged exposure to low temperatures near, though possibly above, freezing. Walking is very painful. In severe cases, the flesh dies and the foot may

require amputation. Immersion foot is very similar although less severe. Although amputation is unusual, some permanent mobility of the extremity may be lost.

Chilblain (pernio) which is an inflammation of the hands and feet caused by exposure to cold and moisture, is characterized by a recurrent localized itching, swelling, and painful inflammation on the fingers, toes, or ears, produced by mild frostbite. Advanced cases produce severe spasms, accompanied by pain.

Hypothermia occurs when the body loses heat faster than it can produce it. The initial reaction involves the constriction of blood vessels in the hands and feet in an attempt to conserve the heat. After the initial reaction, involuntary shivering begins in an attempt to produce more heat.

Temperature is only a relative factor in cases of hypothermia. Cases of exposure have occurred in temperatures well above freezing. Humidity is a very important factor, because higher humidity increases the risk of hypothermia. Moisture on the skin and clothing will allow body heat to escape many times faster than when the skin and clothing are dry.

Hypothermia occurs when the body core temperature drops below 96°F. When this happens, the person becomes exhausted. He may begin to behave irrationally, move more slowly, stumble and fall. The speech becomes weak and slurred. If these preliminary symptoms are allowed to pass untreated, stupor, collapse, and unconsciousness occur, possible ending in death.

Prevention of Cold Related Illness

To reduce the effects of cold exposure:

- **Stay dry.** When the temperature drops below 40°F, pace yourself to minimize perspiration; for personnel who expect to perspire, it is prudent to bring a change of clothing.

- **Wear wool.** Many fabrics, when wet, lose up to 90 percent of their insulating value. Wool clothes provide good insulation, are breathable, give off moisture and retain their insulating properties when wet.
- **Beware of the wind.** A slight breeze carries heat away much faster than still air. Wind drives cold air under and through clothing. Wind refrigerates wet clothes. A rule-of-thumb: each mile per hour of wind increases the wind chill by one to two degrees.
- **Understand cold.** Most hypothermia cases develop in temperatures between 30°F and 50°F. Cold water held against the body in wet clothes also causes hypothermia.
- **Have shelter available.** Make adequate dry, warm shelter available.
- **Provide warm drinks.**
- **Never ignore shivering.** Persistent shivering is a clear warning that a person is experiencing cold stress and may be on the verge of hypothermia. Allow for the fact that exposure greatly reduces normal endurance. Understand that warmth generated by physical activity may be the only factor preventing hypothermia, and if a person's activity level drops, their physical condition could deteriorate quickly and substantially.

Due to the ambient environmental conditions typical for Corpus Christi, Texas, the heat index — Wet Globe Bulb Temperature Index (WGBT) — and core body temperatures will be monitored during hot weather and/or when elevated levels of PPE are used. In addition to using various work-rest regimens, employees also will use cooling vests to help control core body temperature when conditions dictate.

5.3 Severe Weather

Field work shall not be conducted when lightning can be seen from the work area. When lightning is observed, cease work, perform emergency personal and equipment decontamination (see CAP and QAP) as needed, then seek shelter.

During extreme weather conditions, the Site Supervisor and SHSO shall use their best judgment and has the authority to stop field work or dismiss workers for the day. Examples of conditions that may warrant work stoppage include: high winds, hail, flooding, and ice storms.

5.4 Working Around Drill Rigs and Heavy Equipment

Heavy equipment and drill rig operations will adhere to the procedures outlined in Attachment B, Drilling Safety Guide.

5.5 Standard Safe Work Practices

- When conducting field work personnel should walk. Running greatly increases the probability of slipping, tripping, and falling.
- Eating, drinking, chewing gum or tobacco, smoking, or any activity that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated, unless authorized by the SHSO.
- Hands and face must be thoroughly washed upon leaving the work area.
- No contact lenses will be worn in work areas during invasive activities.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as practical after leaving the CRZ.
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces, or lean, sit, or place equipment on drums, containers, or on soil suspected of being contaminated.
- Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel on cleanup or response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Consumption of alcoholic beverages is prohibited.

- Adequate side and overhead clearance must be maintained to ensure that the drill rig boom does not touch or pass close to any overhead power lines or other overhead obstacles or obstructions.
- Utility lines should be marked using characteristic spray paint or labeled stakes. A buffer zone, 3 yards to either side of a utility line, should be maintained during all subsurface investigations.
- Due to the flammable properties of the potential chemical hazards, all spark or ignition sources should be bonded and/or grounded or mitigated before soil boring advancement or other site activities begin.

5.6 General Rules of Conduct

- Liquor, firearms, narcotics, tape recorders, and other contraband items are not permitted on the premises.
- Any violation of local, state, or federal laws, or conduct which is outside the generally accepted moral standards of the community is prohibited.
- Violation of the Espionage Act, willfully hindering or limiting production, or sabotage is not permitted.
- Willfully damaging or destroying property, or removing government records is forbidden.
- Misappropriation or unauthorized altering of any government records is forbidden.
- Securing government tools in a personal or contractor's tool box is forbidden.
- Gambling in any form, selling tickets or articles, taking orders, soliciting subscriptions, taking collections, etc., is forbidden.
- Doing personal work in government shop or office, using government property or material for unauthorized purposes, or using government telephones for unnecessary or unauthorized local or long-distance telephone calls is forbidden.
- Compliance with posted signs and notices is required.

- Boisterousness and noisy or offensive work habits, abusive language, or any verbal, written, symbolic, or other communicative expression which tends to disrupt the work or morale of others is forbidden.
- Fighting or threatening bodily harm to another is forbidden.
- Defacing any government property is forbidden.
- Wearing shorts of any type and/or offensive logos, pictures, or phrases on clothing is forbidden. Shirts, shoes, and pants, slacks, or coverall-type garments will be worn at all times on government property.
- All persons operating motor vehicles will obey all NAS Corpus Christi traffic regulations.

6.0 EMPLOYEE PROTECTION

6.1 Selection of Personal Protective Equipment

It is important that specified PPE protect against known and suspected site hazards. Protective equipment is selected based on the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, and greater emphasis is placed on experience and sound safety practices. As is discussed above, PPE for site workers will be based on previous site history and on the activities to be performed there.

PPE requirements are subject to change as site information is updated or changes. **A decision to deviate from specified levels of PPE as contained in this SHASP must be made or reviewed by the Project Health and Safety Officer (PHSO).** Table 6-1 presents the levels of PPE which may be employed at Fuel Farm 216, and the criteria for upgrading PPE.

Table 6-1
Level of Protection and Criteria

Level of Protection	Criteria for Use	Equipment
Level A	• When atmospheres are "immediately dangerous to life and health" (IDLH in the *NIOSH/OSHA Pocket Guide to Chemical Hazards* or other guides.) • When known atmospheres or potential situations exist that could affect the skin or eyes or be absorbed into the body through these surfaces. Consult standard references to obtain concentrations hazardous to skin, eyes, or mucous membranes. • Potential situations include those where immersion may occur, vapors may be generated, or splashing may occur through site activities. • Where atmospheres are oxygen-deficient. • When the type(s) and or potential concentration of toxic substances are not known.	• Positive-pressure, full-facepiece, self-contained breathing apparatus (SCBA) or positive-pressure supplied air respirator (SAR) with escape SCBA. • Fully encapsulating chemical protective suit. • Chemical-resistant inner and outer gloves. • Steel toe and steel shank chemical-resistant boots. • Hard hat under suit. • Two-way radios worn inside suit. • Optional: coveralls, long cotton underwear, disposable protective suit, gloves and boots, over fully encapsulating suit.
Level B	• When respiratory protection is warranted and cartridge respirators are not appropriate. Examples of these conditions are: — when work area may contain less than 19.5 percent oxygen, — when expected contaminants do not have appropriate warning properties, e.g., vinyl chloride, or — when cartridges are not available to protect against all COPs. • Hazards associated with limited dermal exposure are not significant.	• Chemical-resistant clothes, coveralls. • Positive-pressure, full-face SCBA or SAR with escape bottle. • Hard hat. • Chemical-resistant outer and inner gloves. • Steel toe and steel shank boots. • Chemical-resistant outer boots.
Level C	• When respiratory protection is warranted and cartridge respirators are appropriate. • When PID readings exceed the AL. • When air monitoring indicates airborne concentration of a chemical is 50 percent or more of the PEL or TLV. • And the work area contains at least 19.5 percent oxygen.	• Chemical-resistant coveralls. • Full-face, air-purifying respirator equipped with cartridges suitable for the hazard. • Hard hat. • Chemical-resistant outer and inner gloves. • Steel toe and steel shank boots. • Disposable outer boots.

Table 6-1
Level of Protection and Criteria

Level of Protection	Criteria for Use	Equipment
Modified Level D	• When chemical contamination is known or expected to be present, yet inhalation risk is low and respiratory protection is not required. • Site contaminants may be absorbed through the skin. • The "default level" of PPE required when the SHASP does not specify another level of PPE. • And the work area has at least 19.5 percent oxygen. • When minimal or no chemical contamination is expected. • When SHASP specifies Level D protection is adequate. • And the work area has at least 19.5 percent oxygen.	• Chemical-resistant coveralls. • Chemical-resistant outer gloves; inner gloves or glove liners, optional. • Steel toe and steel shank boots. • Hard hat. • Safety glasses with side shields or safety goggles. • Optional: chemical-resistant outer boots. • Inner gloves or chemical-resistant gloves needed to handle soil or water samples. • Optional: coveralls and disposable outer boots. • Work clothes.

6.2 Air Monitoring

Air monitoring for volatile organic compounds (VOCs), respirable dust, oxygen, and flammable gases will be performed continuously during all intrusive investigative activities and those which activities which require that E/A&H personnel handle potentially contaminated materials. Monitoring will also be performed to determine exposure concentrations realized by personnel performing site investigative procedures. Personnel samples will be collected and analyzed with respect to National Institute for Occupational Safety and Health (NIOSH) *Manual of Analytical Methods*, as required per 29 CFR 1910.1000. Personnel samples will be collected during each site activity in which Level C PPE is prescribed. Additional personnel samples will be collected during each site activities which represent worst case exposure potential.

When possible, real-time monitoring instruments will be used to measure airborne contaminant levels. Air monitoring for VOCs will be accomplished using a photoionization detector. The PID will be field calibrated to measure VOCs relative to a 100 ppm isobutylene standard. If

VOCs are detected downhole, colorimetric detector tubes and/or other sampling media may be used to determine the identification and approximate concentration of these compounds.

The PHSO reserves the right to require personnel exposure monitoring or other types of air sample collection and analysis. These samples may be required for a variety of reasons such as: to identify a chemical odor, PID readings exceed or approach the action level (AL), or to determine if personal exposures are below OSHA PELs.

Air monitoring for total (inspirable) dust will be performed using a real-time aerosol monitor to measure airborne dust concentrations. In addition to the real-time monitor, air samples will be collected to document the actual concentrations measured per a NIOSH-approved method.

A combustible gas indicator (CGI) will be used during all soil borings and well installations. The CGI will be field-calibrated to measure flammable gases relative to a methane standard. Downhole CGI readings will be collected periodically during soil-disturbing operations. Field activities will immediately cease if downhole readings exceed 20 percent of the lower explosive limit (LEL). If CGI readings do not subside, the area will be immediately evacuated and the situation re-evaluated to determine how to proceed. The area will be investigated; operations may not proceed until downhole readings are below 20 percent LEL.

Action Level and Ceiling Concentration

Fuel Farm 216 has a designated action level and ceiling concentration. For this project the AL is defined as the PID reading in the breathing zone above which respiratory protection must be upgraded; chemical protective clothing may also be upgraded. The AL is determined on a site-by-site basis. To exceed the AL, PID readings should be sustainable. Readings should remain above the AL for at least one or two minutes at a time. Readings that are elevated for only a few seconds every 15 or 20 minutes do not exceed the AL and do not require workers to upgrade their level of PPE.

The general AL for this site, as determined on a properly calibrated PID, is 5 PID units above background. PPE shall be upgraded to Level C (assuming that cartridge respirators are appropriate, otherwise Level B) if airborne VOC concentrations in the breathing zone exceed the AL, or if the concentration of any contaminant exceeds 50 percent of the OSHA PEL. This baseline AL and PPE requirement may be superseded by more stringent site-specific levels, as identified in each Site Chemical Hazard and PPE requirements section.

If breathing zone levels exceed the AL, or site conditions indicate that additional health and safety precautions are needed, field activities in the area shall stop. Field staff shall notify the Site Supervisor of the situation and he/she shall contact the Project Manager and/or the PHSO. The PHSO will be responsible for reassessing the hazards and prescribing revised health and safety requirements as necessary, including upgraded PPE requirements, revised work schedules, and revised decontamination procedures. See Table 6-1 for specific criteria for each protection level.

If PID readings exceed 10 units, the SHSO shall contact the PHSO and discuss the need to identify and quantify airborne contaminants. Work shall not proceed until breathing zone concentrations return to background levels and it is reasonably anticipated that breathing zone readings will stay approximately at background levels, or the chemical constituent(s) are identified and appropriate PPE is donned.

The ceiling concentration is defined as the maximum allowable PID reading in the breathing zone regardless of PPE. A ceiling concentration of 50 PID units has been established. Should VOC concentrations exceed 50 ppm in the breathing zone, field workers should secure their equipment and back off the site. Work shall not resume until the Site Supervisor understands why VOC concentrations became elevated, knows the major constituents of the VOCs being generated, and the VOCs in the breathing zone are less than 5 ppm or workers have upgraded to Level C or B. The proper PPE upgrade shall be determined by the PHSO based on

site-specific chemical information, i.e., is there enough information to determine that air-purifying respirators will provide sufficient protection.

Field monitoring values will be recorded in a field logbook and copies must be posted for field personnel review.

Equipment Maintenance

Before being used daily, PIDs, CGIs, and other monitoring equipment shall be calibrated or their proper function verified. Throughout the day this equipment shall be periodically checked to ensure that it is working properly. A final calibration shall be conducted at the end of the workday, at which time each instrument will be checked to ensure that it is free from surface contamination. Air monitoring equipment shall detect the calibration standard within a range of plus or minus 10 percent, otherwise the instrument shall be considered malfunctioning. Field staff shall note in their field notebooks that they conducted these calibrations and checks and note whether the equipment was functioning properly.

When equipment is not functioning properly, it should be brought to the attention of the Site Supervisor or SHSO, who will arrange to repair or replace that equipment as needed.

6.3 Decontamination

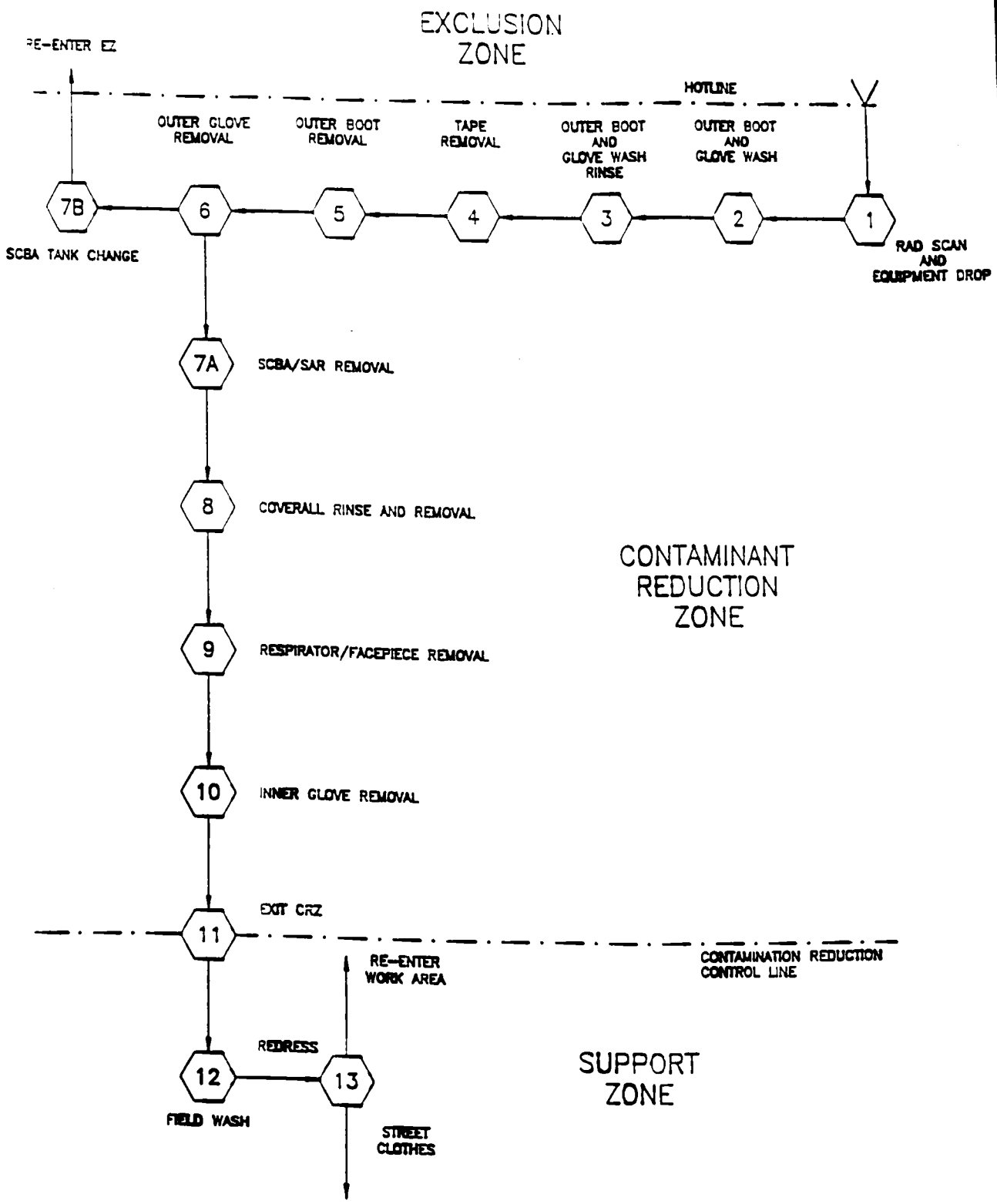
6.3.1 Personnel and Equipment Decontamination

As needed, a CRZ will be established adjacent to EZs established for invasive activities, and will include stations for decontaminating personnel, PPE, and hand tools. Typically, a portion of the CRZ will be covered with sheets of 6-mil polyethylene (generally, an area 20 feet by 20 feet is sufficient) with specific stations to accommodate the removal and disposal of the protective clothing, boot covers, gloves, and respiratory protection.

