PHASE III
SITE INSPECTION & PRIORITIZATION
TASK WORK PLAN

WESTWEGO LANDFILL
WESTWEGO, JEFFERSON PARISH, LOUISIANA
EPA CERCLA ID NO.: LAD980621783

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
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Contract No.: 68-W9-0015
Work Assignment No.: 54-6JZZ
Document Control No.: 4606-54-0128

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May 1996

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B	Health and Safety Plan
C	Sampling Procedures
D	CLP Guidelines

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SECTION 1
INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Roy F. Weston, Inc. (WESTON®) has been tasked to perform a Site Inspection and Prioritization (SI) of the Westwego Landfill site (EPA CERCLA ID No. LAD980621783) located in Westwego, Jefferson Parish, Louisiana. A Site Location Map is included as Figure 1-1. Based on available site information, WESTON believes that the site is currently eligible for action under CERCLA/SARA. The U.S. Environmental Protection Agency (EPA) Region VI retained WESTON to complete this investigation under EPA Contract No. 68-W9-0015 and Work Assignment No. 54-6JZZ.

This document represents the Task Work Plan (TWP) for the SI. The purpose of the TWP is to propose sample locations and field procedures for the SI, based on available background information and the results of the site reconnaissance.

1.1 PURPOSE OF THE INVESTIGATION

The SI is generally the second screening investigation in a series of site assessments that EPA may complete at a known or potential hazardous waste site that is being investigated under CERCLA/SARA prior to its possible inclusion on the National Priorities List (NPL). The SI has two primary objectives:

- To identify potential source areas at the site in an attempt to document the presence of hazardous substances in the source areas and evaluate the threat that migration of or exposure to the hazardous substances from the site may pose.

- To assess the site, using EPA's Hazard Ranking System (HRS), and determine whether further investigation of the site under CERCLA/SARA is warranted in order to pursue listing on the NPL.

EPA will use the information obtained during the SI to help prioritize further work for the site. Based on the results of the SI, EPA may rank the site on the NPL, decide that additional investigation of the site is required, or assign a No Further Remedial Action Planned (NFRAP) status to the site.

1.2 SCOPE OF WORK

The scope of work for the SI will focus on obtaining the most important background information and analytical data required to evaluate the site using the HRS. WESTON will complete the following major tasks as part of this SI:

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- Obtain and review available background information concerning the site.

- Research data related to the groundwater, surface water, soil exposure, and air pathways.

- Conduct a site reconnaissance to document current site conditions, locate hazardous waste sources, identify potential receptors or targets of a release, and select sample locations.

- Prepare a site-specific TWP and a Health and Safety Plan (HASP) describing planned sampling activities and appropriate safety protocol.

- Conduct environmental sampling at and near the site.

- Prepare an SI report to document the results of site reconnaissance, sampling activities, sample analyses, and to present the background information obtained for the site.

1.3 WORK PLAN ORGANIZATION

The SI TWP has been organized in a format that is intended to facilitate application of information in the plan to the HRS. The TWP is organized as follows:

- Section 1 - Introduction
- Section 2 - Site Background Information
- Section 3 - Exposure and Migration Pathway Characteristics
- Section 4 - Sampling Visit Activities
- Section 5 - Project Information
- Section 6 - References

A copy of the site access agreement is provided as Appendix A, a site-specific HASP is provided in Appendix B, sampling procedures are provided in Appendix C, and EPA Contract Laboratory Program (CLP) Guidelines are provided in Appendix D.

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SECTION 2
SITE BACKGROUND INFORMATION

A summary of the location, description, operational history, hazardous waste characteristics, and concerns of the site is presented in the following subsections. The site background information presented in this TWP has been obtained from reports previously completed for the site, as well as WESTON's recent site reconnaissance.

2.1 SITE LOCATION AND DESCRIPTION

The Westwego Landfill site is located in Westwego, Jefferson Parish, Louisiana. The geographic coordinates of the site are approximately latitude 29°52'44" north and longitude 90°09'00" west (Reference 2). A Site Area Map is provided as Figure 2-1.

The Westwego Landfill can be reached by traveling west for approximately 5 miles on U.S. Highway 90 Business Route (U.S. 90 BR) from Gretna, Louisiana towards Westwego, Louisiana. Once in the city of Westwego, exit Central Avenue from U.S. 90 BR and proceed south for approximately 0.6 mile. Central Avenue ends at a locked steel-gate immediately north of Mayrone Canal. From this locked gate, proceed south for approximately 300 feet on the former Westwego Landfill entrance road over Mayrone Canal to the site entrance (Reference 1).

N. Buckner Barkley is president of the Marrero Land Development Company (MLDC) which, at one time, leased a portion of its property to the City of Westwego for landfill use purposes. WESTON contacted Mr. Buckner Barkley, Jr. in December 1995 in order to gain access to the portion of the MLDC property previously used by the City of Westwego and the adjacent Westwego Landfill (hereafter, referred to as the site) to perform a reconnaissance. Mr. Barkley signed an access agreement on 23 January 1996, granting WESTON access to the MLDC property. A copy of this access agreement is included in Appendix A.

WESTON team members conducted the site reconnaissance with Mr. Barkley and Jerry Balu, representatives of the MLDC. The site encompasses approximately 8.3 acres and is situated in an undeveloped area immediately south of the city of Westwego. Property owned by MLDC borders the western portion of the site, and the levee to Mayronne Canal borders the site to the north. A wetland area borders the eastern and southern portions of the site. The site is overgrown with weeds and supports small to medium sized trees on the northern portion of the site. A 50-foot section of fence remains standing at the entrance. The remainder of the site is readily accessible as there are no structures to prevent access. Indiscriminate dumping of trash occurs throughout the adjacent MLDC property and on the northeastern portion of the site. Surface runoff originating on-site generally flows towards an unnamed canal and wetland area immediately south of the site. No rodents, stray animals, or stained soils commonly associated with inactive landfills were identified by WESTON during the reconnaissance. No monitoring wells were observed on site (Reference 1). A Site Plan is provided as Figure 2-2.

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2.2 SITE HISTORY

The City of Westwego began operating the Westwego Landfill in 1980. A small portion of the MLDC property was leased to the City of Westwego for use as a solid waste landfill. The site reportedly received non-hazardous solid wastes from municipal, commercial, and private sources (Reference 4). The site, formerly known as the Gerald Weber site, was identified via CERCLA notification submitted by Browning-Ferris, Inc. (BFI) in June 1981. BFI at one time provided waste collection and transportation services for the City of Westwego. BFI indicated that small quantities of unknown hazardous wastes may have been inadvertently included in the wastes previously deposited by BFI (Reference 3). Large scale dumping of wastes reportedly discontinued by 1 July 1984 and the site ceased operations in October 1985, except for small amounts of trash deposited by City of Westwego residents. A Louisiana Department of Environmental Quality (LDEQ) Compliance Order submitted to the City of Westwego on 11 December 1985 authorized final closure of the site. The final closure plan specified that all on-site wastes be landfilled, capped with a 2-foot clay cover, and seeded with rye grass and other natural vegetation to prevent erosion of the clay cap. No leachate collection system or construction of monitoring wells were reportedly included as part of the closure plan due to a lack of financial resources by the City of Westwego. A routine LDEQ site inspection on 25 April 1986 revealed that the Compliance Order closure requirements were fulfilled. LDEQ officially closed the site on 23 October 1986 (Reference 9).

2.3 SUMMARY OF PREVIOUS INVESTIGATIONS

WESTON reviewed available file information regarding previous investigations at the site. These investigations are summarized as follows:

- BFI submitted a Notification of Hazardous Waste Site to EPA Region VI on 9 June 1981 (Reference 3).

- Ecology and Environment, Inc. prepared a Potential Hazardous Waste Site Identification and Preliminary Assessment and a Site Inspection Report on 4 April 1983. (Reference 4 and 5).

- EPA Region VI filed a Potential Hazardous Waste Site Final Strategy Determination on 9 August 1983. It recommended that no further action be planned (Reference 6).

It should be noted that no samples were collected and analyzed during the previous investigations.

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2.4 SOURCE WASTE CHARACTERISTICS AND SITE CONCERNS

Information concerning the known or potential hazardous waste sources at the site and the constituents thought to be associated with each source are described in the following subsections, along with potential concerns associated with contaminant migration and exposure.

2.4.1 Source Waste Characteristics

Based on available background information and the results of WESTON's site reconnaissance, the inactive landfill has been identified as the potential on-site hazardous waste source. The approximately 8.3-acre site reportedly received non-hazardous, municipal and commercial refuse which may have included small amounts of hazardous substances. A wetland area borders the site to the east and south. No containment features other than the clay cap are known to exist which prevent the migration of site-attributable contaminants to off-site locations.

2.4.2 Site Concerns

Possible concerns associated with the potential hazardous waste source at the site and the migration of or exposure to hazardous substances attributable to the site through the groundwater, surface water, soil exposure, and air pathways include the following:

- The groundwater pathway is of minimal concern because groundwater is not used for drinking water purposes in the city of Westwego and surrounding municipalities due to poor water quality. The city of Westwego relies on a surface water intake along the Mississippi River as the source for their drinking water (Reference 7).

- The surface water pathway is of moderate concern because the site is located adjacent to a wetland area and perennial surface water body. No containment features are known to exist which would prevent the migration of site-attributable contaminants to the wetland area.

- The soil pathway is of minor concern based on the potential presence of contaminated soils resulting from historical activities associated with the site.

- The air pathway is of minor concern since the site is heavily vegetated. No gaseous releases are suspected and the vegetation reduces the potential for any particulate releases to air.