Heavy equipment and field equipment that cannot adequately be decontaminated in the CRZ may be decontaminated on a more centrally located decontamination pad. Below is a list of equipment that may be convenient to have onsite to decontaminate heavy equipment and vehicles. Also explained is how this equipment may be used.

- Tanks or drums to be store collected wash and rinse solutions, alternatively, equipment to treat collected wash and rinse solutions may be substituted.
- Pumps, and filters as needed to collect wash and rinsate solutions.
- Pressurized steam sprayers for steam cleaning equipment.
- Long-handled brushes for general cleaning of exterior surfaces. Also shovels and other equipment may be used to dislodge caked-on contaminated mud on the undercarriage or in the tires.
- Wash solutions, selected for their ability to remove (dissolve, etc.) contaminants
- Rinse solutions, selected for their ability to remove contaminants and wash solutions.
- Pressurized sprayers for washing and rinsing, particularly hard-to-reach areas.
- Clean buckets that can hold cleaning and rinsing solutions.
- Brooms and brushes that can be used to clean the interior, operator areas of vehicles and equipment.

Figure 6-1 shows one method of laying out an acceptable decontamination area for Level B PPE. There are numerous ways to lay out decontamination areas. Decontamination areas for Level C and Modified D PPE should be based on this concept of decontamination, but can be scaled back in accordance with the decontamination needs of the specific site and level of PPE. As a general rule, people working in the CRZ, assisting in the decontamination of workers leaving the EZ, shall be outfitted in PPE that is one protection level below what the exiting workers are using. For example, if workers leave the EZ in Level C, personnel in the CRZ should be in Modified D.



HEALTH AND SAFETY PLAN
NAS CORPUS CHRISTI
FUEL FARM 216
CORPUS CHRISTI, TEXAS

FIGURE 6-1
FULL DECONTAMINATION LAYOUT
LEVEL B PROTECTION

DATE: 11/22/93 | DWG NAME: CNS0001.DWG

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Often equipment may be adequately decontaminated using a soapy wash solution and following specified rinsing procedures. Normally equipment decontamination will be completed in Level D with gloves or Modified D PPE.

In the event of inclement weather (e.g., lightning) or an emergency requiring immediate evacuation, contaminated equipment will be bagged or wrapped and taped in 6-mil polyethylene sheeting and tagged as "contaminated" for later decontamination. Respirators not only need to be decontaminated and cleaned between uses, but also sanitized. Alcohol swabs are generally sufficient.

6.3.2 Full Decontamination Procedures

Workers shall use the following cleaning and decontamination procedures when exiting the EZ. These procedures should be followed when workers are leaving the area for lunch, at the end of their shift, or when work is completed for an EZ. Procedures for rest breaks and changing SCBA tanks and cartridges are described in Section 6.3.3. Not all steps apply to every situation; follow applicable procedures. Decontamination procedures shall start at the EZ/CRZ interface and continue away from the EZ toward the SZ.

Full Decontamination

1. ***Radiation monitoring***. If radioactive monitoring is in effect, scan hands, feet, and equipment with radiation detector.
2. ***Equipment drop***. Deposit equipment used onto plastic drop cloths or into a plastic-lined tub. All gross contamination should be removed here, fine cleaning and decontamination of equipment may be completed here or elsewhere. Before moving contaminated, it must be wrapped and taped.
3. ***Outer boot and glove wash***. Wash/remove gross contamination from outer boots, outer gloves, SCBA, and/or airline equipment.
4. ***Tape removal***. Remove tape from ankles and wrists and dispose of in plastic-lined drum.

5. ***Outer boot removal.*** Remove outer boots; disposable outer boots may be disposed of in the same waste container used in Step 4. Non-disposable boots need a thorough cleaning before they can be removed from the site. (If non-disposable boots are used, it is preferable to have them dedicated to the project.)

6. ***Outer glove removal.*** Remove and dispose of outer gloves. Gloves may be disposed in the same waste container as used in Step 4.

7. ***SCBA and SAR removal.*** For Level B*.

   SCBA — With buddy or other site worker, remove backpack, remove facepiece, and shut off air flow.

   SAR — With buddy or other site worker, remove harness and escape bottle, remove face piece, and shut off air flow.

   * If coveralls are significantly contaminated, leave the respirator facepiece on, disconnect the air hose just downstream of the regulator, turn off the flow of air, remove the backpack or equipment harness, and leave the facepiece in place. Remove the facepiece in Step 9.

8. ***Coverall removal.*** Rinse coveralls, if needed; remove coveralls and dispose of them. The same drum may be used as in Step 4. Non-disposable coveralls shall be double-bagged with the outer bag clearly labeled "contaminated."

9. ***Respirator removal.*** Remove respirator (or facepiece of Level B equipment, if it is still being worn). Dispose of spent cartridges, clean, disinfect, dry, and properly store respirator or facepiece.

10. ***Inner glove removal.*** Remove and dispose of inner gloves.

11. ***Exit area.*** Exit the CRZ via the SZ.

12. ***Field wash.*** Wash and rinse hands and face.

13. ***Re-dress.*** Re-dress into appropriate PPE for re-entry or change into street clothes.

Notes:

- All wastes (soil and water) generated during personal decontamination will be collected in 55-gallon drums. The drums will be labeled by E/A&H personnel for final disposal.
- Hard hats and eye protection should be washed at the end of each workday with soap and water solution.

6.3.3 Partial Decontamination Procedures

To change a respirator cartridge or SCBA tank:

1. ***Radiation monitoring.*** If radiation monitoring is in effect, scan hands, feet, and equipment with radiation detector.
2. ***Outer boot and glove wash.*** Wash outer boots and gloves. Wash/remove gross contamination from SCBA and/or airline equipment.
3. ***Tape removal.*** Remove tape from ankles and wrists and dispose of it in a plastic-lined drum.
4. ***Facepiece removal.*** Disconnect facepiece and air hose just downstream of regulator. The facepiece may remain in place, or be removed and cleaned. Remove the spent tank from the backpack and replace it with a full tank. Connect air hose and turn on air.
5. ***Respirator removal.*** Remove respirator, remove used cartridges, clean and disinfect respirator, install new cartridges, and don respirator.
6. ***Respirator check.*** Check to make sure that respirator still seals properly to your face.
7. ***Don clean PPE.*** Put on clean outer gloves, tape wrists (as applicable), and re-enter EZ.

When taking a rest break:

1. ***Radiation monitoring.*** If radiation monitoring is in effect, scan hands, feet, and equipment with radiation detector.
2. ***Outer boot and glove wash.*** Wash outer boots and gloves. Wash/remove gross contamination from SCBA and/or SAR equipment.

3. ***Tape removal.*** Remove tape from ankles and wrists and dispose in a plastic-lined drum.
4. ***Respirator removal.*** Remove SCBA unit, SAR harness, or respirator, and place in a clean area; plastic sheeting may be needed.
5. ***Coverall removal.*** Remove outer wear if it is ripped or significantly contaminated. In hot weather, at least unzip and pull down upper half of coveralls.
6. ***Inner glove removal.*** Remove and dispose of inner gloves.
7. ***Wash.*** Wash and rinse hands and face at the field wash station.
8. ***Rest break.*** Take rest break. Remember to drink plenty of water, Gatorade, or other similar beverage.
9. ***Don inner gloves.*** Put on inner gloves.
10. ***Don PPE.*** Don coveralls, outer boots, and outer gloves. Tape wrists and ankles (as needed), and re-enter the EZ.

Decontamination procedures, based on Level D protection:

- Brush heavily soiled boots and rinse outer gloves and boots with soap and water.
- Remove gloves and deposit them in a trash container.
- Dispose gloves and other disposable PPE in a trash container.
- Wash hands and face, and preferably shower as soon as practical.

6.3.4 Closure of the Decontamination Station

All disposable clothing and plastic sheeting used during site activities at sites with Level D through Level C will be double-bagged and disposed of in a refuse container. Decontamination and rinse solutions and disposable PPE from Level B sites will be placed in a labeled 55-gallon drum (separate solids and liquids) for later analysis and disposal. All washtubs, pails, buckets, etc., will be washed and rinsed at the end of each workday.

7.0 MEDICAL MONITORING PROGRAM

All E/A&H personnel who enter hazardous waste/spill sites or have the potential for exposure to hazardous materials from these sites must participate in the E/A&H Medical Monitoring Program. The program is conducted by E/A&H's company physician and is managed by the Senior Corporate Health and Safety Officer. The purpose of the program is to identify pre-existing illnesses or problems that could put an employee at an unacceptable risk when performing what for others may be a routine occupational task. E/A&H maintains the right to exclude certain individuals from particular jobs based upon reports from the company physician.

The medical monitoring program will be reviewed annually to determine its effectiveness. The company physician has been employed as an independent contractor to provide medical monitoring for E/A&H. The physician is responsible for the following aspects of the Medical Monitoring Program:

- Selection and quality assurance of medical and laboratory services involved in carrying out the monitoring program.
- Development of a uniform medical record.
- Confidentiality of medical records and information.
- Record retention.
- Employee notification of examination results.
- Determination of content of the medical and biological monitoring programs.
- Record review and correlation between potential exposure and effect.
- Monitoring job-related illness and injury for each employee.

7.1 Preplacement Examinations

Each E/A&H employee will be given a preplacement examination to identify pre-existing illnesses or problems that are, or could lead to, other medical complications if exposed to chemicals at concentrations that would not impact "healthy" employees; to assure that each employee can safely use negative-pressure respirators; and to develop a baseline database to help

evaluate exposure-related events detected during periodic medical monitoring. Data accumulation will include such variables such as age, sex, race, smoking, prior employment history, prior exposure history, and other conditions that might bear upon the occurrence of subsequent events once employment begins. The preplacement examination includes:

- Occupational history, including previous chemical and carcinogenic exposures.
- Medical history including demographic data, family history, personal habits, and past medical history.
- Fertility history.
- Physical examination, stressing examination of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems.
- Physiological parameters including blood pressure and visual acuity testing.
- Pulmonary function testing including FVC, FEVI and FEV 25-75.
- Electrocardiogram.
- PA and lateral chest X-ray.
- A multi-chemistry panel including tests of kidney and liver function.
- Red blood cell cholinesterase.
- Audiogram.

The history, physiological parameters, X-ray, screening tests and laboratory studies will be conducted before the physical examination. After the physical examination, the medical examiner will review the results of the examination with each employee and will offer, as appropriate, referrals for further evaluation of abnormalities detected during the examination. The Health and Safety Officer will provide each employee with a written summary and detailed results of the examination along with any job restrictions. Additional medical testing procedures (e.g. opthamology/optometric assessment, specialized audiometric testing) may be required at the discretion of E/A&H's attending physician.

7.2 Periodic and Exit Examinations

An examination and updated occupational history will be repeated annually and include:

- Updated occupational and medical history.
- Physical examination, stressing examination of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems.
- Pulmonary function testing including FVC, FEVI and FEV 25-75.
- Multi-chemistry panel including tests of kidney and liver function.
- Urinalysis.

The company physician will review the results of the annual examination and exposure data, and request further tests or issue medical clearances as appropriate. An examination will also be administered when an employee leaves the company. The company physician will be consulted for the contents of the exam, except when the employee has had an exam within 6 months or when there has been no site work since the last examination.

7.3 Project Specific Monitoring

Occasionally site work may potentially expose personnel to unusual chemical hazards or high concentrations of highly toxic compounds. In these cases, E/A&H may choose to expand its medical monitoring program to include biological monitoring, medical diagnostic testing or medical screening procedures. These tests and procedures may require pre and/or post site (exposure) medical examination, consultation or testing with the company physician, or possibly a designated medical specialist. Project staff must comply with project-specific medical monitoring requirements or they shall not be allowed to participate in field work for that project.

When projects may involve unusual exposure risks, the Project Manager should consult with the PHSO and/or the company physician concerning the scope of work, known or anticipated chemical hazards and the need for additional medical monitoring requirements for project staff.

If project specific monitoring is established, all E/A&H recordkeeping and confidentiality procedures shall be followed.

7.4 Post Exposure and Return-to-Work Examinations

After any job-related injury or illness, a medical examination is required to determine fitness for duty or to identify any job restrictions. The medical examiner will review the results of this back-to-work examination with the company physician before allowing the employee to return to work. A similar examination will be performed if an employee has missed at least three days of work due to a non-job-related injury requiring medical attention. Medical records shall be maintained by the employer or the physician for at least 30 years following the termination of employment.

7.5 Confidentiality

Medical records will be maintained in a confidential manner so that only authorized persons will have access to the records. The authorized personnel will include medical staff of the joint venture or contract medical personnel, the individual, the individual's personal physician or the individual's designated representative. Upon request, the individual may obtain a copy of the medical file, which will be provided within 15 days of the receipt of the written request. Information used for research, testing, statistical, or epidemiologic purposes will have all identifying data removed, including the identity of the individual. Any medical information or findings obtained which do not affect the individual's job performance will not be made available to E/A&H in order to maintain patient-physician confidentiality. Upon death, retirement, resignation, or other termination of services, the records will be retained by E/A&H or the contracting physician.

8.0 AUTHORIZED PERSONNEL

Personnel anticipated to be onsite at various times during site activities include:

- Engineers-in-Charge — Daryle Fontenot (SOUTHDIV)
- Site Contact — John Young (NAS Corpus Christi)
- Principal-In-Charge — Jim Speakman (E/A&H)
- Task Order Manager — Larry Reynolds (E/A&H)
- Project Health and Safety Officer — TBD (E/A&H)
- Site Supervisor — To Be Determined (E/A&H)
- Site Health and Safety Officer — To Be Determined

Responsibilities of Key Field Staff

Key field staff for this project, in terms of health and safety are:

- Site Supervisor
- Site Health and Safety Officer
- (All) Field Staff

9.0 EMERGENCY INFORMATION

All hazardous waste site activities present a potential risk to onsite personnel. During routine operations, risk is minimized by establishing good work practices, staying alert, and using proper PPE. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

If any situation or unplanned occurrence requires outside emergency, immediately call the appropriate contact from the following list:

Contact	Agency or Organization	Telephone
John Young	NAS Corpus Christi Site Contact	(512) 939-3776
Daryle Fontenot	SOUTHDIV Engineer-in-Charge	(803) 743-0607
Law Enforcement	NAS Security	(512) 939-2480
Fire Department	NAS Fire Department	(512) 939-3333
Ambulance Service	NAS Ambulance	(512) 939-2424
Hospital	NAS Hospital	(512) 939-2424
Southern Poison Control Center	———	(800) 922-1117
Larry Reynolds	EnSafe/Allen & Hoshall Task Order Manager	(615) 399-8800
TBD	EnSafe/Allen & Hoshall PHSO	
Jeff Bennett	EnSafe/Allen & Hoshall Project Manager	(901) 372-7962

* Use the Naval Hospital for (potentially) life-threatening situations, for less urgent medical needs, the Naval Hospital will not serve civilians; seek closest appropriate medical facility.

As soon as practical, John Young, NAS; Daryle Fontenot, SOUTHDIV Engineer-in-Charge; Jeff Bennett, E/A&H Project Manager; and E/A&H PHSO, shall be fully apprised of the situation. Other persons, as appropriate may also need to be contacted.

9.1 Site Resources

It is possible that a cellular telephone will be available in the SZ for routine and emergency communication/coordination with NAS, SOUTHDIV, and the E/A&H field office. First-aid and eye wash equipment will be available at the work area and in each field vehicle.

9.2 Emergency Procedures

Examples of an emergency include:

- A fire, explosion, or similar event at or near the site whether related to this project or not;
- A member of the field crew sustains a significant injury, or experiences symptoms of a chemical exposure; or
- The discovery of a condition which suggests that site conditions are imminently more dangerous or hazardous than anticipated.

In an emergency, the following emergency procedures should be followed:

- If it is necessary to evacuate the area, immediately proceed to a rally point and remain there until instructed otherwise.
- Use planned escape routes.
- If a member of the field team experiences effects or symptoms of exposure while on the scene, the field crew will immediately halt work and act according to the instructions provided by the Site Supervisor or, in his absence, the SHSO.
- For applicable site activities, including all Level B activities, use wind indicators to continuously indicate downwind, preferred escape routes, from upwind routes.
- Investigate condition(s) suggesting that site conditions may be more hazardous than anticipated. The condition observed and the decisions made shall be recorded in the safety logbook, or in the field logbook if a safety logbook is not being maintained. If there are doubts about how to proceed, suspend work and leave the work area until the PHSO has evaluated the situation and provided the appropriate instructions to the field team.
- If an accident occurs, the Site Supervisor is to complete an Accident Report Form (see Attachment A) for submittal to the managing Principal-in-Charge of the project.
- If a member of the field crew suffers a personal injury, the SHSO will call **NAS Fire Department 939-3333** if emergency assistance is needed. Next alert appropriate

emergency response agencies as the situation dictates. Complete an Accident Report Form for any such incident.

- If a member of the field crew suffers chemical exposure, flush the affected areas immediately with copious amounts of clean water, and if the situation dictates, the SHSO should alert appropriate emergency response agencies, or personally ensure that the exposed individual is transported to the nearest medical treatment facility for prompt treatment. (See Attachment C for directions to the emergency medical facility.) An Accident Report Form will be completed for any such incident.

Additional information on appropriate chemical exposure treatment methods will be provided through Material Safety Data Sheets in Attachment D of this SHASP. Directions to the nearest emergency medical facility capable of providing general emergency medical assistance and treating chemical burns are provided in Attachment C of this SHASP.

10.0 FORMS

The following forms will be used in implementing this Health and Safety Plan:

- Plan Acceptance Form
- Plan Feedback Form
- Exposure History Form
- Accident Report Form

A SHASP Plan Acceptance Form will be completed by all employees working onsite before site activities begin. The Plan Feedback Form will be filled out by the SHSO and any other onsite employee who wishes to do so. The Exposure History Form will be completed by both the Field Project Manager and the individual(s) for whom the form is intended. Examples of each form are provided in Attachment A of this plan.

All completed forms must be returned to the Task Order Manager at EnSafe/Allen & Hoshall, Memphis, Tennessee.

ATTACHMENT A

HEALTH AND SAFETY FORMS

The following forms will be used to implement this Health and Safety Plan:

Plan Acceptance Form
Plan Feedback Form
Exposure History Form
Accident Report Form

The Plan Acceptance Form will be filled out by all employees working on the site before site activities begin. The Plan Feedback Form will be filled out by the Site Safety Officer and any other onsite employee who wishes to fill one out. The Exposure History Form will be completed by both the Field Project Manager and the individual(s) for whom the form is intended. Examples of each form are provided.

All completed forms must be returned to the Task Order Manager at EnSafe/Allen & Hoshall, Memphis, Tennessee.

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

INSTRUCTIONS: This form is to be completed by each person working on the project site and returned to: EnSafe/Allen & Hoshall, Memphis, Tennessee.

Job No: 0102-07100

Contract No: N62467-89-D-0318

Project: Fuel Farm 216

I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

Jesus Chapa 3-29-95 CHAS JONES
Joseph P. George Jr. Shanna Curley / EnSafe
Robert Firasek / Jim Moreno / Dwayne Firasek

Signed

Jesus Chapa Rust CHAS JONES
Joseph P. George Jr Shanna Curley / EnSafe
Robert Firasek / Jim Moreno / Dwayne Firasek

Print Name

EnSafe/Allen & Hoshall
Core - TERRA

Company

3-27-95
3-27-95 4-3-95

Date

EMPLOYEE EXPOSURE HISTORY FORM

Employee:

Job Name: _____

Date(s) From/To: _____

Hours Onsite: _____

Contaminants (Suspected/Reported):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(See Attached Laboratory Analysis)

PLAN FEEDBACK FORM

Problems with plan requirements:

_____

_____

_____

Unexpected situations encountered:

_____

_____

_____

_____

Recommendations for revisions:

_____

_____

ACCIDENT REPORT FORM

SUPERVISORS REPORT OF ACCIDENT	**DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS**
TO:	FROM: TELEPHONE: ( )
NAME OF INJURED OR ILL WORKER AND COMPANY	
WORKER'S SOCIAL SECURITY NUMBER	
DATE AND TIME OF ACCIDENT	EXACT LOCATION OF ACCIDENT
NARRATIVE DESCRIPTION OF ACCIDENT	
NATURE OF ILLNESS OR INJURY AND PART OF BODY INVOLVED	
TIME LOST? ___ YES	___NO
PROBABLE DISABILITY (Check one) ___ FATAL ___ LOST WORK DAY WITH ___ DAYS AWAY FROM WORK ___ LOST WORK DAY WITH ___ DAYS OF RESTRICTED ACTIVITY ___ NO LOST WORK DAY ___ FIRST-AID ONLY	
CORRECTIVE ACTION RECOMMENDED (By whom and by when)	
NAME OF SUPERVISOR	TITLE
SIGNATURE	DATE

ATTACHMENT B

DRILLING SAFETY GUIDE

EnSafe is concerned about employee safety while working on or around drill rigs as well as when traveling to and from a drilling site, moving the drill rig and tools from location to location on a site and during maintenance of the drill rig. Every drill crew will have a designated safety supervisor. The safety supervisor will have the responsibility for ensuring that all drilling operations are conducted in a safe manner. All personnel working on, with, or around a drill rig will be under the jurisdiction of the rig safety supervisor.

Drill Rig Safety Supervisor

The safety supervisor for the drill crew will be the drill rig operator. However, the EnSafe safety officer still maintains the overall safety responsibility for the site. The drill crew safety supervisor is a direct representative of the site health and safety supervisor and will report any safety problems directly to the site health and safety officer. The drill rig safety supervisor will:

- Be the leader in using proper personal protective equipment. He/she will set an example for other personnel to follow.
- Enforce the requirements of the health and safety plan and take appropriate actions when other personal are not following the requirements of the health and safety plan.
- Ensure that all drill rig and associated drill rig equipment is properly maintained.
- Ensure that all drill rig operating personnel are thoroughly familiar with the drill operations.
- Inspect the drill rig and associated drill rig equipment for damage before starting drilling operations. Check for structural damage, loose bolts or nuts, correct tension in chains and cables, loose or missing guards or protective covers, fluid leaks, damaged hoses and or damaged pressure gauges and pressure relief valves.
- Test all emergency and warning devices such as emergency shut-down switches at least daily (prior to starting drilling operations). Drilling will not be permitted until all emergency and warning devices are functioning.

- Conduct a safety briefing daily before starting drilling operations. Any new employee will receive a copy of the drilling operations safety manual, and the drill rig manufacturer's operating and maintenance manual.
- Ensure that each employee reads and understands the drill rig manufacturer's operating and maintenance manual.
- Observe the mental, emotional, and physical capabilities of each worker.
- Ensure that each drill rig has a first aid kit and fire extinguisher.
- Maintain a list of emergency contact telephone numbers. This list will be posted in a prominent location and each drill rig employee will be informed of the lists location.

Drill Rig Personnel Protective Equipment

For most geotechnical, mineral, and/or groundwater drilling, drill rig personal protective equipment will include the following:

- Hard hat
- Safety shoes with steel toe and steel shank (or equivalent)
- Gloves
- Safety glasses with side shields
- Close fitting but comfortable clothes
- Hearing protection

It is important that clothing does not have loose ends, straps, draw strings or belts, or other unfastened parts that might become caught in or on a rotating or translating part of the drill rig.

Rings, necklaces, or other jewelry will not be worn during drilling operations.

Additional protective equipment may be required by the site specific health and safety plan.

Drill Rig Housekeeping

The following housekeeping measures must be taken for all drilling operations.

- Suitable storage locations will be provided for all tools, materials and supplies. The storage should be conveniently located and will provide for safe handling of all supplies.
- Drill tools, supplies, and materials will not be transported on the drill rig unless the drill rig is designed and equipped to carry drill tools, supplies, and materials.
- Pipe, drill rods, casing, augers, and similar drilling tools when stored will be stacked in a manner that will prevent spreading, rolling, or sliding.
- Penetration or other driving hammers will be secured to prevent movement when not in use.
- Work areas, platforms, walkways, scaffolding, and other access ways will be kept free of materials, debris and obstructions and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.
- Never store gasoline in a non-approved container. Red, non-sparking, vented containers marked with the word gasoline will be used. The fill spout will have a flame arrester.
- Prior to drilling, adequate site clearing and leveling will be performed to accommodate the drill rig and supplies and to provide a safe working area. Drilling will not be started when tree limbs, unstable ground or site obstructions cause unsafe tool handling conditions.

Maintenance Safety

Well maintained drilling equipment makes drilling operations safer. When performing equipment/tool maintenance, the follow safety precautions will be followed:

- Safety glasses will be worn when maintenance is performed on drill rigs or drilling tools.
- Shut down the drill rig engine to make repairs or adjustments to the rig or to lubricate fittings (except to make repairs or adjustments that can only be made while the engine is running).

- Always block the wheels or lower the leveling jacks or both. Set the hand brake before working under a drill rig.
- Release all pressure on hydraulic systems, the drilling fluid system, and the air operating system of the drill rig prior to performing maintenance.
- Use extreme caution when opening drain plugs and radiator caps and other pressurized plugs and caps.
- Allow time for the engine and exhaust to cool before performing maintenance on these systems.
- Never weld or cut on or near the fuel tank.
- Do not use gasoline or other volatile or flammable liquids as a cleaning agent.
- Follow the manufacturer's recommendations for quantity and type of lubricants, hydraulic fluids and coolants.
- Replace all caps, filler plugs, protective guards or panels, and high pressure hose clamps and chains or cables that have been removed during maintenance.
- Perform a safety inspection prior to starting drilling equipment after maintenance is performed.

Safe Use of Hand Tools

There are a large number of hand tools that can be used on or around a drill rig. The most important rule of hand tools is to use a tool for its intended purpose. The following are a few general and specific safety rules to follow when using hand tools.

- When using a hammer, wear safety glasses and require all others around you to wear safety glasses.
- When using a chisel, wear safety glasses and require all others around you to wear safety glasses.
- Keep all tools cleaned and stored in an orderly manner.
- Use wrenches on nuts, not pliers.
- Use screwdrivers with blades that fit the screw slot.

- When using a wrench on a tight nut, use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and apply force to the wrench with both hands when possible and with both feet firmly placed. Don't push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-off device. Always assume that you may lose your footing. Check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches will be wire brushed frequently to prevent accumulation of dirt and grease which cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hock and heel jaws when visibly worn.
- When breaking tool joints on the ground or on a drilling platform, position hands so that fingers will not be smashed between the wrench handle and the ground or the platform if the wrench were to slip or the joint suddenly to let go.

Safety During Drilling Operations

- Do not drive a drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast, look up to check for overhead obstructions.
- Before raising the mast, all drill rig personnel (except the person raising the mast) and visitors will be cleared from the area immediately to the rear and sides of the mast. All drill rig personnel and visitors will be informed that the mast is being raised prior to raising the mast.
- All drill rig personnel and visitors will be instructed to stand clear of the drill rig immediately prior to and during starting of the engine.
- All gear boxed will be in the neutral position, all hoist levers will be disengaged, all hydraulic levers will be in the non-actuating positions, and the cathead rope will not be on the cathead before starting the drill rig engine.

- The drill rig must be leveled and stabilized with leveling jacks and/or solid cribbing before the mast is raised. The drill rig will be leveled if settling occurs after initial set up.
- The mast will be lowered only when the leveling jacks are down. The leveling jacks must be in the down position until the mast is completely lowered.
- Secure and/or lock the mast according to the drill rig manufacturer's recommendations before starting drilling operations.
- The initial 4 feet will be drilled manually (via post hole digger or hand auger) to ensure clearance from unmarked utilities, unless approval is obtained from the project manager and project health and safety officer. If manual drilling is not possible, metal-detecting equipment will be used to locate utilities at drilling intervals of one foot until a depth of 4 feet is obtained.
- The drill rig must only be operated from the control position. If the operator must leave the control position, the rotary drive and the feed control must be placed in the neutral position. The drill engine will be shut down when the operator leaves the vicinity of the drill rig.
- Throwing or dropping of tools is not permitted. All tools will be carefully passed by hand between personnel or a hoist line will be used.
- When drilling within an enclosed area, ensure that fumes are exhausted out of the area. Exhaust fumes can be toxic and may not be detected by smell.
- Clean mud and grease from boots before mounting the drill platform. Use hand holds and railings. Watch for slippery ground when dismounting from the drill platform.
- Do not touch any metal parts of the drill rig with exposed flesh during freezing weather. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended id, < ,d, must be covered or otherwise protected to prevent drill rig personnel, site visitors, or animals from stepping or falling into the hole.
- Do not attempt to use one or both hands to carry tools when climbing ladders.

Working on Derrick Platforms

- When working on a derrick platform, us a safety belt and a lifeline. The safety belt will be at least 4 inches wide and will fit snugly but comfortably. The lifeline, will be less than 6 feet long and attached to the derrick.
- The safety belt and lifeline will be strong enough to withstand the dynamic force of a 250 pound weight falling 6 feet.
- A safety climbing device will be used when climbing to a derrick platform that is higher than 20 feet.
- The lifeline will be fastened to the derrick just above the derrick platform to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
- Tools will be securely attached to the platform with safety lines. Do not attach a tool to a line attached to the wrist or other body part.
- When working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
- Derrick platforms over 4 feet above the ground will have toe boards and safety railings.

Working on the Ground

- Workers on the ground must avoid going under elevated platforms.
- Terminate drilling operations and if possible lower the mast during an electrical storm.
- Overhead and buried utilities must be located and marked on all boring location plans and boring assignment sheets.
- When there are overhead electrical power lines at or near a drilling site or project, consider all wire to be charged and dangerous.
- Watch for sagging power lines before entering a site. Do not lift power lines to gain entry. Call the utility to have them lift the power lines or to deenergize the power.
- Operations adjacent to overhead lines are prohibited unless on of the following conditions is satisfied:

— Power has been shut off and positive means taken to prevent the lines from being energized.

— Equipment, or any part, does not have the capability of coming within the following minimum clearance from energized overhead lines, or the equipment has been positioned and blocked to assure no part, including cables can come within the following minimum clearances:

Power Lines Nominal System kv	Minimum Required Clearance
0 - 50	10 feet
51 - 100	12 feet
101 - 200	15 feet
201 - 300	20 feet
301 - 500	25 feet
501 - 750	35 feet
751 - 1000	45 feet

- While in transit with boom lowered and no load, the equipment clearance will be a minimum of 4 feet for voltages less than 50kv, 10 feet for voltages 51kv to 345kv, and 16 feet for voltages over 345kv.
- Before working near transmitter towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter will be de-energized. The following precautions will be taken to dissipate induced voltages:

— The equipment will be provided with an electrical ground to the upper rotating structure supporting the boom.

— Ground jumper cables will be attached to materials being handled by boom equipment when electrical charge may be induced while working near

energized transmitters. Crews will be provided nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load. Insulating gloves will be used.

- Continue to watch overhead power lines. Both hoist lines and overhead power lines can be moved toward each other by the wind.
- If there are any questions concerning drill rig operations on a site in the vicinity of overhead power lines, call the power company. The power company will provide expert advice as a public service.
- Look for warning signs indicating underground utilities. Underground utilities may be located a considerable distance away from the warning sign. Call the utility and jointly determine the precise location of all underground utility lines, mark and flag the locations and determine the specific precautions to be taken to ensure safe drilling operations.

Wire Rope Safety

- All wire ropes and fittings will be visually inspected at least once a week for abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper reeving, jamming, crushing, bird caging, kinking, core protrusion, and damage to lifting hardware.
- Wire ropes must be replaced when inspection indicates excessive damage. The Wire **Rope User's Manual** may be used as a guide for determining excessive damage.
- Wire ropes that have not been used for a period of a month or more will be thoroughly inspected before being returned to service.
- All manufactured and end fittings and connections must be installed according to the manufacturer's specifications.
- Swivel bearings on ball-bearing type hoisting swivels must be inspected and lubricated daily to ensure that the swivel rotates freely under load.

- Do not drill through or rotate drill through a slipping device, do not hoist more that 10 feet of the drill rod column above the top of the last (mast), do not hoist a rod column with loose tool joints, and do not make up, tighten, or loosen tool hoists while the rod column is being supported by a rod slipping device.
- Do not attempt to brake the fall of a drill rod column with your hands or by increasing tension on the rod slipping device.
- Wire ropes must be properly matched with each sheave. The sheave will pinch wire rope that is too large. Wire rope that is too small will groove the sheave. Once a sheave is grooved, it will severely pinch and damage larger sized wire rope.
- Use tool handling hoists only for vertical lifting of tools. Do not use tool handling hoists to pull on objects away from the drill rig.
- All hoisting hooks will be equipped with safety latches.
- When tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull for the hoist line or the feed mechanism of the drill.
- Minimize shock loading of a wire rope; apply loads smoothly and steadily.
- Avoid sudden loading in cold weather.
- Never use frozen ropes.
- Protect wire rope from sharp corners or edges.
- Replace faulty guides and rollers.
- Replace worn sheaves or worn sheave bearings.
- Know the safe working load of the equipment and tackle. Never exceed safe working limits.
- Periodically inspect clutches and brakes of hoists.
- Always wear gloves when handling wire ropes.
- Do not guide wire rope onto hoist drums with your hands.
- After installation of a new wire rope, the first lift must be a light load to allow the wire rope to adjust.

- Never leave a load suspended when the hoist is unattended.
- Never use a hoist line to ride up the mast.

Cathead and Rope Hoist Safety

- Keep the cathead clean and free of rust and oil and/or grease. The cathead must be cleaned with a wire brush when it becomes rusty.
- Check the cathead for rope wear grooves. If a rope groove forms that is deeper that ⅛ inch, the cathead must be replaced.
- Always start work with a clean, dry, sound rope. A wet or oily rope may grab the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast. If the rope grabs the cathead or otherwise becomes tangled in the drum, release the rope and sound the alarm for all personnel to clear the area rapidly.
- The rope must not be permitted to contact chemicals.
- Never wrap the rope from a cathead around a hand, wrist, arm, foot, ankle, leg, or any other body part.
- Attach the hammer to the rope using a knot that will not slip such as a bowline.
- A minimum of 18 inches must be maintained between the operating hand and the cathead drum when driving samplers, casing, or other tools. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground. Loosen grip on the rope as the hammer falls. Maintaining a tight grip on the rope increases the chances of being pulled into the cathead.
- Do not use a rope that is longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position all other hoist lines to prevent contact with the operating cathead rope.
- The cathead operator must be on a level surface with good, firm footing conditions.