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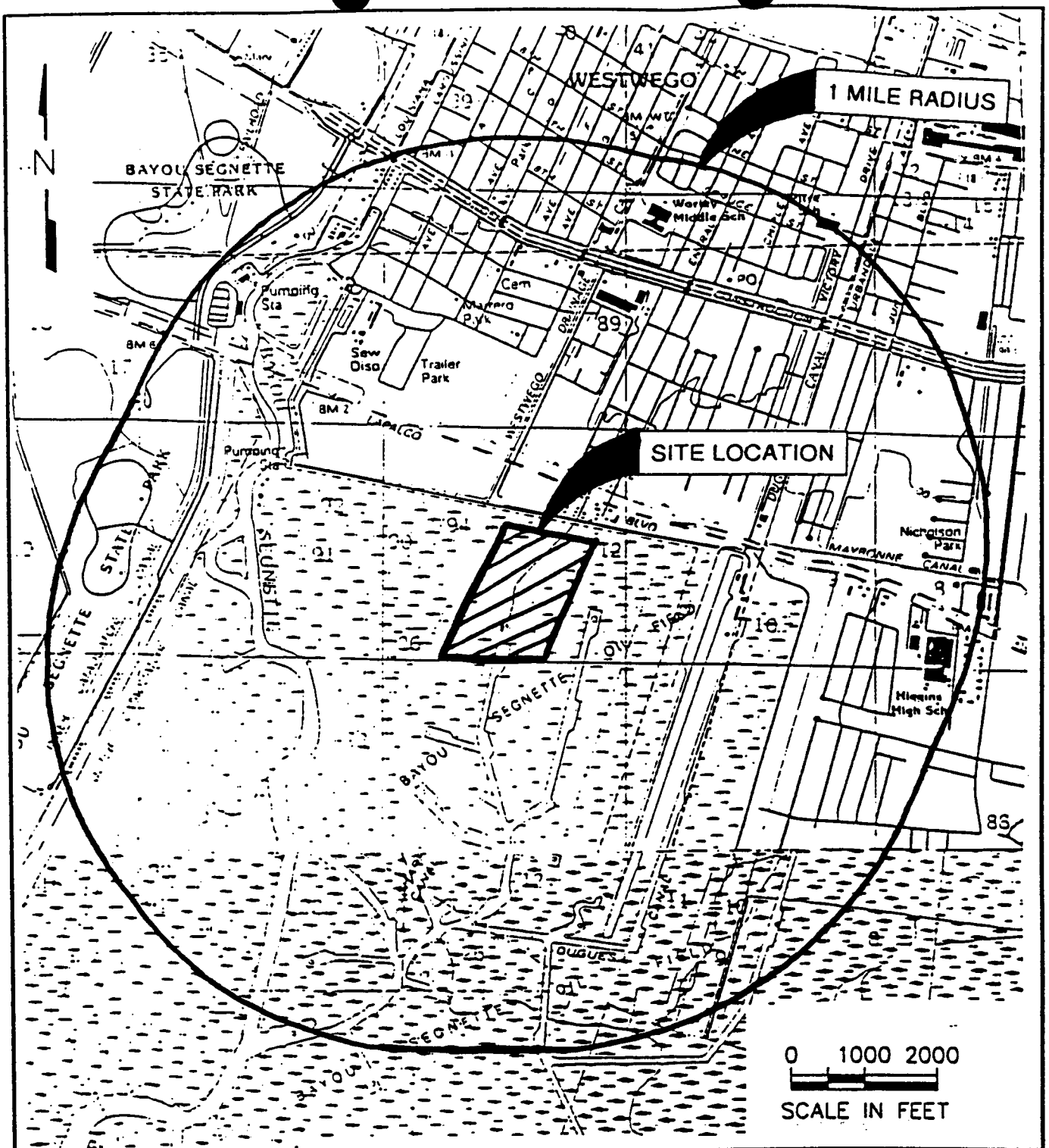

BASE MAP FROM:

U.S. DEPT. OF THE INTERIOR
GEOLOGICAL SURVEY

NEW ORLEANS EAST/WEST
LOUISIANA

7.5 MINUTE SERIES (TOPOGRAPHIC)
VARIOUS SERIES

WESTON

FIGURE 2-1
SITE AREA MAP
WESTWEGO CITY LANDFILL
WESTWEGO, LOUISIANA
CERCLA ID NO: LAD980621783

EPA REGION VI
ARCS SITE INSPECTION
PRIORITIZATION

W.O. NO.: 04606-054-021-3076

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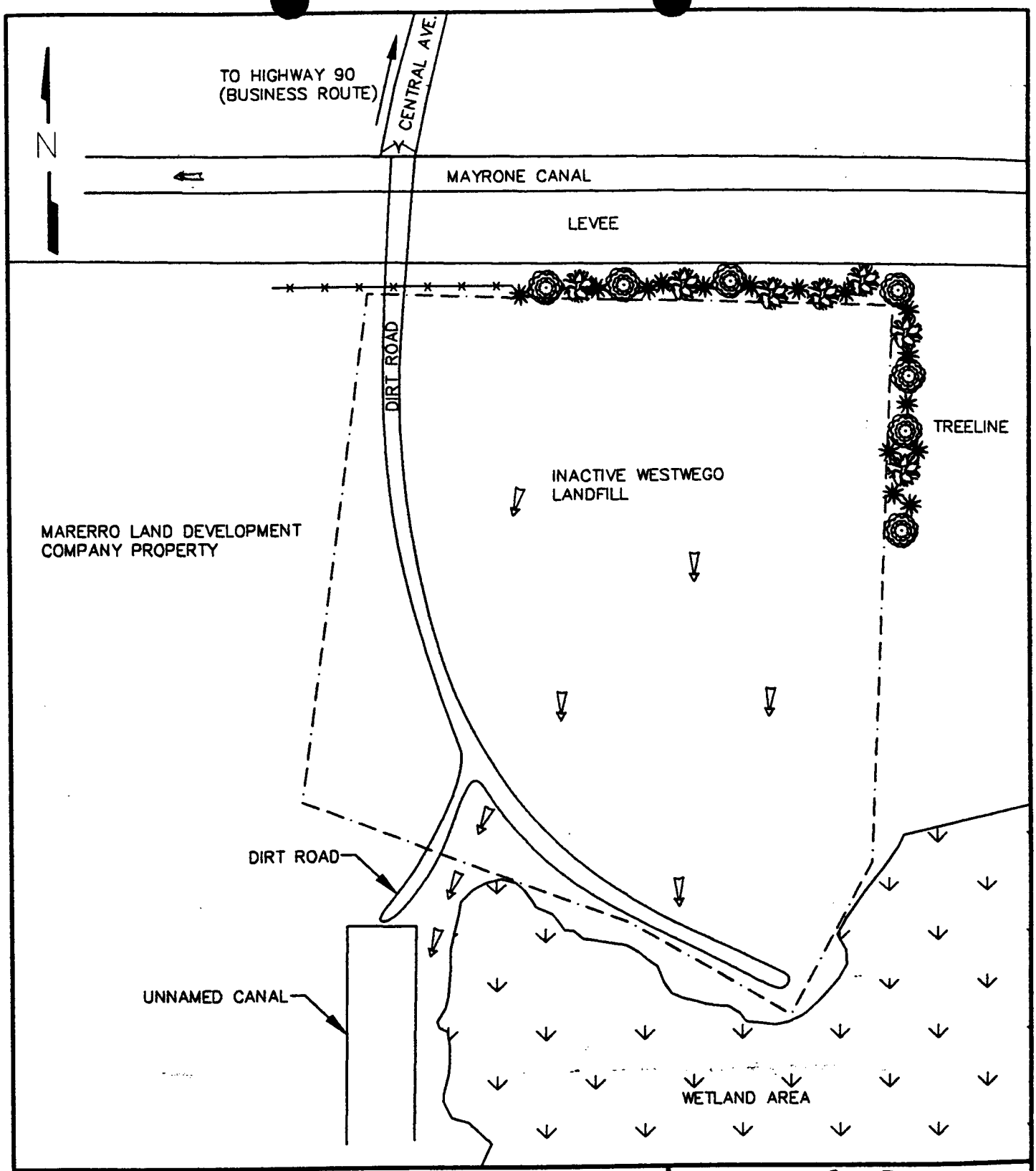

LEGEND:

- - - · - - - · - APPROXIMATE SITE BOUNDARY

—x—x—x—x— FENCE

◁ SURFACE DRAINAGE

NOT TO SCALE

WESTON

FIGURE 2-2

SITE PLAN

WESTWEGO LANDFILL
WESTWEGO, LOUISIANA

CERCLA ID. NO. : LAD980621783

EPA REGION VI
ARCS SITE INSPECTION AND PRIORITIZATION

W.O. NO. : 04606-054-021-3076

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SECTION 3
EXPOSURE AND MIGRATION PATHWAY CHARACTERISTICS

The following subsections present information about the groundwater, surface water, soil exposure, and air pathways. Sampling and nonsampling data previously collected are addressed. Known data gaps are identified at the end of the section.

3.1 GROUNDWATER PATHWAY

WESTON contacted Greg Duhe, Water Plant Operator (Trainee), at the City of Westwego Water Plant to obtain information regarding the source of drinking water for the City of Westwego. Groundwater is not used for drinking water purposes in the city of Westwego due to poor water quality. A surface water intake along the Mississippi River provides drinking water for area residents. No domestic, irrigation, or public supply wells have been identified within the city of Westwego and the surrounding Jefferson Parish (Reference 7). No monitoring wells exist on-site (Reference 1).

3.2 SURFACE WATER PATHWAY

The site is situated in a wetland area near mean sea level. An unnamed perennial canal is located to the south of the site and just west of the wetland area. Although it was not visually observed by WESTON during the site reconnaissance, it is believed that the majority of surface runoff originating on-site flows south towards the adjacent unnamed canal, and wetland area. From the origin of the unnamed canal, which has been identified as the probable point of entry (PPE) into the surface water pathway, water in the unnamed canal flows for approximately 2.8 miles before merging with Bayou Segnette. From Bayou Segnette, water flows southward for approximately 3.6 miles before entering Bayou Bardeaux. Water flows south in Bayou Bardeaux for approximately 2.0 miles before merging with Lake Salvador. The 15-mile target distance limit (TDL) of the surface water pathway is completed in Lake Salvador (Reference 2). Based on available information, targets including fisheries and sensitive environments are located throughout the entire 15-miles TDL. Specific information regarding these targets is not currently available to WESTON.

3.3 SOIL EXPOSURE PATHWAY

During WESTON's site reconnaissance, the site was heavily vegetated with overgrown weeds and small to medium sized trees. An area of potential soil contamination could not be determined as the landfill is capped and no stained soils were observed. The site was not fenced, except for a 50-foot section near the site entrance. The remainder of the site is readily accessible. The site is situated in a wetland area. No residences, schools or daycare facilities are located within 200 feet of the site (Reference 1). WESTON obtained population information from the EPA Region VI Geographical Exposure Modeling Systems (GEMS) database. It is estimated that approximately 3,065 people live within one mile of the site (Reference 8).

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3.4 AIR PATHWAY

No gaseous or particulate releases to air have been documented or were observed during WESTON's site reconnaissance. Overgrown vegetation covering the site effectively reduces the potential for particulate releases to air (Reference 1). Potential targets of the air pathway include the nearby population (approximately 98,081 people) within 4 miles of the site (Reference 8), as well as any sensitive environments that may be in the area.