Auger Safety

- The drill rig must be level, the clutch or hydraulic rotation control disengaged, the transmission in low gear and the engine running at low RPM when starting an auger boring.
- Seat the auger head below the ground surface with an adequate amount of downward pressure prior to rotation.
- Observe the auger head while slowly engaging the clutch or rotation control and start rotation. Stay clear of the auger.
- Slowly rotate the auger and auger head while continuing to apply downward pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about 1 foot or more below the surface.
- Follow manufacturer's recommended methods for securing the auger to the power coupling.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never place feet under the auger section that is being hoisted.
- Stay clear of rotating augers and other rotating components of the drill rig.
- Never reach behind or around a rotating auger.
- Use a long-handle shovel to move auger cuttings away from the auger.
- Augers will be cleaned only when the drill rig is in neutral and the augers have stopped rotating.

Rotary and Core Drilling Safety

- Water swivels and hoist plugs must be lubricated and checked for frozen bearings before use.
- Drill rod chuck jaws must be checked periodically and replaced as necessary.
- The weight of the drill rod string and other expected hoist loads must not exceed the hoist and sheaves capacities.

- Only the operator of the drill rig will brake or set a manual chuck to ensure that rotation of the chuck will not occur prior to removing the wrench from the chuck.
- The drill rod chuck jaws will not be used to brake drill rods during lowering into the hole.
- Drill rods will not be held or lowered into the hole with pipe wrenches.
- Do not attempt to grab falling drill rods with hands or wrenches.
- In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction must be relieved or bled down prior to breaking the first tool joint.
- Use a rubber or other suitable rod wiper to clean rods during removal from the hole. Do not use hands to clean drilling fluids from the drill rods.
- Do not lean unsecured drill rods against the mast.

ATTACHMENT C

DIRECTIONS TO EMERGENCY MEDICAL FACILITY

DIRECTIONS TO THE NEAREST MEDICAL FACILITIES

HOSPITAL

NAVAL HOSPITAL
LEXINGTON DRIVE
NAS CORPUS CHRISTI, TEXAS
EMERGENCY NUMBER: (512) 939-2424 OR 939-2735

DIRECTIONS TO THE NEAREST HOSPITAL CAPABLE OF TREATING CHEMICAL EXPOSURES

HOSPITAL

SPOHN HOSPITAL
THIRD STREET
CORPUS CHRISTI, TEXAS
EMERGENCY NUMBER: (512) 881-3811 OR 911

From the North Gate:

Take Ocean Drive and Turn Left on Ayers Street. Proceed for two blocks and turn right on Third Street. The Emergency Entrance will be on the right.

ATTACHMENT D

MATERIAL SAFETY DATA SHEETS

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CHEMTOX DATA

IDENTIFIERS

CHEMTOX RECORD 59

NAME: BENZENE

LAST UPDATE OF THIS RECORD: 06/03/93

SYNONYMS: BENZOL; COAL TAR NAPHTHA; CYCLOHEXATRIENE; PHENYL HYDRIDE; PHENE; COAL NAPHTHA; PYROBENZOL

CAS: 71-43-2

FORMULA: C6H6 RTECS: CY1400000

WLN: RH MOL WT: 78.11

CHEMICAL CLASS: Aromatic hydrocarbon

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: colorless to pale yellow watery liquid with a gasoline-like odor

BOILING POINT:	353.15 K	80 C	176 F
MELTING POINT:	278.71 K	5.5 C	42 F
FLASH POINT:	262 K	-11.15 C	11.9 F
AUTO IGNITION:	864.8 K	591.6 C	1588.6 F
CRITICAL TEMP:	562.1 K	288.95 C	552.11 F
CRITICAL PRESS:	4.89 kN/M2	48.2 atm	708 psia
HEAT OF VAP:	169 Btu/lb	93.85 cal/g	3.927x E5 J/kg
HEAT OF COMB:	-17460 Btu/lb	-9707 cal/g	-406x E5 J/kg

VAPOR PRESSURE: 75 mm @ 20 C

FL: 7.1 %

LEL: 1.3 %

IONIZATION POTENTIAL (eV): 9.25

VAPOR DENSITY: 2.77 (air=1)

EVAPORATION RATE: 3.50(n-BUTYL ACETATE=1)

SPECIFIC GRAVITY: 0.86-0.88 20 C

DENSITY: 0.8794 @ 20 C

WATER SOLUBILITY: 0.06%

INCOMPATIBILITIES: strong ox,chlorine,bromine with iron

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: OXIDIZING MATERIALS(Br2, F2, CL2, CrO3, NaClO4, O2, O3), PERCHLORATES (AlCl3 +NaClO4), (H2SO4 & PERMANGANATES), K2O2, (AgClO4 & ACETIC ACID), Na2O2 Source: SAX

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES:

VAPOR IS HEAVIER THAN AIR AND MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

ODOR DETECTED AT (ppm): 4.68 ppm
ODOR DESCRIPTION: odor; characteristic odor Source:CHRIS
100 % ODOR DETECTION: No data

---------- REGULATIONS ----------

DOT hazard class: 3 FLAMMABLE LIQUID
DOT guide: 27
Identification number: UN1114
DOT shipping name: Benzene
(after shipping description):
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T8
Packaging exceptions: 173.150
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:40

STCC NUMBER: 4908110

CLEAN WATER ACT Sect.307:Yes
CLEAN WATER ACT Sect.311:Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL): 0.005 mg/L (01/09/89)
Maximum Contaminant Level Goals (MCLG): 0 mg/L (01/09/89)
CLEAN AIR ACT: CAA '90 Listed and CAA '77 Sect 109
EPA WASTE NUMBER: U019,D018,D001
CERCLA REF: Y
RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: carcinogen
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.
LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 0.1 percent

UNITED STATED POSTAL SERVICE MAILABILITY:
Hazard class: Not given
Mailability: Nonmailable
Max per parcel: 0

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (3) This material can be ignited under almost all temperature conditions.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON --------

ACGIH TLV list "Threshold Limit Values for 1992-1993"
ATSDR Toxicology Profile available (NTIS** PB/89/209464/AS)
BENZENE [71-43-2]
California OSHA Carcinogens List.
California Assembly Bill 1803 Well Monitoring Chemicals.
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
California Assembly Bill 1807 Toxic Air Contaminants.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122
Clean Air Act Section 111 List.
Clean Air Act Section 112 Hazardous Air Pollutants List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
DOT Marine Pollutant. Proposed list. 57 FR 3854, Jan 31, 1992
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
National Toxicology Program (NTP) list of human carcinogens
New Jersey Right To Know Substance List. (December 1987)
New Jersey Right to Know Substance List. Listed as a carcinogen.
New Jersey Right to Know Substance List. Listed as a mutagen.
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
OSHA Specifically regulated substance. See 29 CFR 1910.1028
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR 26
RCRA Hazardous Waste
RCRA Toxicity Characteristics (TC) list dated March 29, 1990
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Suspected carcinogen (ACGIH). "Threshold Limit Values for 1992-1993"
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: INHALATION: benzene may produce both nerve and blood effects. irritation of the nose, throat and lungs may occur (3,000 ppm may be tolerated for only 30 to 60 minutes). lung congestion may occur. nerve effects may include an exaggerated feeling of well-being, excitement, headache, dizziness and slurred speech. at high levels, slowed breathing and death may result. death has occurred at 20,000 ppm for 5 to 10 minutes, or 7,500 ppm for 30 minutes. SKIN: irritation may occur, with redness and blistering if not promptly removed. benzene is poorly absorbed. whole body exposure for 30 minutes has been reported with no health effects. Eyes: may cause severe irritation. INGESTION: may cause irritation of mouth, throat and stomach. symptoms are similar to those listed under inhalation. one tablespoon may cause collapse, bronchitis, pneumonia and death.(NYDH)

LONG TERM TOXICITY: may cause loss of appetite, nausea, weight loss, fatigue, muscle weakness, headache, dizziness, nervousness and irritability. mild anemia has been reported from exposures of 25 ppm for several years and 100 ppm for 3 months. at levels between 100 and 200 ppm for periods of 6 months, or more, severe irreversible blood changes and damage to liver and heart may occur. temporary partial paralysis has been reported.(NYDH)

TARGET ORGANS: blood, CNS, skin, bone marrow, eyes, resp sys

SYMPTOMS: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death. Source: CHRIS

CONC IDLH: 3000ppm

NIOSH REL: Potential occupational carcinogen 0.1 ppm Time weighted averages for 8-hour exposure 0.32 mg/M3 Time weighted averages for 8-hour exposure 1 ppm Ceiling exposures which shall at no time be exceeded 3.2 mg/M3 Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = 10ppm Suspected human carcinogen (A2)
ACGIH STEL: Suspected human carcinogen (A2)

OSHA PEL: Final Rule Limits:
TWA = 1 ppm
STEL = 5 ppm
CONSULT 29CFR 1910.1028

MAK INFORMATION: Danger of cutaneous absorption

Carcinogenic working material without MAK
Capable of inducing malignant tumors as shown by experience with humans.
Substances which has been demonstrated to cause genetic damage in mammalian (including human) germ cells without proof of transmission.

CARCINOGEN?: Y

REFERENCES: STATUS: See below

HUMAN SUSPECTED IARC** 7,203,74
HUMAN SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 29,93,82
HUMAN POSITIVE IARC** 29,93,82
ANIMAL INDEFINITE IARC** 7,203,74

CARCINOGEN LISTS:

IARC: Carcinogen as defined by IARC as carcinogenic to humans, with sufficient epidemiological evidence.
MAK: Capable of inducing malignant tumors as shown by experience in humans.
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Carcinogen defined by NTP as known to be carcinogenic, with evidence from human studies.
ACGIH: Carcinogen defined by ACGIH TLV Committee as a confirmed human carcinogen, recognized to have carcinogenic or cocarcinogenic potential.
OSHA: Cancer hazard

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

* ihl-hmn LCLo:2 pph/5M TABIA2 3,231,33

* orl-man LDLo:50 mg/kg YAKUD5 22,883,80

* ihl-hmn LCLo:2000 ppm/5M YAKUD5 22,883,80

ihl-man TCLo:150 ppm/1Y-I BLUTA9 28,293,74
BLOOD
Other changes
NUTRITIONAL AND GROSS METABOLIC
Changes in:
Body temperature increase

ihl-hmn TCLo:100 ppm INMEAF 17,199,48
BEHAVIORAL
Somnolence(general depressed activity)

GASTROINTESTINAL
Nausea or vomiting
SKIN AND APPENDAGES
Skin - after systemic exposure
Dermatitis,other

ihl-hmn LCLo:65 mg/m3/5Y ARGEAR 44,145,74
BLOOD
Other changes

LD50 value:
orl-rat LD50:930 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:930 mg/kg
ihl-rat LC50:10000 ppm/7H
ipr-rat LD50:2890 ug/kg
orl-mus LD50:4700 mg/kg
ihl-mus LC50:9980 ppm
ipr-mus LD50:340 mg/kg
orl-dog LDLo:2 gm/kg
ihl-dog LCLo:146000 mg/m3
ihl-cat LCLo:170000 mg/m3
ihl-rbt LCLo:45000 ppm/30M
skn-rbt LD50:>9400 mg/kg
ivn-rbt LDLo:88 mg/kg
skn-gpg LD50:>9400 mg/kg
ipr-gpg LDLo:527 mg/kg
scu-frg LDLo:1400 mg/kg
ihl-mam LCLo:20000 ppm/5M
ipr-mam LDLo:1500 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)
ihl-rat TCLo:670 mg/m3/24H (15D pre/1-22D preg) HYSAAV
33(1-3),327,68
EFFECTS ON FERTILITY
Female fertility index

ihl-rat TCLo:56600 ug/m3/24H (1-22D preg) HYSAAV
33(7-9),112,68
EFFECTS ON NEWBORN

ihl-rat TCLo:50 ppm/24H (7-14D preg) JHEMA2 24,363,80
EFFECTS ON EMBRYO OR FETUS
Extra embryonic features(e.g.,placenta,umbilical
cord)

EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:150 ppm/24H (7-14D preg) JHEMA2 24,363,80
EFFECTS ON FERTILITY
Post-implantation mortality
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:9 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-mus TDLo:12 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON FERTILITY
Post-implantation mortality

orl-mus TDLo:6500 mg/kg (8-12D preg) TCMUD8 6,361,86
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ihl-mus TCLo:500 ppm/7H (6-15D preg) AIHAAP 40,993,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLo:500 mg/m3/12H (6-15D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLo:5 ppm (6-15D preg) TXCYAC 42,171,86
EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic material)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and marrow)

ihl-mus TCLo:20 ppm/6H (6-15D preg) FAATDF 10,224,88
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and marrow)

ipr-mus TDLo:5 mg/kg (1D male) TPKVAL 15,30,79
EFFECTS ON FERTILITY
Pre-implantation mortility
EFFECTS ON EMBRYO OR FETUS
Fetal death

ipr-mus TDLo:219 mg/kg (14D preg) EMMUEG 18,1,91

SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and marrow)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Hapatobilinary system

scu-mus TDLo:1100 mg/kg (12D preg) TOXID9 1,125,81
EFFECTS ON EMBRYO OR FETUS
Other effects on embryo or fetus

scu-mus TDLo:7030 mg/kg (12-13D preg) SEIJBO 15,47,75
EFFECTS ON EMBRYO OR FETUS
Extra embryonic features(e.g.,placenta,umbilical cord)
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ivn-mus TDLo:13200 ug/kg (13-16D preg) ICHUDW 4(6),24,82
EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic material)

par-mus TDLo:4 gm/kg (12D preg) NEZAAQ 25,438,70
EFFECTS ON NEWBORN
Weaning or lactation index(#alive at weaning per # alive at day 4)

ihl-rbt TCLo:1 gm/m3/24H (7-20D preg) ATSUDG 8,425,85
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON FERTILITY
Abortion
EFFECTS ON EMBRYO OR FETUS
Fetal death

California Prop 65: Carcinogen (02/27/87)
No significant risk level 7. ugD (01/01/94)

---------- EPA's IRIS DATA SUMMARY ----------
Benzene; CASRN 71-43-2 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Benzene
CASRN -- 71-43-2
Last Revised -- 04/01/92

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quant-

itative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

__II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

___II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- A; human carcinogen

Basis -- Several studies of increased incidence of nonlymphocytic leukemia from occupational exposure, increased incidence of neoplasia in rats and mice exposed by inhalation and gavage, and some supporting data form the basis for this classification.

___II.A.2. HUMAN CARCINOGENICITY DATA

Aksoy et al. (1974) reported effects of benzene exposure among 28,500 Turkish workers employed in the shoe industry. Mean duration of employment was 9.7 years (1-15 year range) and mean age was 34.2 years. Peak exposure was reported to be 210-650 ppm. Twenty-six cases of leukemia and a total of 34 leukemias or preleukemias were observed, corresponding to an incidence of 13/100,000 (by comparison to 6/100,000 for the general population). A follow-up paper (Aksoy, 1980) reported eight additional cases of leukemia as well as evidence suggestive of increases in other malignancies.

In a retrospective cohort mortality study Infante et al. (1977a,b) examined leukemogenic effects of benzene exposure in 748 white males exposed while employed in the manufacturing of rubber products. Exposure occurred from 1940-1949, and vital statistics were obtained through 1975. A statistically significant increase (p less than or equal to 0.002) of leukemias was found by comparison to the general U.S. population. There was no evidence of solvent exposure other than benzene. Air concentrations were generally found to be below the recommended limits in effect during the study period.

In a subsequent retrospective cohort mortality study Rinsky et al. (1981) observed seven deaths from leukemia among 748 workers exposed to benzene and followed for at least 24 years (17,020 person-years). This increased incidence was statistically significant; standard mortality ratio (SMR) was

560. For the five leukemia deaths that occurred among workers with more than 5 years exposure, the SMR was 2100. Exposures (which ranged from 10-100 ppm 8-hour TWA) were described as less than the recommended standards for the time period of 1941-1969.

In an updated version of the Rinsky et al. (1981) study, the authors followed the same cohort to 12/31/81 (Rinsky et al., 1987). An in his earlier study, cumulative exposure was derived from historic air-sampling data or interpolated estimates based on exisitng data. Standardized mortality rates ranged from 109 at cumulative benzene exposures under 40 ppm-years and increased montonically to 6637 (6 cases) at 400 ppm-years or more. The authors found significantly elevated risks of leukemia at cumulative exposures less than the equivalent current standard for occupational exposure which is 10 ppm over a 40-year working lifetime.

Ott et al. (1978) observed three deaths from leukemia among 594 workers followed for at least 23 years in a retrospective cohort mortality study, but the increase was not statistically significant. Exposures ranged from <2 to >25 ppm 8-hour TWA.

Wong et al. (1983) reported on the mortality of male chemical workers who had been exposed to benzene for at least 6 months during the years 1946-1975. The study population of 4062 persons was drawn from seven chemical plants, and jobs were categorized as to peak exposure. Those with at least 3 days/week exposure (3036 subjects) were further categorizeed on the basis of an 8-hour TWA. The control subjects held jobs at the same plants for at least 6 months but were never subject to benzene exposure. Dose-dependent increases were seen in leukemia and lymphatic and hematopoietic cancer. The incidence of leukemia was responsible for the majority of the increase. It was noted that the significance of the increase is due largely to a less than expected incidence of neoplasia in the unexposed subjects.

Numerous other epidemiologic and case studies have reported an increased incidence or a causal relationship between leukemia and exposure to benzene (IARC, 1982).

___II.A.3. ANIMAL CARCINOGENICITY DATA

Both gavage and inhalation exposure of rodents to benzene have resulted in development of neoplasia. Maltoni and Scarnato (1979) and Maltoni et al. (1983) administered benzene by gavage at dose levels of 0, 50, 250, and 500 mg/kg bw to 30-40 Sprague-Dawley rats/sex for life. Dose-related increased incidences of mammary tumors were seen in females and of Zymbal gland carcinomas, oral cavity carcinomas and leukemias/lymphomas in both sexes.

In an NTP (1986) study, benzene was administered by gavage doses of 0, 50, 100, or 200 mg/kg bw to 50 F344/N rats/sex or 0, 25, 50, or 100 mg/kg bw to 50 B6C3F1 mice/sex. Treatment was 5 times/week for 103 weeks. Significantly increased incidences ($p<0.05$) of various neoplasic growths were seen in both sexes of both species. Both male and female rats and mice had increased incidence of carcinomas of the Zymbal gland. Male and female rats had oral

cavity tumors, and males showed increased incidences of skin tumors. Mice of both sexes had increased incidence of lymphomas and lung tumors. Males were observed to have harderian and preputial gland tumors and females had tumors of mammary gland and ovary. In general, the increased incidence was dose-related.

Slightly increased incidences of hematopoietic neoplasms were reported fc male C57Bl mice exposed by inhalation to 300 ppm benzene 6 hours/day, 5 days/ week for 488 days. There was no increase in tumor incidence in male AKR or CD-1 mice similarly exposed to 100 ppm or 100 or 300 ppm benzene, respectively. Likewise male Sprague-Dawley rats exposed by inhalation to 300 ppm benzene were not observed to have increased incidence of neoplasia (Snyder et al., 1981).

Maltoni et al. (1983) treated male and female Sprague-Dawley rats in the following manner. Starting at 13 weeks of age rats were exposed to 200 ppm benzene 4 hours/day, 5 days/week for 7 weeks; 200 ppm 7 hours/day, 5 days/wee for 12 weeks; 300 ppm 7 hours/day, 5 days/week for 85 weeks. An 8-hour/day TWA for 5 days/week was calculated to be 241 ppm. A statistically significan increase was noted in hepatomas and carcinomas of the Zymbal gland.

___II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Numerous investigators have found significant increases in chromosomal aberrations of bone marrow cells and peripheral lymphocytes from workers with exposure to benzene (IARC, 1982). Benzene also induced chromosomal aberrations in bone marrow cells from rabbits (Kissling and Speck, 1973), mice (Meyne and Legator, 1980) and rats (Anderson and Richardson, 1979). Several investigators have reported positive results for benzene in mouse micronucleu assays (Meyne and Legator, 1980). Benzene was not mutagenic in several bacterial and yeast systems, in the sex-linked recessive lethal mutation assa with Drosophila melanogaster or in mouse lymphoma cell forward mutation assay

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__II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

___II.B.1. SUMMARY OF RISK ESTIMATES

Oral Slope Factor -- 2.9E-2 per (mg/kg)/day

Drinking Water Unit Risk -- 8.3E-7 per (ug/L)

Extrapolation Method -- One-hit (pooled data)

Drinking Water Concentrations at Specified Risk Levels:

Risk Level	Concentration

E-4 (1 in 10,000)	1E+2 ug/L
E-5 (1 in 100,000)	1E+1 ug/L
E-6 (1 in 1,000,000)	1E+0 ug/L

___II.B.2. DOSE-RESPONSE DATA (CARCINOGENICITY, ORAL EXPOSURE)

Tumor Type -- leukemia
Test Animals -- human
Route -- inhalation, occupational exposure
Reference -- Rinsky et al., 1981; Ott et al., 1978; Wong et al., 1983

The slope factor was derived from human data for inhalation exposure (see dose-response data for inhalation quantitative estimate). The human respiratory rate was assumed to be 20 cu.m/day and the human drinking water intake was assumed to be 2 L/day. The fraction of the administered dose absorbed systemically via inhalation and via drinking water were assumed to be equal.

___II.B.3. ADDITIONAL COMMENTS (CARCINOGENICITY, ORAL EXPOSURE)

The unit risk estimate is the geometric mean of four ML point estimates using pooled data from the Rinsky et al. (1981) and Ott et al. (1978) studies, which was then adjusted for the results of the Wong et al. (1983) study as described in the additional comments section for inhalation data.

The unit risk should not be used if the water concentration exceeds 1E+4 ug/L, since above this concentration the unit risk may not be appropriate.

___II.B.4. DISCUSSION OF CONFIDENCE (CARCINOGENICITY, ORAL EXPOSURE)

The pooled cohorts were sufficiently large and were followed for an adequate time period. The increases in leukemias were statistically significant and dose-related in one of the studies. Wong et al. (1983) disagrees that exposures reported in Rinsky et al. (1981) were within the recommended standards. For the five leukemia deaths in persons with 5 or more years exposure, the author notes that mean exposure levels (range 15-70 ppm) exceeded the recommended standard (25 ppm) in 75% of the work locations sampled. A total of 21 unit risk estimates were prepared using 6 models and various combinations of the epidemiologic data. These range over slightly more than one order of magnitude. A geometric mean of these estimates is 2.7E-2. Regression models give an estimate similar to the geometric mean.

The risk estimate above based on reconsideration of the Rinsky et al. (1981) and Ott et al. (1978) studies is very similar to that of 2.4E-2/ppm (cited in U.S. EPA, 1980) based on Infante et al. (1977a,b), Ott et al. (1978) and Aksoy et al. (1974). It was felt by the authors of U.S. EPA (1985) that

the exposure assessment provided by Aksoy was too imprecise to warrant inclusion in the current risk estimate.

Risk estimates based on animal gavage studies are about 5 times higher than those derived from human data. Pharmacokinetic data which could impact the risk assessment are currently being evaluated.

II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

II.C.1. SUMMARY OF RISK ESTIMATES

Inhalation Unit Risk -- 8.3E-6 per (ug/cu.m)

Extrapolation Method -- One-hit (pooled data)

Air Concentrations at Specified Risk Levels:

Risk Level	Concentration
E-4 (1 in 10,000)	1E+1 ug/cu.m
E-5 (1 in 100,000)	1E+0 ug/cu.m
E-6 (1 in 1,000,000)	1E-1 ug/cu.m

II.C.2. DOSE-RESPONSE DATA FOR CARCINOGENICITY, INHALATION EXPOSURE

Tumor Type -- leukemia
Test Animals -- humans
Route -- inhalation, occupational exposure
Reference -- Rinsky et al., 1981; Ott et al., 1978; Wong et al., 1983

II.C.3. ADDITIONAL COMMENTS (CARCINOGENICITY, INHALATION EXPOSURE)

The unit risk estimate is the geometric mean of four ML point estimates using pooled data from the Rinsky et al. (1981) and Ott et al. (1978) studies, which was then adjusted for the results of the Wong et al. (1983) study. The Rinsky data used were from an updated tape which reports one more case of leukemia than was published in 1981. Equal weight was given to cumulative dose and weighted cumulative dose exposure categories as well as to relative and absolute risk model forms. The results of the Wong et al. (1983) study were incorporated by assuming that the ratio of the Rinsky-Ott-Wong studies to the Rinsky-Ott studies for the relative risk cumulative dose model was the same as for other model-exposure category combinations and multiplying this ratio by the Rinsky-Ott geometric mean. The age-specific U.S. death rates for 1978 (the most current year available) were used for background leukemia and

total death rates. It should be noted that a recently published paper (Rinsky et al., 1987) reported yet another case of leukemia from the study population.

The unit risk should not be used if the air concentration exceeds 100 ug/cu.m, since above this concentration the unit risk may not be appropriate

___II.C.4. DISCUSSION OF CONFIDENCE (CARCINOGENICITY, INHALATION EXPOSURE)

The pooled cohorts were sufficiently large and were followed for an adequate time period. The increases in leukemias were statistically significant and dose-related in one of the studies. Wong et al. (1983) disagrees that exposures reported in Rinsky et al. (1981) were within the recommended standards. For the five leukemia deaths in persons with 5 or more years exposure, the author notes that mean exposure levels (range 15-70 ppm) exceeded the recommended standard (25 ppm) in 75% of the work locations sampled. The risk estimate above based on reconsideration of the Rinsky et al. (1981) and Ott et al. (1978) studies is very similar to that of 2.4E-2/ppm (cited in U.S. EPA, 1980) based on Infante et al. (1977a,b), Ott et al. (1978) and Aksoy et al. (1974). It was felt by the authors of U.S. EPA (1985) that the exposure assessment provided by Aksoy was too imprecise to warrant inclusion in the current risk estimate. A total of 21 unit risk estimates were prepared using 6 models and various combinations of the epidemiologic data. These range over slightly more than one order of magnitude. A geometric mean of these estimates is 2.7E-2/ppm. Regression models give an estimate similar to the geometric mean.

__II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

U.S. EPA. 1980. Ambient Water Quality Criteria Document for Benzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office (Cincinnati, OH) and Carcinogen Assessment Group (Washington, DC), and the Environmental Research Labs (Corvalis, OR; Duluth, MN; Gulf Breeze, FL) for the Office of Water Regulations and Standards, Washington, DC. EPA 440/5-80-018.

U.S. EPA. 1985. Interim Quantitative Cancer Unit Risk Estimates Due to Inhalation of Benzene. Prepared by the Office of Health and Environmental Assessment, Carcinogen Assessment Group, Washington, DC for the Office of Air Quality Planning and Standards, Washington, DC.

U.S. EPA. 1987. Memorandum from J. Orme, HEB, CSD/ODW to C. Vogt, Criteria and Standards Division, ODW, June, 1987.

___II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The 1985 Interim Evaluation was reviewed by the Carcinogen Assessment Group.

The 1987 memorandum is an internal document.

Agency Work Group Review: 03/05/87, 10/09/87

Verification Date: 10/09/87

___II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

D.L. Bayliss / ORD -- (202)260-5726 / FTS 260-5726

R. McGaughy / ORD -- (202)260-5898 / FTS 260-5898

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
hydrocarbon vapor canister, supplied air or hose mask;
hydrocarbon-insoluble rubber or plastic gloves; chemical goggles or face
plash shield; hydrocarbon-insoluble apron such as neoprene.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly wash with soap when skin becomes contaminated.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabili

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (BENZENE)
Less than or equal to 10 ppm: Half-mask air-purifying respirator with organic vapor cartridge.
Less than or equal to 50 ppm: Full facepiece respirator with organic vapor cartridges. / Full facepiece gas mask with chin style canister.

Less than or equal to 100 ppm: Full facepiece powered air-purifying respirator with organic vapor canister.
Less than or equal to 1000 ppm: Supplied air respirator with full facepiece in positive-pressure mode.
Greater than 1000 ppm or Unknown concentration: (1) Self-contained breathing apparatus with full face-piece in positive pressure mode. (2) Full facepiece positive-pressure supplied-air respirator with auxiliary self-contained air supply.
Escape : (1) Any organic vapor gas mask; or (2) Any self-contained breathing apparatus with full facepiece.
Firefighting : Any full facepiece self-contained breathing apparatus operated in positive pressure mode.

FIRST AID SOURCE: NIOSHP
EYE: irr immed
SKIN: soap wash promptly
INHALATION: art resp
INGESTION: no vomit

FIRST AID SOURCE: CHRIS Manual 1991
SKIN: flush with water followed by soap and water; remove contaminated clothing and wash skin.
EYES: flush with plenty of water until irritation subsides.
INHALATION: remove from exposure immediately. Call a physician. IF breathing is irregular or stopped, start resuscitation, administer oxygen.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

---------- INITIAL INCIDENT RESPONSE ----------

FIRE EXTINGUISHMENT: Dry chemical, foam, or carbon dioxide. Note: Water may be ineffective CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: Benzene
DOT ID NUMBER: UN1114

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION
Flammable/combustible material; may be ignited by heat, sparks or flames.
Vapors may travel to a source of ignition and flash back.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.
Material may be transported hot.

*HEALTH HAZARDS
May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
ire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Positive pressure self-contained breathing apparatus (SCBA) and structural fir
*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is inv
CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping
If water pollution occurs, notify the appropriate authorities.
*FIRE
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until we
For massive fire in cargo area, use unmanned hose holder or monitor nozzles; i
Withdraw immediately in case of rising sound from venting safety device or any
*SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Water spray may reduce vapor; but it may not prevent ignition in closed spaces
Small Spills: Take up with sand or other noncombustible absorbent material an
Large Spills: Dike far ahead of liquid spill for later disposal.
*FIRST AID
Move victim to fresh air and call emergency medical care; if not breathing, gi
In case of contact with material, immediately flush eyes with running water fo
emove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort o
the part of the compilers of the CHEMTOX database to obtain useful, accurate,
and factual data. The use of these data shall be in accordance with the
guidelines and limitations of the user's CHEMTOX license agreement.
The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracie
or omissions within this database, or in any of its printed or displayed output
forms.

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IDENTIFIERS

CHEMTOX RECORD 206 LAST UPDATE OF THIS RECORD: 06/03/9

NAME: ETHYL BENZENE

SYNONYMS: AETHYLBENZOL (German); EB; ETHYLBENZEEN (Dutch); ETHYL BENZENE; ETHYL BENZENE (DOT); ETHYLBENZOL; ETILBENZENE (Italian); ETYLOBENZEN (Polish); NCI-C56393; PHENYLETHANE

CAS: 100-41-4 RTECS: DA0700000

FORMULA: C8H10 MOL WT: 106.18

WLN: 2R

CHEMICAL CLASS: Aromatic hydrocarbon

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: colorless liquid with a sweet, gasoline-like odor.

BOILING POINT:	409.2 K	136 C	276.8 F
MELTING POINT:	178.15 K	-95 C	-139 F
FLASH POINT:	294.26 K	21.11 C	69.9 F
AUTO IGNITION:	733 K	459.8 C	1351.4 F
CRITICAL TEMP:	617.1 K	343.95 C	651.11 F
CRITICAL PRESS:	3.61 kN/M2	35.5 atm	523 psia
HEAT OF VAP:	144 Btu/lb	79.97 cal/g	3.346x E5 J/kg
HEAT OF COMB:	-17780 Btu/lb	-9885 cal/g	-413x E5 J/kg

VAPOR PRESSURE: 10mm @ 25.9 C

UEL: 6.7 %

LEL: 1.0 %

IONIZATION POTENTIAL (eV): 8.76

VAPOR DENSITY: 3.7 (air=1)

EVAPORATION RATE: 0.84(n-BUTYL ACETATE=1)

SPECIFIC GRAVITY: 0.867 20C

DENSITY: 0.866 g/mL @ 20 C

WATER SOLUBILITY: 0.015%

INCOMPATIBILITIES: strong oxidizers

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: OXIDIZING MATERIALS Source: SAX

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors

ODOR DETECTED AT (ppm): 140

ODOR DESCRIPTION: AROMATIC Source:CHRIS

100 % ODOR DETECTION: No data

REGULATIONS

DOT hazard class:	3 FLAMMABLE LIQUID
DOT guide:	26
Identification number:	UN1175
DOT shipping name: (after shipping description):	Ethylbenzene
Packing group:	II
Label(s) required:	FLAMMABLE LIQUID
Special provisions:	T1
Packaging exceptions:	173.150
Non bulk packaging:	173.202
Bulk packaging:	173.242
Quantity limitations-	
Passenger air/rail:	5 L
Cargo aircraft only:	60 L
Vessel stowage:	B
Other stowage provisions:	

STCC NUMBER: 4909163

CLEAN WATER ACT Sect.307: Yes
CLEAN WATER ACT Sect.311: Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL): 0.7 mg/L (07/30/92)
Maximum Contaminant Level Goals (MCLG): 0.7 mg/L (07/30/92)

CLEAN AIR ACT:	CAA '90 Listed
EPA WASTE NUMBER:	D001
CERCLA REF:	Y
RQ DESIGNATION:	C
ARA TPQ VALUE:	1000 pounds (454 kg) CERCLA
SARA Sect. 312 categories:	Not listed

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.

LISTED IN SARA Sect 313:	Yes
de minimus CONCENTRATION:	1.0 percent

UNITED STATED POSTAL SERVICE MAILABILITY:

Hazard class:	Flammable liquid - Mailable as ORM-D
Mailability:	Domestic surface mail only
Max per parcel:	1 QT METAL; 1 PT OTHER

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED): (3) This material can be ignited under almost all temperature conditions.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON ----------

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 1803 Well Monitoring Chemicals.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 11/19/82
EPA TSCA 8(d) Health and Safety Data Rule - effective date 06/19/87
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
ETHYL BENZENE [100-41-4]
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR
RCRA Hazardous Waste
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: INHALATION: 200 ppm for 30 minutes can cause irritation of the nose and throat, dizziness, difficult breathing and depression. very high levels can cause unconsciousness. SKIN: can cause irritation, inflammation, blisters and burns. Eyes: 200 ppm can cause irritation. higher levels can cause burning, tearing and injury. INGESTION: can cause headache, sleepiness and coma. (NYDH)

LONG TERM TOXICITY: may cause skin rash and irritation of eyes, nose and throat. (NYDH)

TARGET ORGANS: eyes, upper resp sys, skin, CNS

SYMPTOMS:

Inhalation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters. Source: CHRIS

CONC IDLH: 2000PPM

NIOSH REL:

ACGIH TLV: TLV = 100ppm(435 mg/M3)
ACGIH STEL: STEL = 125 ppm(545 mg/M3)

OSHA PEL:

Transitional Limits:
PEL = 100 ppm(435mg/M3)
Final Rule Limits:
TWA = 100 ppm (435 mg/M3)
STEL = 125 ppm(545 mg/M3)

MAK INFORMATION:

100 ppm
440 mG/M3
Local irritant: Peak = 2xMAK for 5 minutes, 8 times per shift.
Danger of cutaneous absorption

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-hmn TCLo:100 ppm/8H AIHAAP 31,206,70
SENSE ORGANS
Eye
Other
BEHAVIORAL
Sleep
LUNGS, THORAX, OR RESPIRATION
Other changes

LD50 value: orl-rat LD50:3500 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:3500 mg/kg
ihl-rat LCLo:4000 ppm/4H
ihl-mus LDLo:50 gm/m3/2H
ipr-mus LD50:2272 mg/kg

skn-rbt LD50:17800 mg/kg
ihl-gpg LCLo:10000 ppm

IRRITATION DATA: (Source: NIOSH RTECS 1992)

skn-rbt 15 mg/24H open MLD
eye-rbt 100 mg

Reproductive toxicity (1992 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rat TCLo:97 ppm/7H (15D pre) NTIS** PB83-208074
EFFECTS ON FERTILITY
Female fertility index

ihl-rat TCLo:985 ppm/7H (1-19D preg) NTIS** PB83-208074
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:96 ppm/7H (1-19D preg) NTIS** PB83-208074
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:600 mg/m3/24H (7-15D preg) ATSUDG 8,425,85
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetal death
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:2400 mg/m3/24H (7-15D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rbt TCLo:99 ppm/7H (1-18D preg) NTIS** PB83-208074
EFFECTS ON FERTILITY
Litter size(# fetuses per litter;measured before birth)

ihl-rbt TCLo:500 mg/m3/24H (7-20D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

California Prop 65: Not listed

---------- EPA's IRIS DATA SUMMARY ----------
Ethylbenzene; CASRN 100-41-4 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Ethylbenzene

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which ris is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I fo information on long-term toxic effects other than carcinogenicity.