3.5 DATA GAPS

Several data gaps have been identified for the site based on a review of the background information available from previous investigations and WESTON's site reconnaissance visit. WESTON will close as many of these gaps as possible as part of the SI sampling visit. The major data gaps are as follows:

- Analytical data of samples collected from the on-site and surrounding soils to verify the presence of hazardous substances and document source waste characteristics.

- Analytical data of samples collected from off-site bottom sediments to determine if site-attributable contaminants have migrated overland to the wetland area and unnamed canal south of the site.

- Identification of fisheries, wetlands, and resources in the site area and along the surface water pathway to establish additional pathway targets.

- Identification of endangered species habitats located near the site that may be impacted to establish additional surface water, soil exposure, and air pathway targets.

- Verification of EPA Region VI GEMS population data regarding population within 4 miles of the site to more accurately identify potential pathway targets.

- Determination of the current property owners of the site.

WESTON will conduct additional background research as time permits to close remaining non-sampling data gaps such as environmental setting information and target documentation.

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SECTION 4
SAMPLING VISIT ACTIVITIES

The activities planned for the SI sampling visit are outlined in this section of the TWP. The sampling strategy presented is based on the operational history, known and suspected source waste characteristics, the probable pathways of contaminant migration, and the likely targets related to the site. It is important to note that the intent of the sampling mission is to sample what appear to be the most contaminated materials in the areas targeted for sampling. Based on the results of site reconnaissance and available file information, WESTON has selected locations for sampling that appear to be those most likely to provide positive evidence of the presence of hazardous substances on-site.

WESTON will complete soil and sediment sampling activities as part of the SI. Samples will be collected using sampling techniques and quality control procedures that generally meet EPA Region VI, EPA Contract Laboratory Program (CLP), and WESTON guidelines. The specific tasks that will be performed during the sampling visit are described in Subsections 4.2, 4.3, and 4.4. It is expected that the tasks will be completed in the order outlined in these subsections; however, some tasks may overlap with others. General information for each task is provided as instructions to guide the field team.

4.1 FIELD PERSONNEL

WESTON plans for a field team consisting of four personnel to complete the tasks described in the following subsections. The anticipated personnel, along with their respective project roles and responsibilities, are identified in Table 4-1.

4.2 MOBILIZATION TASKS

The tasks that the WESTON filed team generally will complete prior to sampling are described in this subsection.

4.2.1 Task 1-Mobilization

The WESTON field team will mobilize from the WESTON Regional Equipment Stores (RES) warehouse in Houston, Texas. One or two team members will load equipment for the SI sampling visit in a van, checking the equipment in the process. An equipment checklist will be used to verify that the necessary sampling equipment is included in the mobilization.

As part of the mobilization effort, the field team will assemble the required sample containers and CLP documentation prior to leaving for the site, as time permits. The sample jars, sample tags, sample numbers, and custody seals needed for each sample station will be placed in a plastic Ziploc bag. The sample station number will be labeled in ink on each bag. This process will facilitate sampling efforts once the fieldwork begins. When the required sampling equipment has been loaded, one or two field team members will drive the equipment van to the site. Depending on the distance

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from WESTON's office to the site, this may be done the day before sampling activities are scheduled or early on the same day. The remaining field team members will drive or fly to the site. The field team generally will meet at its place of lodging, if any, before proceeding to the site. WESTON will attempt to inform the EPA Work Assignment Manager (WAM) of the sampling mission and its final schedule 2 weeks before the start date of the fieldwork.

Once at the site, the Field Team Leader (FTL) will meet with the site and EPA representative, if present. The access agreement may be shown to the site representative to reconfirm site access.

As part of initial mobilization reconnaissance activities and before going on-site, the WESTON team will drive the route from the site to the nearest hospital.

4.2.2 Task 2-Health and Safety Meeting and Protocol

After arriving at the site and checking in with the site representative, if present, the WESTON FTL and the Site Health and Safety Coordinator (SHSC) will conduct a meeting to review the technical aspects of the project and discuss the site-specific HASP and related WESTON Standard Operating Procedures (SOPs) with the sampling team. It should be noted that the HASP is provided in Appendix B and the SOPs are provided in the SHSC manual which will be on-site during activities. After this meeting, a copy of the HASP, with the map to the hospital on the first page, will be placed on the dash of the field vehicle designated for emergency use. At the start of each day and as necessary at other times during the sampling visit, the FTL will conduct safety meetings to reiterate site concerns and address any new technical or safety issues.

The fieldwork for the SI will be conducted in accordance with the site-specific HASP. The sampling team generally will work with Level-D personal protective clothing and equipment as specified in the HASP, as long as air monitoring results justify this level of protection. The monitoring instruments to be used are specified in the HASP. Depending on the air monitoring results, the sampling team may be required to upgrade to a Level-C personal protection status if one of more of the air monitoring action levels listed in the HASP are met or exceeded. The SHSC or another designated team member will perform a field calibration check and overall inspection of the monitoring instruments each day prior to sampling.

4.2.3 Task 3-Initial Sample Location Reconnaissance

After the safety meeting is conducted, the WESTON FTL will meet with the site representative and any EPA representative present to complete an initial survey of the sample locations indicated in the TWP. This survey will allow the FTL to become familiar with the area of investigation, verify that sample locations are accessible, and identify potential health and safety concerns at each location. This initial reconnaissance will be conducted from the support zone as much as possible. If entry into a potential exclusion zone area is required for this task, a second WESTON team member will accompany the FTL to perform air monitoring during the reconnaissance.

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If a sample location is found to be inaccessible for some reason, alternative sample locations may be chosen in consultation with the WESTON Project Team Leader (PTL). The PTL will communicate alteration in the TWP to the WESTON Site Manager and EPA WAM.

4.2.4 Task 4-Acquisition of Off-Site Access

Prior to performing sampling activities, the owners of any off-site properties for which sampling has been proposed will be contacted. Unless an EPA representative designated by the WAM to obtain off-site access is present in the field, the WESTON FTL will obtain permission from the owners for WESTON to collect samples from their property. The owners of off-site properties targeted for sampling will be provided with a fact sheet explaining the investigation, if one is available.

If access cannot be obtained at an off-site property targeted for sampling, the WESTON FTL will select an alternate sampling location after consultation with the WESTON PTL who in turn will notify the EPA WAM of any alterations to the TWP.

4.2.5 Task 5-Command Post Establishment

After the safety meeting has been held, the WESTON team will establish a command post in an accessible location at the site in an area generally thought to be unaffected by site operations, if such an area is available. The command post will be located in the support zone, where work may proceed in Level D without continuous air monitoring. Access to the exclusion zone and contaminant reduction zone established around the on-site waste source areas will be controlled through the command post.

The command post will include the following:

- An equipment staging area where equipment can be prepared for usage
- A decontamination area (as specified in the HASP, Appendix B) where field personnel and equipment can be decontaminated
- A sample management area where samples can be labeled, preserved, and packaged

Sampling activities to be performed in off-site areas, if any, will be mobilized from the on-site command post.

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4.3 SAMPLING TASKS

Field tasks 6 through 12 are associated with the collection of samples, and they are described in the following subsections. The proposed sample locations are shown on Figure 4-1 and are summarized in Table 4-2.

4.3.1 Task 6-Documentation of Field Activities

The WESTON FTL will document in a logbook the activities performed during the SI sampling visit as well as other significant observations made throughout the field investigation. The FTL will keep chronological log of field activities in the logbook. Additionally, the FTL will take photographs to support the observations documented in the logbook.

The documentation recorded in the logbook for each sample location will include the following:

- Sample station number
- Sample location (including the address and the distance and bearing from a fixed reference point)
- Sample description (matrix, color, odor, organic vapor analyzer [OVA] responses, etc.)
- CLP sample numbers and tag numbers
- Date and time of sample collection
- Conditions around the sample location

4.3.2 Task 7-Equipment Decontamination

Prior to sampling, the WESTON field team will decontaminate the sampling equipment that will come in contact with the samples during sample collection procedures. Equipment decontamination will be performed at the command post. To complete the decontamination process, the equipment will be washed in a tub or bucket with a mixture of potable water and Liquinox (or other nonphosphate detergent), rinsed in a bucket with potable water, rinsed with deionized water, and allowed to air-dry.

WESTON will use dedicated sampling equipment, when available, for each sample station to minimize the need for decontamination. WESTON will decontaminate the sampling equipment at the command post before and after use. The amount of rinsate water generated will be kept to a minimum, and the rinsate water generated during the decontamination processes will be collected in a small drum or 5-gallon buckets.

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4.3.3 Task 8-Waste Sampling

WESTON will not collect any waste source samples as part of the SI. Soil, sediment, and/or surface water samples will be collected in an effort to accurately characterize the potential waste source.

4.3.4 Task 9-Soil Sampling

WESTON will attempt to collect six soil samples (SS-01 through SS-06). Five of these soil samples (SS-01 through SS-05), including one duplicate sample, will be collected from the northern, southern, eastern, and western portions of the landfill. One background sample (SS-06) will be collected from an undisturbed area east of the site on MLDC property. The proposed samples will be collected as part of the SI to document areas of observed contamination and for waste source characterization. Soil samples will be collected in general accordance with the soil sample operating procedures included in Appendix C. Samples will be collected from depths varying from 0 to 24 inches below ground surface. The proposed sample locations will not be situated directly on the landfill in order not to potentially jeopardize the integrity of the clay cap. If the aerial extent of the landfill cap is not clearly identified, the proposed sample locations will be moved. The soil samples WESTON will collect are summarized in Table 4-2, and are shown on Figure 4-1.

4.3.5 Task 10-Surface Water and/or Bottom Sediment Sampling

To characterize the potential for a release to the surface water pathway, WESTON will attempt to collect a total of six bottom sediment samples (SED-01 through SED-06). Three bottom sediment samples (SED-01 through SED-03), including one duplicate sample, will be collected from the unnamed canal. One background sediment sample (SED-04) will be collected from Bayou Segnette at a location upgradient of the confluence of the unnamed canal and Bayou Segnette. In the event access restrictions inhibit the collection of bottom sediment samples, the sediment samples will then be collected from the bank of the canal near the waterline. In addition, WESTON will attempt to collect two sediment samples (SED-05 and SED-06) from the wetland area to document a potential release to a sensitive environment. The sediment samples will be collected in general accordance with the sediment sample operating procedures included in Appendix C. The sediment samples that WESTON will collect are summarized in Table 4-2, and are shown on Figure 4-1.