__II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

___II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- nonclassifiable due to lack of animal bioassays and human studies.

___II.A.2. HUMAN CARCINOGENICITY DATA

None.

___II.A.3. ANIMAL CARCINOGENICITY DATA

None. NTP has plans to initiate bioassay. Metabolism and excretion studies at 3.5, 35 and 350 mg/kg are to be conducted as well.

___II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

The metabolic pathways for humans and rodents are different (Engstrom et al., 1984). Major metabolites in humans, mandelic acid and phenylglyoxylic acid, are minor metabolites in rats and rabbits (Kiese and Lenk, 1974). The major animal metabolites were not detected in the urine of exposed workers (Engstrom et al., 1984).

Ethylbenzene at 0.4 mg/plate was not mutagenic for Salmonella strains

TA98, TA1535, TA1537 and TA1538 with or without Aroclor 1254 induced rat liver homogenates (S9) (Nestmann et al., 1980). Ethylbenzene was shown to increase the mean number of sister chromatid exchanges in human whole blood lymphocyte culture at the highest dose examined without any metabolic activation system (Norppa and Vainio, 1983).

Dean et al. (1985) used a battery of short-term tests including bacterial mutation assays, mitotic gene conversion in Saccharomyces cerevisiae JD1 in the presence and absence of S9 and chromosomal damage in a cultured rat liver cell line. Ethylbenzene was not mutagenic in the range of concentrations tested (0.2, 2, 20, 50 and 200 ug/plate) for S. typhimurium TA98, TA100, TA1535, TA1537 and TA1538 or for Escherichia coli WP2 and WP2uvrA. Ethylbenzene also showed no response in the S. cerevisiae JD1 gene conversion assay. In contrast, ethylbenzene hydroperoxide showed positive responses with E. coli WP2 at 200 ug/plate in the presence of S9 and an equally significant response with the gene conversion system of yeast.

__II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

__II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

__II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

U.S. EPA. 1980. Ambient Water Quality Criteria Document for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Water Regulations and Standards, Washington, DC. EPA 440/5-80-048. NTIS PB 81-117590.

U.S. EPA. 1984. Health Effects Assessment for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Emergency and Remedial

Response, Washington, DC. EPA/540/1-86/008.

U.S. EPA. 1987. Drinking Water Criteria Document for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC.

___II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The Ambient Water Quality Criteria Document and the Health Assessment Document have received Agency and external review. The Drinking Water Criteria Document has been extensively reviewed.

Agency Work Group Review: 10/07/87

Verification Date: 10/07/87

___II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Arthur S. Chiu / ORD -- (202)260-6764 / FTS 260-6764

Lynn Papa / ORD -- (513)569-7523 / FTS 684-7523

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
self-contained breathing apparatus; safety goggles.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabili

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (ETHYL BENZENE)

1000 ppm: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection. / Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection.
2000 ppm: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any supplied-air respirator with a full facepiece. / Any self-contained breathing apparatus with a full facepiece.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: CHRIS Manual 1991
INHALATION: if ill effects occur, remove victim to fresh air, keep him warm and quiet, and get medical help promptly; if breathing stops, give artificial respiration.
INGESTION: induce vomiting only upon physician's approval; material in lung may cause chemical pneumonitis.
SKIN AND
EYES: promptly flush with plenty of water (15 min. for eyes) and get medical attention; remove and wash contaminated clothing before reuse.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

---------- INITIAL INCIDENT RESPONSE ----------

FIRE EXTINGUISHMENT: Foam (most effective), water fog, carbon dioxide or dry chemical. CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: Ethylbenzene
DOT ID NUMBER: UN1175

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GUIDE 26

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Flammable/combustible material; may be ignited by heat, sparks or flames.
Vapors may travel to a source of ignition and flash back.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS

May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may give off poisonous gases and ca

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Positive pressure self-contained breathing apparatus (SCBA) and structural fi
*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is in
CALL Emergency Response Telephone Number on Shipping Paper first. If Shippin
If water pollution occurs, notify the appropriate authorities.

*FIRE

Small Fires: Dry chemical, CO2, water spray or alcohol-resistant foam.
Do not use dry chemical extinguishers to control fires involving nitromethane
Large Fires: Water spray, fog or alcohol-resistant foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until w
For massive fire in cargo area, use unmanned hose holder or monitor nozzles;
Withdraw immediately in case of rising sound from venting safety device or an

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
ater spray may reduce vapor; but it may not prevent ignition in closed space
Small Spills: Take up with sand or other noncombustible absorbent material a
Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, g
In case of contact with material, immediately flush eyes with running water f
Remove and isolate contaminated clothing and shoes at the site.

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forms.

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CHEMTOX DATA

IDENTIFIERS

CHEMTOX RECORD 1513

LAST UPDATE OF THIS RECORD: 06/03/

NAME: KEROSENE

SYNONYMS: COAL OIL; KEROSINE; ILLUMINATING OIL; RANGE OIL; A FUEL OIL NO. 1; JET FUEL; JP-1

CAS: 8008-20-6

RTECS: NY9350000

FORMULA: CnH2n+2

MOL WT:

WLN:

CHEMICAL CLASS:

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: colorless watery liquid with a fuel oil odor; pale yellow or water white, mobile oily liquid

BOILING POINT:	448.16-598.16 K	175-325 C	347-617 F
MELTING POINT:	227.55 K	-45.6 C	-50.1 F
FLASH POINT:	310.92 K	37.77 C	99.9 F
AUTO IGNITION:	502 K	228.8 C	935.6 F

VAPOR PRESSURE: 2 mmHg @ 21 C

UEL: 5.0 %

LEL: 0.7 %

IONIZATION POTENTIAL (eV): 6.79

VAPOR DENSITY: 4.5 (air=1)

EVAPORATION RATE: 0.212138

SPECIFIC GRAVITY: 0.80 15C

DENSITY: 0.80 g/mL

WATER SOLUBILITY: INSOLUBLE

INCOMPATIBILITIES:

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: OXIDIZING MATERIALS

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors

ODOR DETECTED AT (ppm): 1 ppm

ODOR DESCRIPTION: Fuel oil odor Source:CHRIS

100 % ODOR DETECTION: No data

REGULATIONS

DOT hazard class: 3 FLAMMABLE LIQUID

DOT guide: 27

Identification number: UN1223

DOT shipping name:	Kerosene
Packing group:	III
Label(s) required:	FLAMMABLE LIQUID
Special provisions:	B1,T1
Packaging exceptions:	173.150
Non bulk packaging:	173.203
Bulk packaging:	173.242
Quantity limitations-	
Passenger air/rail:	60 L
Cargo aircraft only:	220 L
Vessel stowage:	A
Other stowage provisions:	

STCC NUMBER: 4915171

CLEAN WATER ACT Sect.307:	No
CLEAN WATER ACT Sect.311:	No
CLEAN AIR ACT:	Not listed
EPA WASTE NUMBER:	D001
CERCLA REF:	Not listed
RQ DESIGNATION:	Not listed
SARA TPQ VALUE:	Not listed
SARA Sect. 312 categories:	

Acute toxicity: Irritant
Chronic toxicity: mutagen.
Fire hazard: flammable.
Chronic toxicity: carcinogen

UNITED STATED POSTAL SERVICE MAILABILITY:

Hazard class:	Combustible liquid - Mailable as ORM-D
Mailability:	Domestic service and air transportation shipper's declaratic
Max per parcel:	1 GAL

NFPA CODES:

HEALTH HAZARD (BLUE):	(0) No unusual health hazard.
FLAMMABILITY (RED) :	(2) This material must be moderately heated before ignition will occur.
REACTIVITY (YELLOW):	(0) Stable even under fire conditions.
SPECIAL :	Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON ---------

Canadian Domestic Substances List
DOT Hazardous Materials Table. 49 CFR 172.101
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
KEROSENE [8008-20-6]

Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
Pennsylvania Hazardous Substance List
RCRA Hazardous Waste

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: INHALATION: does not evaporate fast enough to cause health effects except when heated or in enclosed spaces. headache, tiredness, stupor, dizziness, nausea, coma and death, may occur with increasing exposure. SKIN: if not promptly removed, may cause reddening, blisters, itching and an increased risk of infection. Eyes: irritation may occur. INGESTION: accidental ingestion of unknown amounts has caused irritation of mouth, throat and stomach, nausea, vomiting, rapid breathing, blue skin coloration, and convulsions. death may result from as little as 1 fluid ounce. inhalation into lungs following ingestion may result in bronchitis, chemical pneumonia, accumulation of fluid and blood in lungs, and death. as little as 1/30 oz. may be fatal in this way. (NYDH)

LONG TERM TOXICITY: absorption through skin is slow but repeated skin contact over many years has caused muscular weakness, anemia, changes in white blood cells, fever and death. (NYDH)

TARGET ORGANS:

SYMPTOMS: Vapor causes slight irritation of eyes and nose. Liquid irritates stomach; if taken into lungs, causes coughing, distress, and rapidly developing pulmonary edema. Source: CHRIS

CONC IDLH: Nonegiven

NIOSH REL: 100 mg/M3 Time weighted averages for 8-hour exposure

ACGIH TLV: Not listed
ACGIH STEL: Not listed

OSHA PEL: Not in Table Z-1-A

MAK INFORMATION: Not listed

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be probably carcinogenic to humans with (usually). at least limited human evidence.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: orl-rat LD50:26 gm/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:26 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):
This chemical has no known mammalian reproductive toxicit

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
protective gloves; goggles or face sheild.

FIRST AID SOURCE: CHRIS Manual 1991
ASPIRATION: enforce bed rest; administer oxygen; call a doctor.
INGESTION: do NOT induce vomiting; call a doctor.
EYES: wash with plenty of water.
SKIN: wipe off and wash with soap and water.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

---------- INITIAL INCIDENT RESPONSE ----------

FIRE EXTINGUISHMENT: Foam, dry chemical, or carbon dioxide. Note: Water may be ineffective CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: Kerosene
DOT ID NUMBER: UN1223

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION
Flammable/combustible material; may be ignited by heat, sparks or flames.
Vapors may travel to a source of ignition and flash back.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.
Material may be transported hot.
*HEALTH HAZARDS
May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Positive pressure self-contained breathing apparatus (SCBA) and structural fir
*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is inv
CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping
If water pollution occurs, notify the appropriate authorities.
*FIRE
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until we
For massive fire in cargo area, use unmanned hose holder or monitor nozzles; i
Withdraw immediately in case of rising sound from venting safety device or any
*SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Water spray may reduce vapor; but it may not prevent ignition in closed spaces
Small Spills: Take up with sand or other noncombustible absorbent material an
Large Spills: Dike far ahead of liquid spill for later disposal.
*FIRST AID
Move victim to fresh air and call emergency medical care; if not breathing, gi
In case of contact with material, immediately flush eyes with running water fo
Remove and isolate contaminated clothing and shoes at the site.

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IDENTIFIERS

CHEMTOX RECORD 388
LAST UPDATE OF THIS RECORD: 06/03/93

NAME: TETRAETHYL LEAD
SYNONYMS: PLUMBANE, TETRAETHYL-; LEAD TETRAETHYL; TEL; MOTOR FUEL ANTI-KNOCK COMPOUND
CAS: 78-00-2
FORMULA: $Pb(C_2H_5)_4$
RTECS: TP4550000
WLN: 2-PB-2
MOL WT: 323
CHEMICAL CLASS: Organometallic

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: oily liquid, colorless, but generally dyed red, with a fruity odor.

BOILING POINT:	373.15 K	100 C	212 F
MELTING POINT:	135.38 K	-137.8 C	-216 F
FLASH POINT:	366 K	92.85 C	199.1 F
AUTO IGNITION:	383 K	109.8 C	721.4 F

VAPOR PRESSURE: 0.2 mm @ 20 C
UEL: ?
LEL: 1.8 %
IONIZATION POTENTIAL (eV): 11.1
VAPOR DENSITY: No data
EVAPORATION RATE: 0.02
SPECIFIC GRAVITY: 1.633 20C
DENSITY: 1.633 g/cc or 15.1869 lb/gal
WATER SOLUBILITY: INSOLUBLE
INCOMPATIBILITIES: strong oxidizers, sulfuryl chloride, potassium permanganate

REACTIVITY WITH WATER: No data on water reactivity
REACTIVITY WITH COMMON MATERIALS: RUST AND SOME METALS CAUSE DECOMPOSITION
STABILITY DURING TRANSPORT: STABLE BELOW 230F. AT HIGHER TEMPERATURES, MAY DETONATE OR EXPLODE WHEN CONFINED.
NEUTRALIZING AGENTS: No data
POLYMERIZATION POSSIBILITIES: No data
TOXIC FIRE GASES: None reported other than possible unburned vapors
ODOR DETECTED AT (ppm): Unknown
ODOR DESCRIPTION: SWEETISH, SLIGHTLY MUSTY, PLEASANT Source:NYDH
100 % ODOR DETECTION: No data

REGULATIONS

DOT hazard class:	6.1 POISON
DOT guide:	56
Identification number:	NA1649
DOT shipping name:	TETRAETHYL LEAD, LIQUID
Packing group:	I
Label(s) required:	POISON, FLAMMABLE LIQUID
Special provisions:	
Packaging exceptions:	173.NONE
Non bulk packaging:	173.201
Bulk packaging:	173.NONE
Quantity limitations-	
Passenger air/rail:	FORBIDDEN
Cargo aircraft only:	FORBIDDEN
Vessel stowage:	E
Other stowage provisions:	40

STCC NUMBER:	Not listed

CLEAN WATER ACT Sect.307:	Yes
CLEAN WATER ACT Sect.311:	Yes
CLEAN AIR ACT:	CAA '90 By category
EPA WASTE NUMBER:	P110,D008
CERCLA REF:	Not listed
RQ DESIGNATION:	A 10 pounds (4.54 kg) CERCLA
SARA TPQ VALUE:	100 pounds
SARA Sect. 312 categories:	Acute toxicity: adverse effect to target organs. Chronic toxicity: adverse effect to target organ after long period of exposure. Chronic toxicity: mutagen. Chronic toxicity: reproductive toxin. Acute toxicity: Highly toxic. LD50 is 50 mg/kg or less (oral rat). Chronic toxicity: carcinogen
LISTED IN SARA Sect 313:	Yes
de minimus CONCENTRATION:	1.0 percent

UNITED STATED POSTAL SERVICE MAILABILITY:

Hazard class:	Not given
Mailability:	Nonmailable
Max per parcel:	0

NFPA CODES:

HEALTH HAZARD (BLUE): (3) Extremely hazardous to health. Full protection required. No skin surface should be exposed.

FLAMMABILITY (RED) : (2) This material must be moderately heated before ignition will occur.

REACTIVITY (YELLOW): (3) Capable of detonation or explosive decomposition, but requires a strong initiating

SPECIAL source.
: Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -------

ACGIH TLV list "Threshold Limit Values for 1992-1993"
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 12
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
First Third Wastes List. 40 CFR 268.10. 54 FR 26594 (June 23, 1989)
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
Pennsylvania Hazardous Substance List
RCRA Hazardous Waste
RCRA Toxicity Characteristics (TC) list dated March 29, 1990
SARA Section 313 Toxic Chemicals List
SARA Title III Extremely Hazardous Substance. Sections 302 and 304.
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
TETRAETHYL LEAD [78-00-2]
Washington State Discarded Chemical Products List, November 17, 1989

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: INHALATION: reported symptoms are from accidental exposure and no levels were available. insomnia, disturbing dreams, loss of appetite, nausea, vomiting, diarrhea, headache, muscle weakness, abdominal pain and metallic taste may result from moderate exposure. more severe exposures may cause muscular incoordination, accumulation of fluid in the lungs, hallucinations, convulsions, coma and death. some symptoms may be delayed hours or days. SKIN: is absorbed slowly and can cause or increase the severity of symptoms listed above. Eyes: can cause irritation. INGESTION: an unusual route of exposure, but may cause symptoms listed above. based on animal studies about 1/25 ounce would be fatal.(NYDH)

LONG TERM TOXICITY: prolonged exposure to low levels may cause symptoms listed above.(NYDH)

TARGET ORGANS: CNS, cardiovascular syst., kidneys, eyes.