4.3.6 Task 11-Groundwater Sampling

WESTON will not collect any groundwater samples as part of the SI. Groundwater is not used for drinking water purposes by the City of Westwego due to poor water quality. The source of drinking water for the City of Westwego is surface water obtained from the Mississippi River. No monitoring wells were observed on-site. No domestic, irrigation, or public supply wells have been identified within the city of Westwego and Jefferson Parish area (Reference 3).

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4.3.7 Task 12-Sample Management

WESTON will manage the samples collected during the SI in a manner generally consistent with EPA and EPA CLP guidelines. Specific guidelines are provided in the following subsections. Additional guidelines are provided in Appendix D.

4.3.7.1 Sample Container Decontamination

When a sample is collected and returned to the command post, the Sample Manager will see that the outside of each container is decontaminated. To decontaminate the sample containers, each sample container will be washed with deionized water and dried with a towel.

4.3.7.2 Sample Documentation

Each sample will be appropriately documented and identified using the appropriate EPA CLP labels, tags, and forms. The following guidelines will be used:

- Each sample station will receive a set of CLP sample numbers. Samples for organic analysis will receive sample numbers beginning with "F," and the inorganic samples will receive sample numbers beginning with "M."

- Each bottle or jar for a sample station will receive a sample number sticker, a sample tag, and a custody seal.

- The sample information will be written on the appropriate Traffic Reports/Chain-of-Custody forms, which will remain with the samples.

Additional information regarding sample documentation procedures is included in Appendix D.

4.3.7.3 Sample Packaging

Once labeling is completed, two WESTON personnel will review the sample documentation for accuracy before the samples are packaged for shipping. Once this quality assurance check is completed, the samples will be packaged in coolers using the following guidelines:

- Each sample bottle or jar will be placed within a sealed Ziploc bag.

- The bottles and jars will be placed into coolers. Samples for organic and inorganic analyses will be placed into different coolers, as they typically will be going to different laboratories.

- Vermiculite will be poured into the spaces around the sample containers to fill space and help prevent breakage during transport.

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- At least two 1-gallon bags filled with ice will be placed on the samples in each cooler to help maintain the ice chest temperature at approximately 4°C. A temperature blank to be analyzed by the laboratory may be placed in the organic sample ice chest to verify the temperature. Additional vermiculite may be added on top of the ice to fill the cooler.

- The appropriate Traffic Report/Chain-of-Custody forms (laboratory copies only) will be sealed inside a plastic bag and taped to the inside of the cooler lid.

- The coolers will then be closed, at least two EPA custody seals (on opposite sides of the cooler) will be affixed to the cooler, and they will be sealed with strapping or packing tape. Also, if samples need to be left unattended, the samples will be placed in a cooler, and the cooler will be sealed with custody tape and stored in a secured place.

4.3.7.4 Sample Shipping

When sampling is complete for a given day, the sampling team will ship the samples by Federal Express Priority Overnight Service (at government rate) to the assigned laboratories for analytical testing. The names and addresses of the laboratories will be provided by EPA by the Friday prior to the week that sampling activities are scheduled. The Sample Manager will contact the EPA Sample Management Office (SMO) with information concerning the shipment after shipping the samples.

4.3.8 Task 13-Sample Receipt Form Completion

Following sampling activities at the site or at off-site locations, the WESTON FTL will provide an EPA Receipt for Samples form to the representatives of the property sampled. The property representatives need to sign these forms, and the FTL should provide the property owners with a carbon copy of the signed form. These forms will identify the date, location, and type of each sample collected. The forms will be forwarded to EPA as part of the final SI report. An example Receipt for Samples form is included in Appendix D.

4.4 DEMOBILIZATION AND OTHER ACTIVITIES

The remaining tasks will be completed by the field team after all samples are collected and shipped and after the FTL acquires the consent of the WESTON PTL or Site Manager.

4.4.1 Task 14-Demobilization

Following the completion of all sampling activities, the field team will decontaminate, package, and transfer all nondisposable sampling equipment back to the WESTON RES warehouse in Houston, Texas. The command post and decontamination areas will also be dismantled. WESTON will, if possible, leave the site in the same condition it was prior to the investigation.

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4.4.2 Task 15-Decontamination Rinsate Water Disposal or Staging

After completing sampling activities, the FTL will request permission from the site representative, if present, to dispose of the decontamination rinsate water, if any, in a known or suspected hazardous waste source at the site. If permission is granted, the water will be disposed of on-site. If the site representative is not present during the fieldwork and the site is inactive and abandoned, WESTON generally will dispose of the water on site.

If the site representative will not grant permission for on-site rinsate water disposal, the rinsate water will be transferred to a small drum. The rinsate water will be sampled using protocol similar to that used for surface water sampling. The drum of water then will be sealed with EPA custody tape, labeled, and staged in an area of the site designated by the site representative.

4.4.3 Task 16-Background Information Acquisition

While in the field, the WESTON FTL and other designated personnel may collect background information needed to close project data gaps, as time allows. Activities may include visiting city offices to collect local agency file information and to obtain maps, locating water wells in the area, or driving along the surface water pathway to visually document fisheries and wetlands. Background research tasks will be assigned to the FTL by the PTL once sampling activities are completed. In general, only one or two field team members will be assigned background research tasks (if time allows).

4.5 COMMUNITY RELATIONS

Persons requesting site information from the WESTON field team will be instructed to submit a Freedom of Information Act Request to Freedom of Information Officer, U.S. EPA Region VI, 1445 Ross Avenue, Dallas, Texas 75202-2733. Reporters will be instructed to contact the EPA's Office of External Affairs at (214) 665-2200 or the EPA representative in the field if one is present. The WESTON FTL will notify the WESTON PTL or Site Manager immediately if reporters are present at the site. The WESTON personnel in the office, in turn, will notify the EPA WAM.

4.6 FIELD FOLLOW-UP MEMORANDUM

As stated in WESTON's Generic Site Inspection Prioritization Work Plan (Document Control No. 4603-27-0001) dated December 1991, WESTON will submit a memorandum to the WAM describing alterations that were made to the TWP in the field. This memorandum will also serve to notify the WAM of any conditions observed at the site that appeared to represent an imminent threat.

4.7 REPORT PREPARATION

After receiving analytical data for the site from EPA, WESTON will prepare the final report for the SI. The report will contain information as specified in WESTON's Generic Site Inspection Prioritization Work Plan and by regional guidance. The report format will include the following:

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- An introduction describing the background and purpose of the investigation.
- A site characteristics section describing the site location, operating history, source waste characteristics, and site concerns.
- A sampling activities section discussing the field activities completed during the SI.
- Individual sections for the groundwater, surface water, soil exposure, and air pathways, describing the environmental conditions at the site, the likelihood of a release, targets, and relevant analytical data.
- A summary and conclusions section discussing the major site concerns.

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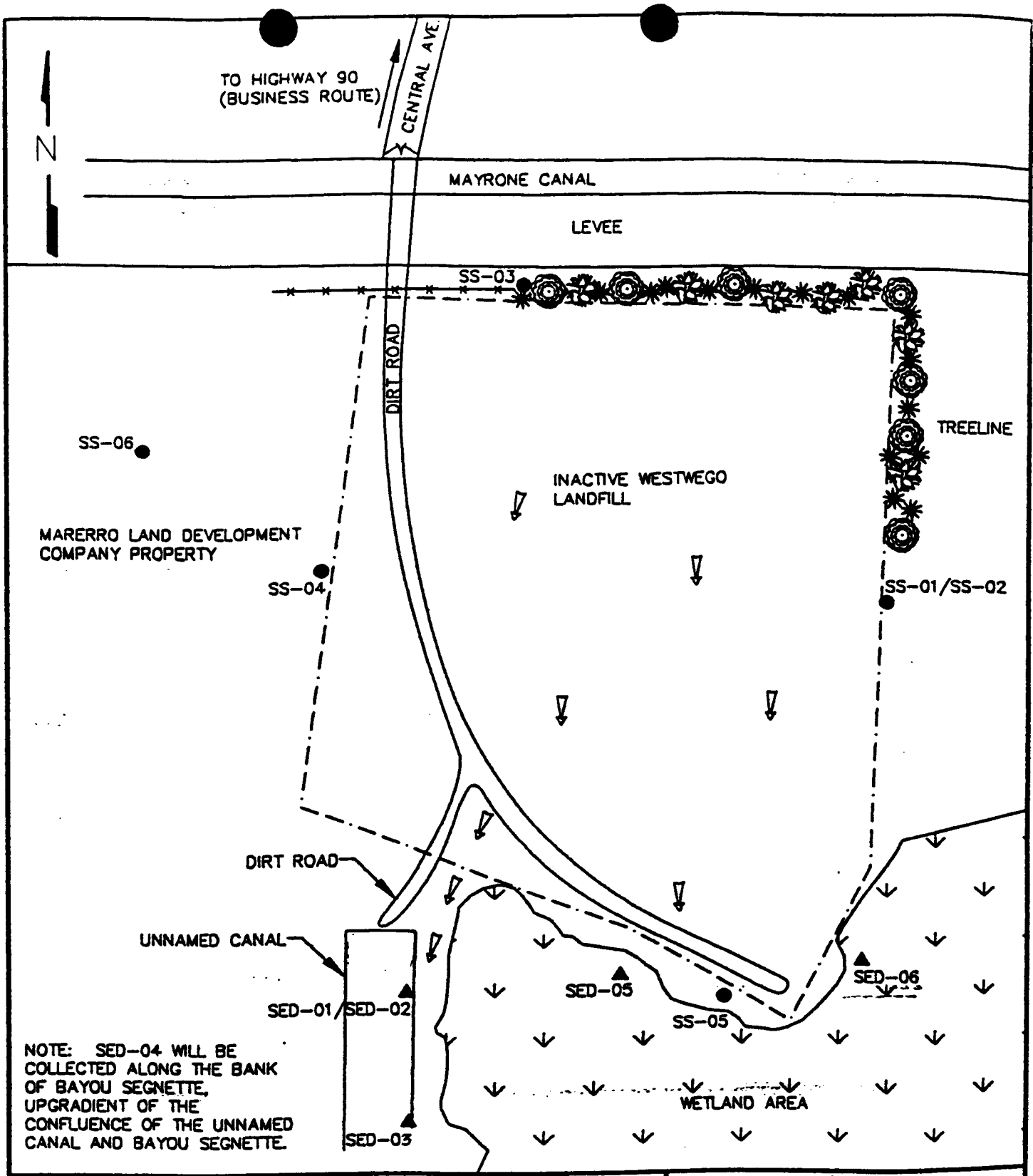

LEGEND:

- APPROXIMATE SITE BOUNDARY
- FENCE
- SURFACE DRAINAGE
- PROPOSED SOIL SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE LOCATION
- SS-03 SAMPLE IDENTIFICATION

NOT TO SCALE

WESTON

FIGURE 4-1

SAMPLE LOCATION MAP

WESTWEGO LANDFILL
WESTWEGO, LOUISIANA

CERCLA ID. NO. : LAD980621783

EPA REGION VI
ARCS SITE INSPECTION AND PRIORITIZATION

W.O. NO. : 04606-054-021-3076

H:\ARCS\ARC3076\3076B.PA 1=1 04-30-96 (PCP=ARCS

TABLE 4-1

ANTICIPATED PROJECT PERSONNEL

NAME	TITLE	ROLES	PROJECT RESPONSIBILITIES
Troy Hile	Assistant Engineer	Project Team Leader	• Implementation of the TWP in the field and final sample location selection. • Project Field Coordinator. • Collection of samples. • Equipment management. • Sample documentation, packaging, and shipping. • Mobilization/Demobilization.
Jeff Criner	Project Scientist	Site Safety Officer	• Implementation of HASP in the field. • Sampling and safety oversight and quality control. • Logbook documentation and photography. • Public relations and client interactions.
Richard Bost	Assistant Engineer	Sampler	• Air monitoring/monitoring equipment calibration. • Collection of samples. • Equipment management and decontamination. • Mobilization/Demobilization.
Camille Scardina	Assistant Project Scientist	Sample Manager	• Sample management. • Air monitoring/monitoring equipment calibration. • Collection of samples. • Equipment management and decontamination. • Mobilization/Demobilization.

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Table 4-2
Westwego Landfill (CERCLIS ID LAD980621783)
Sampling Station Descriptions and Rationales

Station Identification/Type	Description	Rationale	Sample Identification/QC Type
SED-01 Characterization	Low concentration sediment sample collected from the bank of the unnamed canal at the assumed probable point of entry (PPE).	Sample collected to document a release of site-attributable contaminants to the surface water pathway.	SED-01 Normal SED-02 Duplicate
SED-03 Background	Low concentration sediment sample collected from the unnamed canal at a location downgradient of the PPE.	Sample collected to document a release of site-attributable contaminants to the surface water pathway.	SED-03 Normal
SED-04 Characterization	Low concentration sediment sample collected along the bank of Bayou Segnette upgradient from the confluence of the unnamed canal and Bayou Segnette.	Sample collected to document background conditions in the surface water pathway.	SED-04 Normal
SED-05 Characterization	Low concentration sediment sample collected from the wetland area adjacent to the site.	Sample collected to document a release of site-attributable contaminants to a sensitive enviroment and surface water pathway.	SED-05 Normal
SED-06 Characterization	Low concentration sediment sample collected from the wetland area adjacent to the site.	Sample collected to document a release of site-related contaminants to a sensitive environment and surface water pathway.	SED-06 Normal
SS-01 Characterization	Low concentration soil sample collected from the eastern portion of the landfill.	Sample collected to document site-related contamination in the soil exposure pathway and to characterize a potential hazardous waste source.	SS-01 Normal SS-02 Duplicate
SS-03 Characterization	Low concentration soil sample collected from the northern portion of the landfill.	Sample collected to document site-related contamination in the soil exposure pathway and to characterize a potential hazardous waste source.	SS-03 Normal

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Table 4-2 (Continued)
Westwego Landfill (CERCLIS ID LAD980621783)
Sampling Station Descriptions and Rationales

Station Identification/Type	Description	Rationale	Sample Identification/QC Type
SS-04 Characterization	Low concentration soil sample collected from the western portion of landfill.	Sample collected to document site-related contamination in the soil exposure pathway and to characterize a potential hazardous waste source.	SS-04 Normal
SS-05 Characterization	Low concentration soil sample collected from the southern portion of the landfill.	Sample collected to document site-related contamination in the soil exposure pathway and to characterize a potential hazardous waste source.	SS-05 Normal
SS-06 Background	Low concentration soil sample collected from an undisturbed area immediately west of the site.	Sample collected to document background soil conditions in the soil exposure pathway.	SS-06 Normal

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TABLE 4-3
SAMPLING INFORMATION

SAMPLE TYPE	NUMBER AND TYPE OF CONTAINERS REQUIRED PER SAMPLE	ANALYSIS REQUIRED	SAMPLE PRESERVATION REQUIRED
Soil/Sediment	Two 4-oz. glass jars	Volatiles	Cool to 4°C
	One 8-oz. glass jar	Base-Neutral Acids (BNAs)/Pesticides/ Polychlorinated Biphenyls (PCBs)	Cool to 4°C
	One 8-oz. glass jar	Total Metals/Cyanide	Cool to 4°C

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SECTION 5
PROJECT INFORMATION

This section outlines basic project management information for the SI. Details concerning key personnel and the project schedule are provided. Reference should be made to WESTON's Generic Site Inspection Prioritization Work Plan (WESTON Document Control Number 4603-27-0001) for more detailed information concerning WESTON's project management plan.

5.1 KEY PROJECT PERSONNEL

The key project personnel for this SI assignment are shown on Figure 5-1.

5.2 PROJECT SCHEDULE

The overall project schedule is summarized in Table 5-1.

5.3 SAMPLING VISIT SCHEDULE

- Day 1

  8:00 a.m. Team arrives on-site and meets site representative. Team conducts site health and safety meeting. Samplers establish command post. FTL and Sample Manager prepare sample tags and labels.

  9:00 a.m. Team collects soil and/or sediment samples. Sample Manager documents samples.

  12:00 p.m. Lunch.

  1:00 p.m. Team verifies sample documentation and packages samples.

  4:00 p.m. FTL and Sample Manager depart for Federal Express to ship samples. Samplers decontaminate and load equipment and depart the site for the day.

- Day 2

  8:00 a.m. Team arrives on-site and holds brief health and safety meeting. Samplers establish command post. FTL and Sample Manager prepare sample tags and labels.

  9:00 a.m. Team collects remainder of soil and/or sediment samples. Sample Manager documents samples.

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12:00 p.m. Lunch.

1:00 p.m. Team verifies sample documentation and packages samples.

4:00 p.m. FTL and Sample Manager depart for Federal Express to ship samples. Samplers decontaminate and load equipment and depart the site.

- Day 3 Contingency

5.4 IMPORTANT TELEPHONE NUMBERS

Important telephone numbers that may be needed by the FTL include the following:

- Local Hospital: (504) 537-6841
- WESTON 24-hr Emergency: (800) 229-3674
- WESTON office: (210) 342-7810
- WESTON RES: (713) 957-3267
- WESTON RES Pager: (800) 409-2261
- EPA WAM (Stacey Bennett): (214) 665-6740
- EPA RSCC (Myra Perez/Christy McDowell): (713) 983-2130/(713) 983-2137
- EPA SMO: (Jonathan Rude): (703) 557-2490
- Place of Lodging in Field: To be determined
- Federal Express (National): (800) 238-5355
- Federal Express (Local Office): To be determined

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FIGURE 5-1
ANTICIPATED KEY PERSONNEL

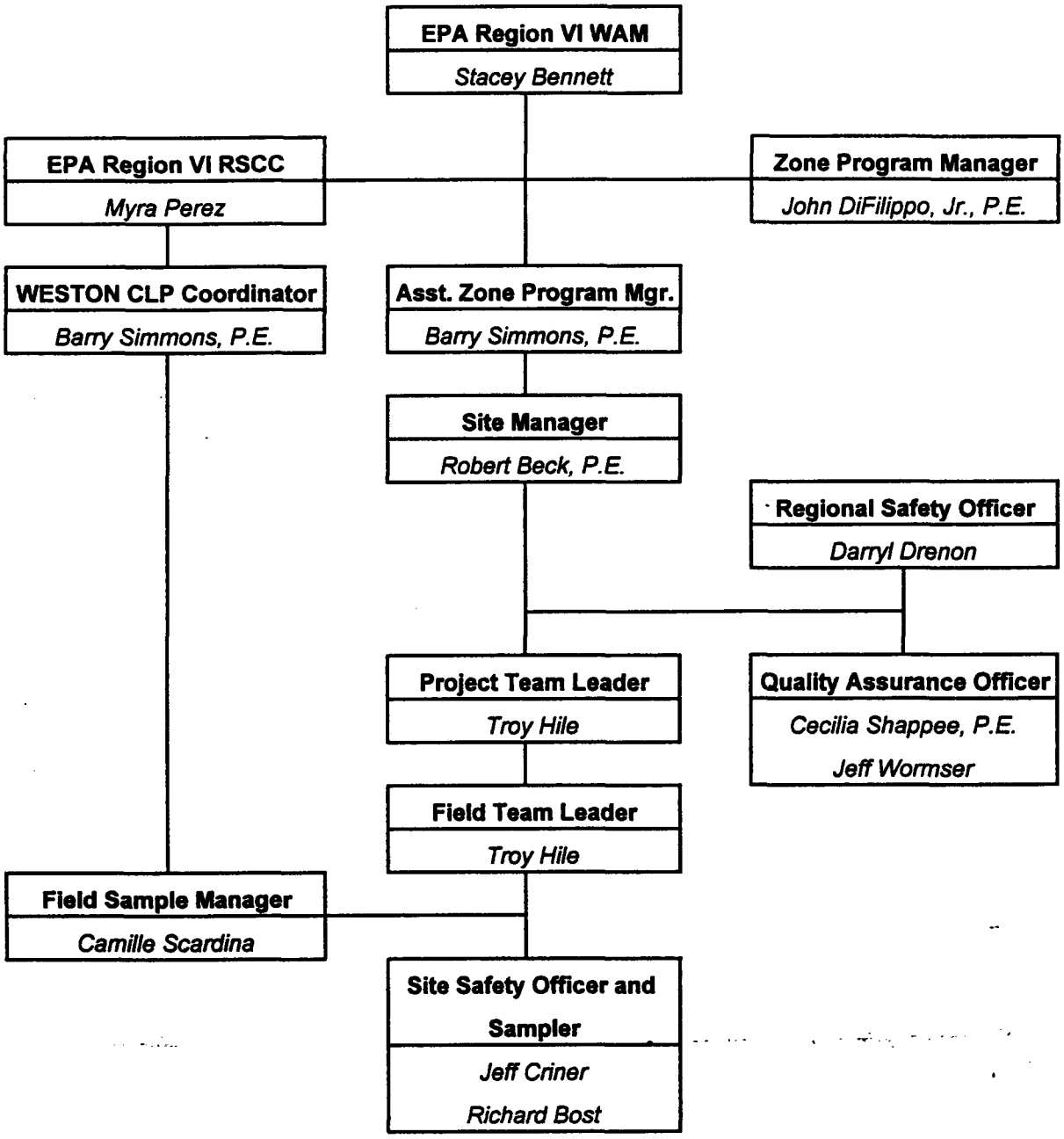

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TABLE 5-1
PROJECT SCHEDULE
(1996)

TARGET MILESTONES	March	April	May	June	July	August	September
SITE RECONNAISSANCE							
WORK PLAN PREPARATION AND SUBMITTAL							
WORK PLAN REVIEW/APPROVAL BY EPA							
LABORATORY SPACE REQUEST							
EQUIPMENT MOBILIZATION							
FIELD SAMPLING VISIT							
DATA ANALYSIS							
DATA VALIDATION							
REPORT WRITING							
REPORT QUALITY ASSURANCE							
REPORT SUBMISSION							

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SECTION 6
REFERENCES

1. Criner, J. and Hile, T. 1996. Roy F. Weston, Inc. (WESTON). Site Reconnaissance Logbook. 15 March 1996.

2. U.S. Geological Survey (USGS). 1992. New Orleans East and New Orleans West, Louisiana Quadrangles (7.5-minute series topographic maps).