SYMPTOMS: Increased urinary output of lead. If a large degree of absorption from inhalation or skin contact, may cause insomnia, excitability, delirium, coma and death. Do not confuse with inorganic lead. Source: CHRIS

CONC IDLH: 40MG/M3

NIOSH REL: <0.1 mg/M3 Air level to be maintained so that worker blood level remains <0.06 mg/100 g of whole blood

ACGIH TLV: TLV = 0.100mg/M3 SKIN - (as Pb)
ACGIH STEL: Not listed

OSHA PEL: Transitional Limits:
PEL = 0.075mg/M3(SKIN)
Final Rule Limits:
TWA = 0.075 mg/M3(SKIN)

MAK INFORMATION: 0.01 ppm
0.075 mG/M3
Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 2xMAK for 30 minutes, 4 times per shift of 8 hours.
Danger of cutaneous absorption

CARCINOGEN?: N STATUS: See below
REFERENCES:

ANIMAL INDEFINITE IARC** 2,150,73
ANIMAL INDEFINITE IARC** 23,325,80

CARCINOGEN LISTS:

IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
ihl-hmn TCLo:1749 gm/m3/30M SAIGBL 17,223,75
SENSE ORGANS
Nose
Other
SENSE ORGANS
Eye
Lacrimation
GASTROINTESTINAL
Nausea or vomiting

LD50 value: orl-rat LD50:12300 ug/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:12300 ug/kg
ihl-rat LC50:850 mg/m3/1H
ipr-rat LD50:15 mg/kg
ivn-rat LD50:14400 ug/kg
par-rat LD50:15 mg/kg
ihl-mus LCLo:650 mg/m3/7H
skn-dog LDLo:547 mg/kg
orl-rbt LDLo:30 mg/kg
skn-rbt LDLo:830 mg/kg
scu-rbt LDLo:32 mg/kg
ivn-rbt LDLo:22 mg/kg
skn-gpg LDLo:995 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:11 mg/kg (6-16D preg) FCTXAV 13,629,75
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-rat TDLo:7500 ug/kg (12-14D preg) TXAPA9 21,265,72
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ipr-rat TDLo:3 mg/kg (14D preg) BNEOBV 58,41,90
EFFECTS ON NEWBORN

California Prop 65: Carcinogen (10/01/92)

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Any possibility of skin contact.

** WEAR EYE PROTECTION TO PREVENT:

Reasonable probability of eye contact.

** WORK CLOTHING SHOULD BE CHANGED DAILY:
If there is any possibility that the clothing may be contaminated.

** REMOVE CLOTHING:
Immediately remove non-impervious clothing that becomes contaminated.

** THE FOLLOWING EQUIPMENT SHOULD BE MADE AVAILABLE:
Eyewash, quick drench.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (TETRAETHYL LEAD)
0.75 mg/M3: Any supplied-air respirator. / Any self-contained breathing apparatus.
1.875 mg/M3: Any supplied-air respirator operated in a continuous flow mode.
3.75 mg/M3: Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece. / Any supplied-air respirator with a tight-fitting facepiece operated in a continuous flow mode.
40 mg/M3: Any supplied-air respirator with a half-mask and operated in a pressure-demand or other positive pressure mode.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSH
EYE: irr immed
SKIN: petro product rinse
INHALATION: art resp
INGESTION: water, vomit

FIRST AID SOURCE: CHRIS Manual 1991
Remove victim from contaminated area and consult physician immediately.
INGESTION: induce vomiting.
SKIN: wash immediately with kerosene or similar petroleum distillate followed by soap and water.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material

from skin is of extreme importance. Removal of solidified molten material from skin requires medical assistance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.

---------- INITIAL INCIDENT RESPONSE ----------

FIRE EXTINGUISHMENT: Water, foam, dry chemical, or carbon dioxide. CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: TETRAETHYL LEAD, LIQUID
DOT ID NUMBER: NA1649

ERG93

GUIDE 56

POTENTIAL HAZARDS

*HEALTH HAZARDS
Poisonous; may be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes.
Runoff from fire control or dilution water may cause pollution.
*FIRE OR EXPLOSION
Some of these materials may burn, but none of them ignites readily.
May explode from friction, heat or contamination.
Material may be transported in a molten form.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind, out of low areas, and ventilate closed spaces before entering.
Positive pressure self-contained breathing apparatus (SCBA) and chemical prot
:e the Table of Initial Isolation and Protective Action Distances. If you f
CALL Emergency Response Telephone Number on Shipping Paper first. If Shippin
*FIRE
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until we
For massive fire in cargo area, use unmanned hose holder or monitor nozzles;
*SPILL OR LEAK
Do not touch or walk through spilled material; stop leak if you can do it wit
Fully-encapsulating, vapor-protective clothing should be worn for spills and
Use water spray to reduce vapors.
Small Spills: Take up with sand or other noncombustible absorbent material a
Small Dry Spills: With clean shovel place material into clean, dry container
Large Spills: Dike far ahead of liquid spill for later disposal.
*FIRST AID
Move victim to fresh air and call emergency medical care; if not breathing, g
In case of contact with material, immediately flush skin or eyes with running
Speed in removing material from skin is of extreme importance.
Removal of solidified molten material from skin requires medical assistance.
Remove and isolate contaminated clothing and shoes at the site.
Keep victim quiet and maintain normal body temperature.
Effects may be delayed; keep victim under observation.

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CHEMTOX DATA

IDENTIFIERS

CHEMTOX RECORD 398
NAME: TOLUENE
LAST UPDATE OF THIS RECORD: 06/03/93
SYNONYMS: TOLUOL; PHENYL METHANE; METHYL BENZENE; BENZENE, METHYL-
CAS: 108-88-3
RTECS: XS5250000
FORMULA: C7H8
MOL WT: 92
WLN: 1R
CHEMICAL CLASS: Aromatic hydrocarbon

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION:	colorless watery liquid with a pleasant odor		
BOILING POINT:	383.6 K	110.4 C	230.8 F
MELTING POINT:	178.00 K	-95.2 C	-139.3 F
FLASH POINT:	277.6 K	4.45 C	40 F
AUTO IGNITION:	809 K	535.8 C	1488.2 F
CRITICAL TEMP:	591.8 K	318.65 C	605.57 F
CRITICAL PRESS:	4.108 kN/M2	40.5 atm	595 psia
HEAT OF VAP:	155 Btu/lb	86.08 cal/g	3.601x E5 J/kg
HEAT OF COMB:	-17430 Btu/lb	-9690 cal/g	-405x E5 J/kg
VAPOR PRESSURE:	36.7 mm @ 30 C		
UEL:	7.1 %		
LEL:	1.3 %		
IONIZATION POTENTIAL (eV):	8.82		
VAPOR DENSITY:	3.14 (air=1)		
EVAPORATION RATE:	2.00(n-BUTYL ACETATE=1)		
SPECIFIC GRAVITY:	0.867 @ 20 C		
DENSITY:	0.867		
WATER SOLUBILITY:	0.05%		
INCOMPATIBILITIES:	strong ox		
REACTIVITY WITH WATER:	No data on water reactivity		
REACTIVITY WITH COMMON MATERIALS:	No data		
STABILITY DURING TRANSPORT:	No Data		
NEUTRALIZING AGENTS:	No data		
POLYMERIZATION POSSIBILITIES:	No data		
TOXIC FIRE GASES:	None reported other than possible unburned vapors		
ODOR DETECTED AT (ppm):	40 PPM		
ODOR DESCRIPTION:	STRONG, PLEASANT Source:NYDH		
100 % ODOR DETECTION:	No data		

REGULATIONS

DOT hazard class: 3 FLAMMABLE LIQUID

DOT guide: 27
Identification number: UN1294
DOT shipping name: Toluene
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T1
Packaging exceptions: 173.150
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:

STCC NUMBER: 4909305

CLEAN WATER ACT Sect.307: Yes
CLEAN WATER ACT Sect.311: Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL): 1 mg/L (07/30/92)
Maximum Contaminant Level Goals (MCLG): 1 mg/L (07/30/92)
CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: U220,D001
CERCLA REF: Not listed
RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312 categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: adverse effect to target organ after long period of exposure.
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.

Fire hazard: flammable.
Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATED POSTAL SERVICE MAILABILITY:
Hazard class: Flammable liquid - Mailable as ORM-D
Mailability: Domestic surface mail only
Max per parcel: 1 QT METAL; 1 PT OTHER

NFPA CODES:
HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED): (3) This material can be ignited under almost all temperature conditions.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -------

ACGIH TLV list "Threshold Limit Values for 1992-1993"
ATSDR Toxicology Profile available (NTIS** PB/90/198904/AS)
California Assembly Bill 1803 Well Monitoring Chemicals.
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
California Department of Health Services Drinking Water Action List.
California Proposition 65 Developmental Toxin List
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 11/19/82
EPA TSCA 8(d) Health and Safety Data Rule - effective date 10/04/82
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
Pennsylvania Hazardous Substance List
[illegible] Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR 26
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
TOLUENE [108-88-3]
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: INHALATION: 100 ppm exposure can cause dizziness, drowsiness and hallucinations. 100-200 ppm can cause depression. 200-500 ppm can cause headaches, nausea, loss of appetite, loss of energy, loss of coordination and coma. in addition to the above, death has resulted from exposure to 10,000 ppm for an unknown time. SKIN: can cause dryness and irritation. absorption may cause or increase the severity of

symptoms listed above. Eyes: can cause irritation at 300 ppm. INGESTION: can cause a burning sensation in the mouth and stomach, upper abdominal pain, cough, hoarseness, headache, nausea, loss of appetite, loss of energy, loss of coordination and coma.(NYDH)

LONG TERM TOXICITY: levels below 200 ppm may produce headache, tiredness and nausea. from 200 to 750 ppm symptoms may include insomnia, irritability, dizziness, some loss of memory, loss of appetite, a feeling of drunkeness and disturbed menstruation. levels up to 1,500 ppm may cause heart palpitations and loss of coordination. blood effects and anemia have been reported but are probably due to contamination by benzene. most of these effects area believed to go away when exposure stops.(NYDH)

TARGET ORGANS: CNS, liver, kidneys, skin, eyes

SYMPTOMS: Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest. Liquid irritates eyes and causes drying of skin. If aspirated, causes coughing, gagging, distress, and rapidly developing pulmonary edema. If ingested causes vomiting, griping, diarrhea, depressed respiration. Source: CHRIS

CONC IDLH: 2000ppm

IOSH REL: 100 ppm Time weighted averages for 8-hour exposure 375 mg/M3 Time weighted averages for 8-hour exposure 200 ppm Ceiling exposures which shall at no time be exceeded(10-MIN) 750 mg/M3 Ceiling exposures which shall at no time be exceeded( )

ACGIH TLV: TLV = 50ppm(188 mg/M3) Skin

ACGIH STEL: Not listed

OSHA PEL:

Transitional Limits:
PEL = 200 PPM; CEILING = 300 PPM; MAXIMUM PEAK ABOVE CEILI
Final Rule Limits:
TWA = 100 ppm (375 mg/M3)
STEL = 150 ppm(560 mg/M3)

MAK INFORMATION:

50 ppm
190 mG/M3
Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 5xMAK for 30 minutes, 2 times per shift of 8 hours.
There is no reason to fear a risk of damage to the developing embryo or fetus when MAK values are adhered to.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

* orl-hmn LDLo:50 mg/kg YAKUD5 22,883,80

ihl-hmn TCLo:200 ppm JAMAAP 123,1106,43
BRAIN AND COVERINGS
Recordings from specific areas of CNS
BEHAVIORAL
Antipsychotic
BLOOD
Changes in bone marrow not included above

LD50 value: orl-rat LD50:636 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:636 mg/kg
ihl-rat LC50:>26700 ppm/1H
ipr-rat LD50:1332 mg/kg
ivn-rat LD50:1960 mg/kg
unr-rat LD50:6900 mg/kg
ihl-mus LC50:400 ppm/24H
ipr-mus LD50:59 mg/kg
scu-mus LD50:2250 mg/kg
unr-mus LD50:2 gm/kg
ihl-rbt LCLo:55000 ppm/40M
skn-rbt LD50:12124 mg/kg
ivn-rbt LDLo:130 mg/kg
ihl-gpg LCLo:1600 ppm
ipr-gpg LD50:500 mg/kg
scu-frg LDLo:920 mg/kg
ipr-mam LDLo:1750 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)
ihl-rat TCLo:1500 mg/m3/24H (1-8D preg) TXCYAC 11,55,78

EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:1000 mg/m3/24H (7-14D preg) FMORAO 28,286,80
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:800 mg/m3/6H (14-20D preg) BJMRDK 23,533,90
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
EFFECTS ON NEWBORN
Behavioral

orl-mus TDLo:9 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetal death

orl-mus TDLo:15 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-mus TDLo:30 gm/kg (6-15D preg) TJADAB 19,41A,79
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)

ihl-mus TCLo:500 mg/m3/24H (6-13D preg) TXCYAC 11,55,78
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-mus TCLo:1000 ppm/6H (2-17D preg) TJEMDR 7,265,82
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLo:400 ppm/7H (7-16D preg) FAATDF 6,145,86
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
EFFECTS ON NEWBORN

ihl-mus TCLo:200 ppm/7H (7-16D preg) FAATDF 6,145,86
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Urogenital system

ihl-rbt TCLo:1 gm/m3/24H (7-20D preg) ATSUDG 8,425,85
EFFECTS ON FERTILITY
Abortion

ihl-rbt TDLo:100 ppm/6H (6-18D preg) ARTODN 66,373,92
SPECIFIC DEVELOPMENTAL ABNORMALITIES

Cardiovascular(circulatory)system

California Prop 65: Developmental toxin (01/01/91)
Acceptable intake level-inhalation 13000. ugD (01/01/94)
Acceptable intake level-oral intake 7000. ugD (01/01/94)

---------- EPA's IRIS DATA SUMMARY ----------
Toluene; CASRN 108-88-3 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Toluene
CASRN -- 108-88-3
Last Revised -- 08/01/90

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

__II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

___II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classified

Basis -- No human data and inadequate animal data. Toluene did not produce positive results in the majority of genotoxic assays.

___II.A.2. HUMAN CARCINOGENICITY DATA

None.

___II.A.3. ANIMAL CARCINOGENICITY DATA

A chronic (106-week) bioassay of toluene in F344 rats of both sexes

reported no carcinogenic responses (CIIT, 1980). A total of 960 rats were exposed by inhalation for 6 hours/day, 5 days/week to toluene at 0, 30, 100, or 300 ppm. Groups of 20/sex/dose were sacrificed at 18 months. Gross and microscopic examination of tissues and organs identified no increase in neoplastic tissue or tumor masses among treated rats when compared with controls. The study is considered inadequate because the highest dose administered was well below the MTD for toluene and because of the high incidence of lesions and pathological changes in the control animals.

Several studies have examined the carcinogenicity of toluene following repeated dermal applications. Toluene (dose not reported) applied to shaved interscapular skin of 54 male mice (strains A/He, C3HeB, SWR) throughout their lifetime (3 times weekly) produced no carcinogenic response (Poel, 1963). One drop of toluene (about 6 mL) applied to the dorsal skin of 20 random-bred albino mice twice weekly for 50 weeks caused no skin papillomas or carcinomas after a 1-year latency period was allowed (Coombs et al., 1973). No increase in the incidence of skin or systemic tumors was demonstrated in male or female mice of three strains (CF, C3H, or CBaH) when toluene was applied to the back of 25 mice of each sex of each strain at 0.05-0.1 mL/mouse, twice weekly for 56 weeks (Doak et al., 1976). One skin papilloma and a single skin carcinoma were reported among a group of 30 mice treated dermally with one drop of 0.2% (w/v) solution toluene twice weekly, administered from droppers delivering 16-20 uL per drop for 72 weeks (Lijinsky and Garcia, 1972). It is not reported whether evaporation of toluene from the skin was prevented during these studies.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Toluene was found to be nonmutagenic in reverse mutation assays with S. typhimurium (Mortelmans and Riccio, 1980; Nestmann et al., 1980; Bos et al., 1981; Litton Bionetics, Inc., 1981; Snow et al., 1981) and E. coli (Mortelmans and Riccio, 1980), with and without metabolic activation. Toluene did not induce mitotic gene conversion (Litton Bionetics, Inc., 1981; Mortelmans and Riccio, 1980) or mitotic crossing over (Mortelmans and Riccio, 1980) in S. cerevisiae. Although Litton Bionetics, Inc. (1981) reported that toluene did not cause increased chromosomal aberrations in bone marrow cells, several Russian studies (Dobrokhotov, 1972; Lyapkalo, 1973) report toluene as effective in causing chromosal damage in bone marrow cells of rats. There was no evidence of chromosomal aberrations in blood lymphocytes of workers exposed to toluene only (Maki-Paakkanen et al., 1980; Forni et al., 1971), although a slight increase was noted in workers exposed to toluene and benzene (Forni et al., 1971; Funes-Craviota et al., 1977). This finding is supported by studies of cultured human lymphocytes exposed to toluene in vitro; no elevation of chromosomal aberrations or sister chromatid exchanges was observed (Gerner-Smidt and Friedrich, 1978).

II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

__II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

__II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

U.S. EPA. 1987. Drinking Water Criteria Document for Toluene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-408.

___II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The values in the 1987 Drinking Water Criteria Document for Toluene have received peer and administrative review.

Agency Work Group Review: 09/15/87

Verification Date: 09/15/87

___II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Dharm V. Singh / ORD -- (202)260-5958 / FTS 260-5958

Robert E. McGaughy / ORD -- (202)260-5898 / FTS 260-5898

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabili

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (TOLUENE)
1000 ppm: Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.
2000 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require ye protection. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece. / Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSH
EYE: irr immed
SKIN: soap wash promptly
INHALATION: art resp
INGESTION: no vomit

FIRST AID SOURCE: CHRIS Manual 1991
INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor.

INGESTION: do NOT induce vomiting; call a doctor.
EYES: flush with water for at least 15 min.
SKIN: wipe off, wash with soap and water.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

---------- INITIAL INCIDENT RESPONSE ----------

FIRE EXTINGUISHMENT: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires. Note: Water may be ineffective CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: Toluene
DOT ID NUMBER: UN1294

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION
Flammable/combustible material; may be ignited by heat, sparks or flames.
Vapors may travel to a source of ignition and flash back.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.
Material may be transported hot.
*HEALTH HAZARDS
May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Positive pressure self-contained breathing apparatus (SCBA) and structural fi
*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is in
CALL Emergency Response Telephone Number on Shipping Paper first. If Shippin
If water pollution occurs, notify the appropriate authorities.
*FIRE
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until we
For massive fire in cargo area, use unmanned hose holder or monitor nozzles;
Withdraw immediately in case of rising sound from venting safety device or an
*SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.