3. U.S. Environmental Protection Agency Region VI (EPA Region VI). Notification of Hazardous Waste. 9 June 1981.

4. Ecology and Environment, Inc. Potential Hazardous Waste Site Inspection Report. 4 April 1983.

5. Ecology and Environment, Inc. Potential Hazardous Waste Site Identification and Preliminary Assessment. 4 April 1983.

6. EPA Region VI Potential Hazardous Waste Site Final Strategy Determination. 9 August 1983.

7. Hile, T. 1996. WESTON. Personal Communication with Greg Duhe, Water Plant Operator (Trainee), City of Westwego Water Plant, 17 April 1996.

8. EPA Region VI. 1996. Geographical Exposure Modeling System (GEMS). 1990 Census Data.

9. Louisiana Department of Environmental Quality (LDEQ) Office of Solid and Hazardous Waste. Westwego Landfill File Information. 1981 to 1986.

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APPENDIX A

SITE ACCESS AGREEMENT

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CONSENT FOR ACCESS TO PROPERTY

Name: Mr. N. Buckner Barkley, Jr.

EPA I.D. No.: LAD981621783
Site Name: Westwego Landfill

Description of Property: The Westwego Landfill is located on Lapalco Boulevard in Westwego, Jefferson Parish, Louisiana (see attached site location map). This "Consent for Access to Property" is for the Marrero Land owned portion of the site.

I hereby consent to officers, employees, and representatives authorized by the United States Environmental Protection Agency (EPA) entering and having continued access to my property for the following purposes:

1. Reviewing and copying documents related to the site;
2. The taking of such soil, water and air samples as may be determined to be necessary;
3. The sampling of any solids or liquids stored or disposed of on property;
4. The drilling of holes and the installation of monitoring wells for subsurface investigation of subsurface contamination.

I realize that these actions are undertaken pursuant to EPA's response and enforcement responsibilities under the Comprehensive Environmental Responsibility, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. § 9601 et seq., as well as 40 CFR Part 300.400 Subpart E.

I am the property owner, or a responsible agent of the property owner, and I warrant that I have the authority to enter into this access agreement.

Place a check mark in the appropriate space. Please note that if no selection is made EPA will assume that you do not wish to be provided with a portion of the sample.

(X) Please provide me with a portion of each sample taken at the property described above. I understand that there will be no charge for the sample portions provided by the EPA. I also understand that I must furnish suitable containers, be responsible for the laboratory analytical analysis, and sign for the transfer of custody from the EPA designated sampler.

( ) I do not wish to receive a portion of samples taken at the property described above.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

Marrero Land and Improvement Association, Limited,

January 23, 1996
DATE

By: N. Buckner Barkley Jr.
SIGNATURE, Title
N. Buckner Barkley, Jr., President

arcs:46032722:westwego.908(lcd)

Marrero Land & Improvement Association, Ltd.
5201 Westbank Expressway • Marrero, La. 70072
(504) 341-1635 • FAX: (504) 340-4277

January 23, 1996

N. Buckner Barkley, Jr.
President

United States Environmental
Protection Agency - Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Attn: Stacey Bennett
Superfund Site Assessment
Hazardous Waste Section (6E-SH)

RE: Site Inspection Prioritization -
Westwego Landfill (F.K.A Gerald Weber Site)
Jefferson Parish, Louisiana
EPA ID No. LAD981621783
Our File No. 2089-A

Gentlemen:

From time to time during the past year, we have been in communication with representatives of Roy F. Weston, Inc. in connection with the captioned matter.

We have been advised recently that Roy F. Weston, Inc. is prepared to proceed with its inspection and sampling, and, accordingly, we have completed, executed, and enclose your "Consent For Access To Property", with attached "site location map" previously furnished to us. We are also forwarding a copy of the consent and map to Roy F. Weston, Inc.

Very truly yours,

MARRERO LAND AND IMPROVEMENT
ASSOCIATION, LIMITED,

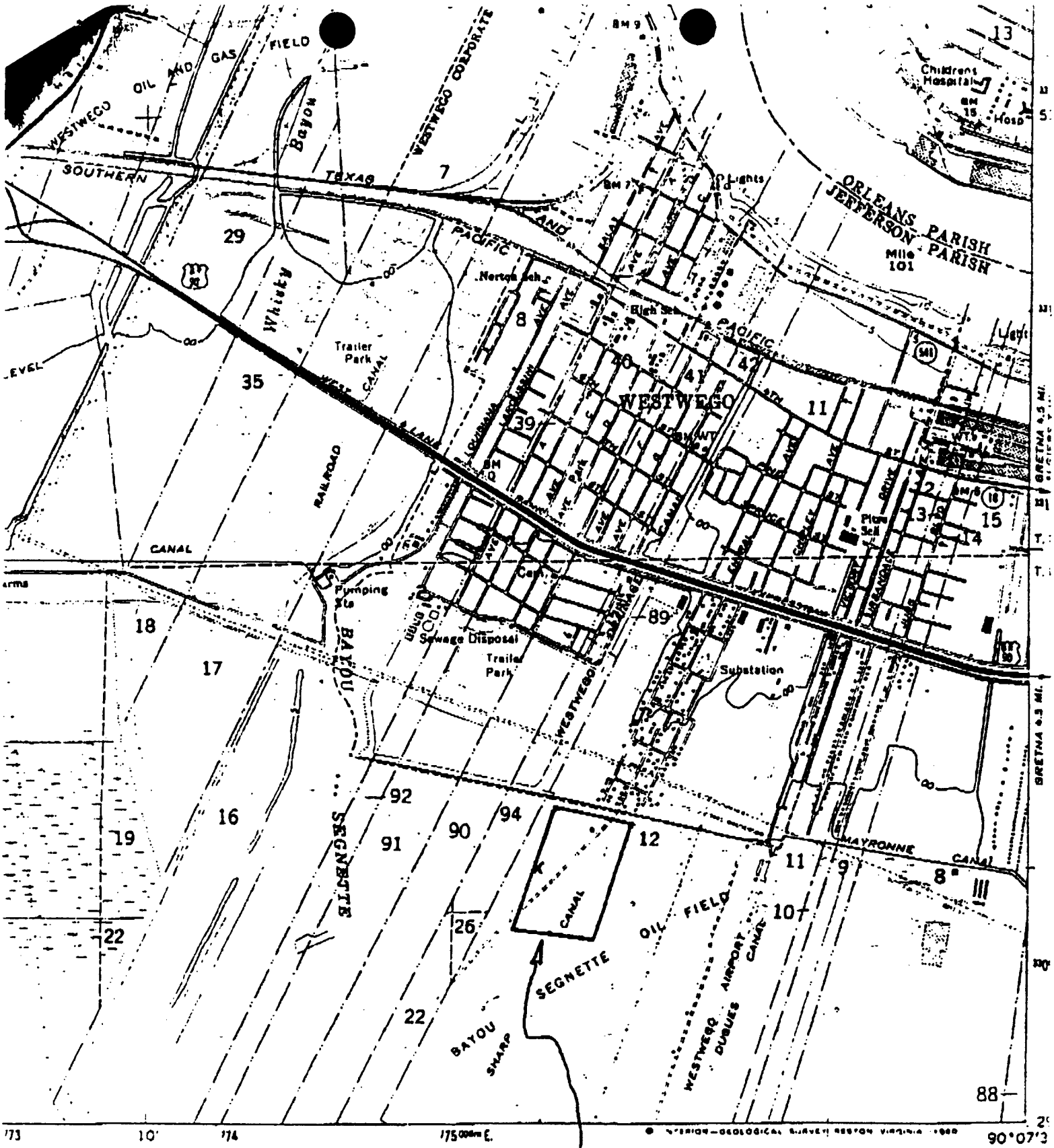
ORIGINAL SIGNED
N. B. Barkley, Jr.

By: _____
N. Buckner Barkley, Jr.,
President

NBB/ntb

Encl.

cc: Roy F. Weston, Inc.
Attn: Billy B. Cress,
Project Engineer



ROAD CLASSIFICATION

Heavy duty — Light-duty

Medium-duty — Unimproved dirt

Interstate Route — U.S. Route — State Route

QUADRANGLE LOCATION

NEW ORLEANS WEST, LA.

NW/4 NEW ORLEANS 15' QUADRANGLE

APPENDIX B

HEALTH AND SAFETY PLAN

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SITE HEALTH AND SAFETY PLAN (HASP)

Prepared by: Troy D. Hile

W.O. Number: 04606-054-021-3076-03

Project Identification:
Division: WESTON/South Central Region
Department/Office: 001010/San Antonio, Texas
Site Name: Westwego Landfill
Client: EPA Region VI/ARCS Dallas, Texas
Work Location Address:
Marrero, Louisiana

Site History: (describe briefly)
As of April 1983, the Westwego Landfill site was an inactive municipal landfill. The site reportedly received municipal, private, and commercial waste. No evidence of hazardous waste was observed during an EPA Site Inspection conducted in 1983.

Scope of Work: (describe briefly)
The scope of work to be completed at the Westwego Landfill site includes an on-site and off-site reconnaissance with extensive note-taking and photodocumentation; no intrusive activities will be performed.

☐ Site visit only; site HASP not necessary. List personnel here and sign off below:

Regulatory Status:

Site regulatory status:

CERCLA/SARA	RCRA	Other Federal Agency
☒ US EPA	☐ US EPA	☐ DOE
☐ State	☐ State	☐ USACE
☐ NPL Site	NRC	☐ Air Force
OSHA	☐ 10 CFR 20	☐ _____

☐ Hazard Communication (Req'd See Attachment "D")

☒ 1910 ☐ 1926 ☐ State

☒ Safety Officer Manual (Required to be On Site)

Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard HASP will be used and append the appropriate pages of this form along with the Standard Plan.

☐ Stack Test	☐ _____
☐ Air Emissions	☐ _____
☐ Asbestos	☐ _____
☐ Industrial Hygiene	☐ _____
☒ Hazardous Material	☐ _____

Review and Approval Documentation:

Reviewed by:
DSO/RSO/CHS — Name (Print): DANIEL S. JOHNSON — Signature: [signature] — Date: 3/05/96

Other — Name (Print): _____ — Signature: _____ — Date: _____

Approved by:
Project Director/
Project Manager — Name (Print): [signature] — Signature: [signature] — Date: 3/6/96

Hazard Assessment and Equipment Selection

In accordance with WESTON's Personal Protective Equipment Program and 29 CFR 1910.132 at the site prior to personnel beginning work the SHCS and/or the Site Manager have evaluated conditions and verified that the personal protective equipment selection outlined within this HASP is appropriate for the hazards known or expected to exist. (Refer to Safety Officer Manual Section 2 Personal Protection Program for Guidance)

☒ SHSC ☐ Site Manager — Name (Print): Jeff Criner — Signature: [signature] — Date: 3/4/96

Project start date: 3/15/1996 End date: 9/15/1996	This site HASP must be reissued/reapproved for any activities conducted after: Date: 9/15/1996	Amendment date(s): 1. 5/1/96 DSJ 2. 3. 4. 5.

By: Troy Hile (Troy Hi

SITE HEALTH AND SAFETY PLAN (HASP)

Prepared by: Troy D. Hile, Assistant Engineer

W.O. Number: 04606-054-021-3076-03

Project Identification:
Division: WESTON/South Central Region
Department/Office: 001010/San Antonio, Texas
Site Name: Westwego Landfill
Client: EPA Region VI/ARCS Dallas, Texas
Work Location Address:
Marrero, Louisiana

Site History: (describe briefly)
As of April 1983, the Westwego Landfill site was an inactive municipal landfill. The site reportedly received municipal, private, and commercial waste. No evidence of hazardous waste was observed during an EPA Site Inspection conducted in 1983.

Scope of Work: (describe briefly)
The scope of work to be completed at the Westwego Landfill site includes an on-site and off-site sampling investigation with extensive note-taking and photodocumentation; sampling activities include the collection of soil and sediment samples.

☐ Site visit only; site HASP not necessary. List personnel here and sign off below:

Regulatory Status:

Site regulatory status:

CERCLA/SARA	RCRA	Other Federal Agency
☒ US EPA	☐ US EPA	☐ DOE
☐ State	☐ State	☐ USACE
☐ NPL Site	NRC	☐ Air Force
OSHA	☐ 10 CFR 20	☐ _____

☐ Hazard Communication (Req'd See Attachment "D")
☒ 1910 ☐ 1926 ☐ State

☒ Safety Officer Manual (Required to be On Site)
Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard HASP will be used and append the appropriate pages of this form along with the Standard Plan.

☐ Stack Test	☐ _____
☐ Air Emissions	☐ _____
☐ Asbestos	☐ _____
☐ Industrial Hygiene	☐ _____
☒ Hazardous Material	☐ _____

Review and Approval Documentation:

Reviewed by:
DSO/RSO/CHS — DANIEL S. JOHNSON (Name (Print)) — Signature — Date: 5.4.96
Other — Name (Print) — Signature — Date: _____

Approved by:
Project Director/ Project Manager — Name (Print) — Signature — Date: _____

Hazard Assessment and Equipment Selection

In accordance with WESTON's Personal Protective Equipment Program and 29 CFR 1910.132 at the site prior to personnel beginning work the SHCS and/or the Site Manager have evaluated conditions and verified that the personal protective equipment selection outlined within this HASP is appropriate for the hazards known or expected to exist. (Refer to Safety Officer Manual Section 2 Personal Protection Program for Guidance)

☒ SHSC ☐ Site Manager Jeff Criner (Name (Print)) — Signature — Date: 5/14/96

Project start date: 3/15/1996 End date: 9/15/1996	This site HASP must be reissued/reapproved for any activities conducted after: Date: 9/15/1996	Amendment date(s): By: 1. 2. 3. 4. 5.

WESTON REPRESENTATIVES

Organization/Branch	Name/Title	Address	Telephone
WESTON/San Antonio	Robert Beck/Site Manager	70 NE Loop 410, Suite 460 San Antonio, TX 78216	(210) 342-7810
WESTON/Houston	Barry Simmons/Asst. Zone Program Manager	5599 San Felipe, Suite 700 Houston, TX 77056	(713)621-1620
WESTON/San Antonio	Troy Hile /Project Team Leader	70 NE Loop 410, Suite 460 San Antonio, TX 78216	(210) 342-7810

Roles and Responsibilities: The Site Manager is responsible for project management of the Site Inspection and Prioritization (SI&P) work assignment. The Assistant Zone Program Manager oversees all ARCS work assignments, including SI&Ps. The Project Team Leader (PTL) is responsible for completion of technical activities associated with the site.

WESTON SUBCONTRACTORS

Organization/Branch	Name/Title	Address	Telephone
N/A			

Roles and Responsibilities:

N/A

SITE SPECIFIC HEALTH AND SAFETY PERSONNEL

The Site Health and Safety Coordinator (SHSC) for activities to be conducted at this site is: Jeff Criner

The SHSC has total responsibility for ensuring that the provisions of this Site HASP are adequate and implemented in the field.

Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as SHSCs are experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120

Qualifications: At a minimum, the SHSC will be a WESTON certified Level-D SHSC. Qualifications include: OSHA 40-hour Hazardous Waste site training, an 8-hour refresher within the last year, current CPR, First Aid, and Bloodborne Pathogen training, completion of WESTON's Dangerous Goods Shipping training, and completion of WESTON SHSC training.

Designated alternates include: Jeff Criner, John Warren, Dan Johnson, Billy Cress

HEALTH AND SAFETY EVALUATION

Hazard Assessment

Background Review: ☐ Complete ☒ Partial If partial why? The contaminant source areas on-site and the contaminant migration have not been fully characterized. The HASP will be amended to include hazards noted during site reconnaissance, if necessary.

Activities Covered Under This Plan:

No.	Task/Subtask	Description	Schedule
1	Site Reconnaissance	Site Recon Walk Through	15 March 1996
2	2A	Soil Sampling	6/24/96
	2B	Sediment Sampling	6/24/96

Type of Hazards:

☐ Numbers refer to one of the following hazard evaluation forms. Complete hazard evaluation forms for each appropriate hazard class.

Physiochemical [1]

- ☒ Flammable
- ☒ Explosive
- ☐ Corrosive
- ☒ Reactive
- ☐ O_2 Rich
- ☐ O_2 Deficient

Chemically Toxic [1]

- ☒ Inhalation
- ☒ Ingestion
- ☒ Contact
- ☒ Absorbtion
- ☒ Carcinogen
- ☐ Mutagen
- ☐ Teratogen
- ☒ OSHA 1910.1000 Substance (Air Contaminants)
  Benzene 1910.1028
  Vinyl Chloride 1910.1017
- ☒ OSHA Specific Hazard Substance Standard
  (Refer to HASP Form 04HASP.894 for Listing.)

Radiation [3]

Ionizing:

- ☐ Internal exposure
- ☐ External exposure

Non-ionizing:

- ☐ UV
- ☐ RF
- ☐ Laser

Biological [2]

- ☐ Etiological Agent
- ☒ Other (Plant, insect, animal)

- ☒ Physical Hazards [4]
- ☐ Construction Activities

Source/Location of Contaminants and Hazardous Substances

Directly Related to Tasks

- ☒ Air
- ☐ Other Surface
- ☐ Groundwater
- ☒ Soil
- ☒ Surface Water
- ☐ Sanitary Wastewater
- ☐ Process Wastewater
- ☐ Other _____

Indirectly Related to Tasks - Nearby Process(es) That Could Affect Team Members:

- ☒ Client Facility
- ☐ Nearby Non-client Facility

Describe: Nearby process(es) that could affect team members include air traffice at nearby Westwego Airport.

- ☐ Client Briefing Arranged

HEALTH AND SAFETY EVALUATION - CHEMICAL HAZARDS

☐ N/A

Chemical Contaminants of Concern

Provide the data requested for chemical contaminants on HASP Form 33HASP.894 or attach data sheets from an acceptable sources such as NIOSH pocket guide, condensed chemical dictionary, ACGIH TLV booklet, etc. List chemical and concentration below and locate data sheets in Appendix A of this HASP.

☒ N/A

Identify hazardous materials used or on-site and attach Material Safety Data Sheets (MSDS) for all reagent type chemicals, solutions, or other identified materials that in normal use in performing tasks related to this project could produce hazardous substances. Ensure that all subcontractors and other parties working nearby are informed of the presence of these chemicals and the location of MSDS's. Obtain from subcontractors and other parties lists of the hazardous materials they use or have on-site and identify location of MSDS's here. List chemicals and quantities below and locate MSDS in Appendix B of this HASP.

Chemical Name	Concentration (if known)	Chemical Name	Quantity
Methane	Unknown		
Benzene	Unknown		
Toluene	Unknown		
Ethyl Benzene	Unknown		
Xylene	Unknown		
Vinyl Chloride	Unknown		

OSHA SITE SPECIFIC HAZARDOUS SUBSTANCES

The following substances may require specific medical, training, or monitoring based upon concentration or evaluation of risk. See the appropriate citation listed under 29 CFR 1910 or 1926 for additional information.