Stop leak if you can do it without risk.
Water spray may reduce vapor; but it may not prevent ignition in closed space
Small Spills: Take up with sand or other noncombustible absorbent material a
Large Spills: Dike far ahead of liquid spill for later disposal.

FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, g
In case of contact with material, immediately flush eyes with running water f
Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort the part of the compilers of the CHEMTOX database to obtain useful, accurate. and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccurac or omissions within this database, or in any of its printed or displayed outp forms.

CHEMTOX DATA

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---------- IDENTIFIERS ----------

CHEMTOX RECORD 421 LAST UPDATE OF THIS RECORD: 06/03/93

NAME: XYLENE

SYNONYMS: XYLENE (XYLOL); XYLOL; METHYL TOLUENE; BENZENE, DIMETHYL-; DIMETHYLBENZENE; NCI-C55232; VIOLET 3; XYLOL (DOT); SOCAL AQUATIC SOLVENT 3501

CAS: 1330-20-7 RTECS: ZE2100000

FORMULA: C8H10 MOL WT: 106.18

WLN: 1R X1

CHEMICAL CLASS: Aromatic hydrocarbon

See other identifiers listed below under Regulations.

---------- PROPERTIES ----------

PHYSICAL DESCRIPTION:	colorless liquid with aromatic odor		
BOILING POINT:	412 K	138.8 C	281.9 F
MELTING POINT:	247 K	-26.2 C	-15.1 F
FLASH POINT:	300.35-305.35 K	27.2-32.2 C	80.9-89.9 F
AUTO IGNITION:	736.45-802.05 K	463.3-528.9 C	1357.6-1475.6 F

VAPOR PRESSURE:	6.7 mm @ 21 C
UEL:	7 %
LEL:	1 %
IONIZATION POTENTIAL (eV):	8.56
VAPOR DENSITY:	3.7 (air=1)
EVAPORATION RATE:	0.77(n-BUTYL ACETATE=1)
SPECIFIC GRAVITY:	0.861 20C
DENSITY:	0.861 g/cc or 8.0073 lb/gal
WATER SOLUBILITY:	VERY SL SOL
INCOMPATIBILITIES:	strong oxidizers
REACTIVITY WITH WATER:	No data on water reactivity
REACTIVITY WITH COMMON MATERIALS:	No data
STABILITY DURING TRANSPORT:	No Data
NEUTRALIZING AGENTS:	No data
POLYMERIZATION POSSIBILITIES:	No data
TOXIC FIRE GASES:	None reported other than possible unburned vapors
ODOR DETECTED AT (ppm):	0.05
ODOR DESCRIPTION:	LIKE BENZENE; CHARACTERISTIC AROMATIC Source:CHRIS
100 % ODOR DETECTION:	0.4-20 ppm

---------- REGULATIONS ----------

DOT hazard class: 3 FLAMMABLE LIQUID

DOT guide: 27

Identification number: UN1307
DOT shipping name: XYLENES
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T1
Packaging exceptions: 173.150
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:

STCC NUMBER: 4909350, 4909351

CLEAN WATER ACT Sect.307: No
CLEAN WATER ACT Sect.311: Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL): 10 mg/L (07/30/92)
Maximum Contaminant Level Goals (MCLG): 10 mg/L (07/30/92)
CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: U239,D001
CERCLA REF: Not listed
RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312 categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: adverse effect to target organ after long period of exposure.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.
Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATED POSTAL SERVICE MAILABILITY:
Hazard class: Not given
Mailability: Nonmailable
Max per parcel: 0

NFPA CODES:
HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED): (3) This material can be ignited under almost all temperature conditions.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL: Unspecified

---------- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON --------

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 1803 Well Monitoring Chemicals.
Canadian Domestic Substances List
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)
XYLENE [1330-20-7]

---------- TOXICITY DATA ----------

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: unknown

TARGET ORGANS: CNS, eyes, gi tract, blood, liver, kidneys, skin

SYMPTOMS: DIZZ, EXCITEMENT, DROW, INCO, STAGGERING GAIT, IRRIT EYES, NOSE, THROAT, CORNEAL VACUOLIZATION, ANOREXIA, NAU, VOMIT, ABDOM PAIN; DERM Source: CHRIS

CONC IDLH: 1000ppm

NIOSH REL: 100 ppm Time weighted averages for 8-hour exposure 434 mg/M3 Time weighted averages for 8-hour exposure 200 ppm Ceiling exposures which shall at no time be exceeded(10-MIN) 868 mg/M3 Ceiling exposures which shall at no time be exceeded(10-MIN)

ACGIH TLV: TLV = 100ppm(435 mg/M3)

ACGIH STEL: STEL = 150 ppm(655 mg/M3)

OSHA PEL:

Transitional Limits:
PEL = 100 ppm(435mg/M3)
Final Rule Limits:
TWA = 100 ppm (435 mg/M3)
STEL = 150 ppm(655 mg/M3)

MAK INFORMATION:

100 ppm
440 mG/M3
Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 2xMAK for 30 minutes, 4 times per shift of 8 hours.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

* orl-hmn LDLo:50 mg/kg YAKUD5 22,883,80

ihl-man LCLo:10000 ppm/6H BMJOAE 3,442,70
BEHAVIORAL
General anesthetic
LUNGS, THORAX, OR RESPIRATION
Cyanosis
BLOOD
Other changes

LD50 value: orl-rat LD50:4300 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:4300 mg/kg
ihl-rat LC50:5000 ppm/4H
ipr-rat LD50:2459 mg/kg
scu-rat LD50:1700 mg/kg
ipr-mus LD50:1548 mg/kg
ivn-rbt LDLo:129 mg/kg
ihl-gpg LCLo:450 ppm
ipr-gpg LDLo:2 gm/kg
ipr-mam LDLo:2 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rat TCLo:250 mg/m3/24H (7-15D preg) ATSUDG 8,425,85
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:50 mg/m3/6H (1-21D preg) JHEMA2 27,337,83
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)

ihl-rat TCLo:50 mg/m3/6H (1-21D preg) JHEMA2 27,337,83
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Other developmental abnormalities
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ihl-rat TCLo:600 mg/m3/24H (7-15D preg) PCBRD2 163B,295,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:20600 ug/kg (6-15D preg) JTEHD6 9,97,82
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:31 mg/kg (6-15D preg) JTEHD6 9,97,82
EFFECTS ON FERTILITY
Post-implantation mortality

ihl-mus TCLo:4000 ppm/6H (6-12D preg) TJADAB 28,22A,83
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)
EFFECTS ON NEWBORN
Physical

ihl-mus TCLo:2000 ppm/6H (6-12D preg) TJADAB 28,22A,83
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-mus TCLo:1 gm/m3/12H (6-15D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rbt TCLo:500 mg/m3/24H (7-20D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

California Prop 65: Not listed

---------- EPA's IRIS DATA SUMMARY ----------
Xylenes; CASRN 1330-20-7 (04/01/92)

II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Xylenes
CASRN -- 1330-20-7
Last Revised -- 03/01/91

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- Orally administered technical xylene mixtures did not result in significant increases in incidences in tumor responses in rats or mice of both sexes.

II.A.2. HUMAN CARCINOGENICITY DATA

None.

___II.A.3. ANIMAL CARCINOGENICITY DATA

Inadequate. In an NTP (1986) study, 50 male and 50 female F344/N rats were treated by gavage with mixed xylenes in corn oil (60% m-xylene, 14% p-xylene, 9% o-xylene and 17% ethylbenzene) at dosages of 0, 250 or 500 mg/kg/day, 5 days/week for 103 weeks. Similarly, 50 male and 50 female B6C3F1 mice were treated with the same xylene mixture at dosages of 0, 500 or 1000 mg/kg/day. Animals were killed and examined histologically when moribund or after 104-105 weeks. An apparent dose-related increased mortality was observed in male rats, but this difference was statistically significant for the high dose group, only. No other differences in survival between dosage groups of either sex were observed. Interstitial cell tumors of the testes could not be attributed to administration of the test compound observed in male rats (43/50 control, 38/50 low-dose and 41/49 high-dose). NTP (1986) reported that there were no significant changes in the incidence of neoplastic or nonneoplastic lesions in either the rats or mice that could be considered related to the mixed xylene treatment, and concluded that under the conditions of these 2-year gavage studies, there was "no evidence of carcinogenicity" of xylene (mixed) for rats or mice of either sex at any dosage tested.

Maltoni et al. (1985), in a limited study, reported higher incidences (compared with controls) of malignant tumors in male and female Sprague-Da rats treated by gavage with xylene in olive oil at 500 mg/kg/day, 4 or 5 days/week for 104 weeks. This study did not report survival rates or specifi tumor types; therefore, the results cannot be interpreted.

Berenblum (1941) reported that "undiluted" xylene applied at weekly intervals produced one tumor-bearing animal out of 40 after 25 weeks in skin-painting experiments in mice. No control groups were described. Pound (1970) reported negative results in initiation-promotion experiments with xylene as the initiator and croton oil as the promotor.

___II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

The frequency of sister chromatid exchanges and chromosomal aberrations were nearly identical between a group of 17 paint industry workers exposed to xylene and their respective referents (Haglund et al., 1980). In vitro, xylene caused no increase in the number of sister chromatid exchanges in human lymphocytes (Gerner-Smidt and Friedrich, 1978). Studies indicate that xylene isomers, technical grade xylene or mixed xylene are not mutagenic in tests with Salmonella typhimurium (Florin et al., 1980; NTP, 1986; Bos et al., 1981) nor in mutant reversion assays with Escherichia coli (McCarroll et al., 1981). Technical grade xylene, but not o- and m-xylene, was weakly mutagenic in Drosophila recessive lethal tests. Chromosomal aberrations were not incre in bone marrow cells of rats exposed to xylenes by inhalation (Donner et a 1980).

II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

II.D.1. EPA DOCUMENTATION

U.S. EPA. 1987. Drinking Water Criteria Document for Xylene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-416. Final.

II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The Drinking Water Criteria Document for Xylene has received Agency and external review.

Agency Work Group Review: 12/02/87

Verification Date: 12/02/87

II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Bruce Mintz / ODW -- (202)260-9569 / FTS 260-9569

W. Bruce Peirano / ORD -- (513)569-7540 / FTS 684-7540

---------- PROTECTION AND FIRST AID ----------

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabil.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (XYLENE)
1000 ppm: Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSH
EYE: irr immed
SKIN: soap wash promptly
INHALATION: art resp
INGESTION: no vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with

running water for at least 15 minutes. Wash skin with soap and water.
Remove and isolate contaminated clothing and shoes at the site.

---------- INITIAL INCIDENT RESPONSE ----------

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: XYLENES
DOT ID NUMBER: UN1307

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION
Flammable/combustible material; may be ignited by heat, sparks or flames.
Vapors may travel to a source of ignition and flash back.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.
Material may be transported hot.
*HEALTH HAZARDS
May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Positive pressure self-contained breathing apparatus (SCBA) and structural fi
Isolate for 1/2 mile in all directions if tank, rail car or tank truck is in
CALL Emergency Response Telephone Number on Shipping Paper first. If Shippi
If water pollution occurs, notify the appropriate authorities.
*FIRE
Small Fires: Dry chemical, CO2, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until w
For massive fire in cargo area, use unmanned hose holder or monitor nozzles;
Withdraw immediately in case of rising sound from venting safety device or an
*SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Water spray may reduce vapor; but it may not prevent ignition in closed space
Small Spills: Take up with sand or other noncombustible absorbent material a
Large Spills: Dike far ahead of liquid spill for later disposal.
*FIRST AID
Move victim to fresh air and call emergency medical care; if not breathing, g
In case of contact with material, immediately flush eyes with running water f
Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort

the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccur-ci or omissions within this database, or in any of its printed or displayed forms.

John Hall, Chairman
Pam Reed, Commissioner
Peggy Garner, Commissioner

From Final G.W. M.P.

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

June 22, 1993

CERTIFIED MAIL

CDR Mick Brennan, USN
Env Dept. Code 026
Naval Air Station Dallas
Dallas, TX 75211

Re: Subsurface Hydrocarbon Contamination at the NAS Fuel Farm (Facility 60), Naval Air Station Dallas, Dallas, (Dallas County), Texas (LPST ID No. 97921)

Dear Commander Brennan:

We have completed our review of the January 1993 Draft-Final Contamination Assessment Report for NAS Dallas (Facility 60), prepared on the above-referenced incident by your consultant, Ensafe/Allen & Hoshall. After careful review of all the information provided and pursuant to Title 31, Texas Administrative Code (TAC), Section 334.78-334.81, we conclude that the following actions should be pursued in order to further address the contamination resulting from the release of hydrocarbons at this site:

1. Continue to collect groundwater samples and groundwater elevation measurements on a semi-annual (six-month) basis. Groundwater samples should be analyzed for BTEX and TPH. Observation reports should be submitted to this Office every six (6) months and should contain the results of the previous sampling event. Include the following information:

   a. Laboratory reports providing the results of all sample analyses and a detailed description of sample collection and analytical procedures.

   b. Groundwater gradient maps for each sampling date as well as a list of the groundwater level measurements utilized to prepare these maps.

   c. Status of any ongoing remediation activities.

   d. Cumulative tables of laboratory analyses for ~~quarterly~~ semi-annual groundwater results to date.

2. After removal of the remaining tanks and piping located at Facility 60 is completed, and all details of the underground storage tank system excavation and removal processes performed are submitted, this project will be reevaluated and a determination made as to whether additional corrective action is warranted. Sampling of monitoring wells should continue at least one year after the removal process is complete.

A written response to this letter that adequately addresses the completion of the aforementioned items should be submitted to this Office within ninety (90) days from the date of this letter. The LPST ID Number should be included on all correspondence.

Copies of all correspondence with this Office must be provided to our District 4 Field Office in Duncanville to the attention of Mr. Ron Sharber. You are also required to notify Mr. Sharber at 214/298-6171 at least forty-eight (48) hours in advance of conducting any significant on-site investigation or the performance of sampling activities.

Should you have any questions regarding this letter, please contact me at 512/908-2234. Your cooperation in this matter will be appreciated.

Sincerely,

Liz Scaggs

Liz Scaggs
Federal Facilities Coordinator
Responsible Party Remediation Section
Petroleum Storage Tank Division

LAS/cma
97921.rev

cc: Ron Sharber, TWC District 4 Field Office
(1019 N. Duncanville Road, Duncanville, Texas 75116-2201)
Nadira Kabir, TWC, Industrial & Hazardous Waste, Corrective Action Section
Daryle Fontenot, US Navy

John Hall, *Chairman*
Pam Reed, *Commissioner*
Peggy Garner, *Commissioner*
Anthony Crigsby, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 1, 1993

CERTIFIED MAIL

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 2
To JOHN STEADMAN	From DL Fontenot
Co. ENSAFE	Co. SOUTHDIV
Dept.	Phone # 803 743-0607
Fax # 901-372-2454	Fax # 803 743-0563

CDR Mick Brennan, USN
Env Dept. Code 026
Naval Air Station - Dallas
Dallas, Texas 75211-9501

Re: Subsurface Hydrocarbon Contamination at the NAS Fuel Farm (Facility 60), Naval Air Station Dallas (Dallas County), Texas (LPST ID No. 97921)

Dear Commander Brennan:

We have completed our review of the August 1993 final contamination assessment report and the September 17, 1993 groundwater monitoring plan prepared by your consultant, Ensafe/Allen and Hoshall. After careful review of all the available information provided and pursuant to Title 30, Texas Administrative Code (TAC), Section 334.78-334.81, we conclude the following actions must be pursued in order to further address the contamination at this site.

1. Submit all details of the underground storage tank system excavation and removal processes performed at this facility. Information should include descriptions and analytical results of any impacted media encountered, volume and disposition of all backfill and soil removed, and all data on verification samples collected. Also, provide a description of the condition of the tanks and lines at the time of their removal.

2. Provide a site map drawn to scale which portrays:

   a. the locations and types of USTs formerly in place,
   b. the locations of the former product lines and dispensers,
   c. the locations of all samples collected during the UST closure process,
   d. the final limits of excavation,
   e. a north arrow, and
   f. a bar scale.

3. Groundwater monitoring should be conducted in accordance with the enclosed guidance document titled *Groundwater Monitoring and Reporting*.

4. Provide an estimated time frame for the initiation of tank removal activities for the remaining USTs in the southern compound. Upon completion of removal activities, a proposal that addresses the removal or treatment of contaminated backfill and native soil should be submitted to this Office.

5. In the report dated August 1993, it is stated that three potable water supply wells (State Well Numbers 33-17-103, 33-17-104, 33-17-105) on the base have been closed. Provide documentation to support that statement.

A written response to this letter that adequately addresses the completion of the aforementioned items should be submitted to this Office within ninety (90) days from the date of this letter. The LPST ID Number should be included on all correspondence.

Pursuant to 30 TAC Section 334.82 (b), if you determine that contamination from the release has migrated off-site, then you are required to notify the affected landowner(s). Please provide documentation that the affected landowner(s) have been notified.

Copies of all correspondence with this Office must be provided to our Region 4 Field Office in Duncanville to the attention of Mr. Ron Sharber. You are also required to notify Mr. Sharber at 214/298-6171 at least forty-eight (48) hours in advance of conducting any significant on-site investigation or remediation activities including excavation and/or the installation of soil borings/monitor wells or the performance of groundwater monitoring activities.

Should you have any questions, please contact Mr. Ronnie Eason of my staff at 512/908-2221. Your prompt attention to this matter will be appreciated.

Sincerely,

Janet Koock

Janet Koock
Manager, Remediation Unit I
Responsible Party Remediation Section
Petroleum Storage Tank Division

REE/cma
97921.rev

Enclosures

cc: Daryle Fontenot, U.S. Navy, North Charleston, South Carolina
Ron Sharber, TNRCC Region 4 Field Office
(1019 N. Duncanville Road, Duncanville, Texas 75116-2201)
Nadira Kabir, TNRCC Corrective Action Section, Austin