☐ 1910.1001 Asbestos	☐ 1910.1002 Coal tar pitch volatiles	☐ 1910.1003 4-Nitrobiphenyl	☐ 1910.1004 alpha-Naphthylamine
☐ 1910.1005 [Reserved]	☐ 1910.1006 Methyl chloromethyl ether	☐ 1910.1007 3,3'-Dichlorobenzidine (and its salts).	☐ 1910.1008 bis-Chloromethyl ether
☐ 1910.1009 beta-Naphthylamine	☐ 1910.1010 Benzidine	☐ 1910.1011 4-Aminodiphenyl	☐ 1910.1012 Ethyleneimine
☐ 1910.1013 beta-Propiolactone	☐ 1910.1014 2-Acetylaminofluorene	☐ 1910.1015 4-Dimethylaminoazobenzene	☐ 1910.1016 N-Nitrosodimethylamine
☒ 1910.1017 Vinyl chloride	☐ 1910.1018 Inorganic arsenic	☐ 1910.1025 Lead	☐ 1910.1027 Cadmium
☒ 1910.1028 Benzene	☐ 1910.1029 Coke bven emissions	☐ 1910.1043 Cotton dust	☐ 1910.1044 1,2-dibromo-3-chloropropane
☐ 1910.1045 Acrylonitrile	☐ 1910.1047 Ethylene oxide	☐ 1910.1048 Formaldehyde	☐ 1910.1050 Methylenedianiline

HEALTH AND SAFETY EVALUATION - BIOLOGICAL HAZARDS OF CONCERN

2

[X] Poisonous Plants (FLD 43)

Location/Task No(s).: ALL

Source: [ ] Known [X] Suspect

Route of Exposure: [ ] Inhalation [ ] Ingestion [X] Contact [ ] Direct Penetration

Team Member(s) Allergic: [ ] Yes [X] No

Immunization required: [ ] Yes [X] No

[X] Insects (FLD 43)

Location/Task No(s).: ALL

Source: [ ] Known [X] Suspect

Route of Exposure: [ ] Inhalation [ ] Ingestion [X] Contact [X] Direct Penetration

Team Member(s) Allergic: [ ] Yes [X] No

Immunization required: [ ] Yes [X] No

[X] Snakes, Reptiles (FLD 43)

Location/Task No(s).: ALL

Source: [ ] Known [X] Suspect

Route of Exposure: [ ] Inhalation [ ] Ingestion [ ] Contact [X] Direct Penetration

Team Member(s) Allergic: [ ] Yes [X] No

Immunization required: [ ] Yes [X] No

[X] Animals (FLD 43)

Location/Task No(s).: ALL

Source: [ ] Known [X] Suspect

Route of Exposure: [ ] Inhalation [ ] Ingestion [X] Contact [X] Direct Penetration

Team Member(s) Allergic: [ ] Yes [X] No

Immunization required: [ ] Yes [X] No

FLD 43 — WESTON Biohazard Field Operating Procedures: Att. OP [X]

[X] Sanitary Sludges

Location/Task No(s).: ALL

Source: [X] Known [ ] Suspect

Route of Exposure: [X] Inhalation [ ] Ingestion [ ] Contact [ ] Direct Penetration

Team Member(s) Allergic: [ ] Yes [X] No

Immunization required: [ ] Yes [X] No

Tetanus Vaccination within Past 7 yrs: [X] Yes [ ] No
(see Note #1 below)

[ ] Etiologic Agents (List)

Location/Task No(s).:

Source: [ ] Known [ ] Suspect

Route of Exposure: [ ] Inhalation [ ] Ingestion [ ] Contact [ ] Direct Penetration

Team Member(s) Allergic: [ ] Yes [ ] No

Immunization required: [ ] Yes [ ] No

FLD 44 — WESTON Bloodborne Pathogens Exposure Control Plan - First Aid Procedures: Att. OP [X]

FLD 45 — WESTON Bloodborne Pathogens Exposure Control Plan – Working with Infectious Waste: Att. OP [ ]

Note #1: A tetanus injection is recommended every 10 years for employees with "normal exposure risks." However, if employees have frequent potential for exposure at "higher risk," as working with raw sewage, then a frequency of 7 years is recommended.

HEALTH AND SAFETY EVALUATION — RADIATION HAZARDS OF CONCERN

NONIONIZING RADIATION

Task #	Type of Nonionizing Radiation	Source Onsite	TLV/PEL	Wavelength Range	Control Measures	Monitoring Instrument		
	Ultraviolet							
	Infrared							
	Radio Frequency							
	Microwave							
	Laser							

IONIZING RADIATION

				DAC (μCi/mL)				
Task #	Radionuclide	Major Radiations	Radioactive Half-Life (Years)	D	W	Y	Surface Contamination Limit	Monitoring Instrument
1	∝ Suspect β Suspect δ Suspect							Micro R (μR)
2	No radiation hazards suspected per site reconnaissance activities							

HEALTH AND SAFETY EVALUATION - PHYSICAL HAZARDS OF CONCERN

4

Phy.Haz.Cond.	Physical Hazard	Att.OP	Weston OP Titles
Loud noise	Hearing loss/disruption of communication	☐	FLD01 - Noise Protection
Inclement weather	Rain/humidity/cold/ice/snow/lightning	☒	FLD02 - Inclement Weather
Steam heat stress	Burns/displaced oxygen/wet working surfaces	☐	FLD03 - Hot Process - Steam
Heat/Stress	Burns/hot surfaces/low pressure steam	☒	FLD04 - Hot Process - LT3
Ambient heat stress	Heat rash/cramps/exhaustion/heat stroke	☒	FLD05 - Heat Stress Prevention/Monitoring
Cold Stress	Hypothermia/frostbite	☐	FLD06 - Cold Stress
Cold/wet	Trench/paddy/immersion foot/edema	☒	FLD07 - Wet Feet
Confined spaces	Falls/burns/drowning/engulfment/electrocution	☐	FLD08 - Confined Space Entry
Explosive vapors	Thermal burns/impaction/dismemberment	☒	FLD09 - Hot Work
Improper lifting	Back strain/abdomen/arm/leg muscle/joint injury	☒	FLD10 - Manual Lifting/Handling Heavy Objects
Uneven Surfaces	Vehicle accidents/slips/trips/falls	☒	FLD11 - Rough Terrain
Poor housekeeping	Slips/trips/falls/punctures/cuts/fires	☒	FLD12 - Housekeeping
Structural integrity	Crushing/overhead hazards/compromised floors	☐	FLD13 - Structural Integrity
Hostile persons	Bodily injury	☒	FLD14 - Site Security
Remote Area	Slips/trips/falls/back strain/communication	☒	FLD15 - Remote Area
Improper Cyl.Handling	Mechanical injury/fire/explosion/suffocation	☐	FLD16 - Pressure Systems - Compressed Gases
Water Hazards	Poor visibility/entanglement/drowning/cold stress	☐	FLD17 - Diving
Water Hazards	Drowning/heat/cold stress/hypothermia/falls	☐	FLD18 - Operation and Use of Boats
Water Hazards	Drowning/frostbite/hypothermia/falls/electrocution	☐	FLD19 - Working Over Water
Vehicle Hazards	Struck by vehicle/collision	☐	FLD20 - Traffic
Explosions	Explosion/fire/thermal burns	☐	FLD21 - Explosives
Moving mechanical parts	Crushing/pinch points/overhead hazards	☐	FLD22 - Heavy Equipment Operation
Moving mech.parts	Overhead hazard/electrocution	☐	FLD23 - Cranes/Lifting Equipment Operation
Working at elevation	Overhead hazards/falls/electrocution	☐	FLD24 - Aerial Lifts/Manlifts
Working at elevation	Overhead hazard/falls/electrocution	☐	FLD25 - Working at Elevation
Working at elevation	Overhead hazard/falls/electrocution/slips	☐	FLD26 - Ladders
Working at elevation	Slips/trips/falls/overhead hazards	☐	FLD27 - Scaffolding
Trench Cave-in	Crushing/falling/overhead hazards/suffocation	☐	FLD28 - Excavating/Trenching
Improper material handling	Back injury/crushing from load shifts	☐	FLD29 - Materials Handling
Physiochemical	Explosions/fires from oxidizing, flam./corr.material	☐	FLD30 - Hazardous Materials Use/Storage
Physiochemical	Fire and explosion	☐	FLD31 - Fire Prevention/Response Plan Required
Physiochemical	Fire	☒	FLD32 - Fire Extinguishers Required
Structural integrity	Overhead/electrocution/slips/trips/falls/fire	☐	FLD33 - Demolition
Electrical	Electrocution/shock/thermal burns	☐	FLD34 - Utilities
Electrical	Electrocution/shock/thermal burns	☐	FLD35 - Electrical Safety
Burns/Fires	Heat Stress/Fires/Burns	☐	FLD36 - Welding/Cutting/Burning
Impact/thermal	Thermal burn/high pressure impaction/heat stress	☐	FLD37 - High Pressure Washers
Impaction/electrical	Smashing body parts/pinching/cuts/electrocution	☐	FLD38 - Hand and Power Tools
Poor visibility	Slips/trips/falls	☐	FLD39 - Illumination
Fire/Explosion	Burns/impaction	☐	FLD40 - Storage Tank
Communications	Disruption of Communications	☐	FLD41 - Std. Hand/Emergency Signals
Energy/Release	Unexpected release of energy	☐	FLD42 - Lockout/Tagout
Drilling hazards	Electrocution/overhead hazards/pinch points	☐	2.5 - Drilling Safety Guide

TASK-BY-TASK RISK ASSESSMENT
(Complete One Sheet for Each Task)

TASK DESCRIPTION

TASK 1 - SITE RECONNAISSANCE

Members of the project team will perform a walk through survey of the site. No intrusive activities will take place.

EQUIPMENT REQUIRED/USED
(Be specific, e.g., hand tools, heavy equipment, instruments, PPE)

Modified Level D (long sleeve shirt, blue jeans, steel toed boots)

Logbook (Waterproof)	Surgical Gloves	First Aid Kit
OVA	Hard Hat	Micro R
Safety Glasses	Booties	BBP Kit
Fire Extinguisher		

POTENTIAL HAZARDS/RISKS

CHEMICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☐ M ☒ L

What Justifies Risk Level? The risk level is expected to be low as activities will be non-intrusive and continuous air monitoring will be performed.

PHYSICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as the site is an inactive municipal landfill, which may contain objects which could pose a tripping hazard.

BIOLOGICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as animals, insects, and poisonous plants may be present on site. In addition, the nearby swamp may contribute to the risk of mosquitos and ticks at the site.

RADIOLOGICAL

☐ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? Risk Level is suspected to be moderate; however, no radiological hazards have not been documented at the site.

LEVELS OF PROTECTION/JUSTIFICATION

Modified Level D, since no air pathway hazards are known or suspected in the breathing zone. PPE will be worn by WESTON personnel to eliminate possibility of direct contact. If elevated monitoring instrument readings are observed, the team will withdraw immediately and reassess the situation.

SAFETY PROCEDURES REQUIRED AND/OR FIELD OPS UTILIZED

All field activities will be performed in accordance with this HASP and WESTON's standard operating procedures outlined in WESTON's safety officer field manual.

TASK-BY-TASK RISK ASSESSMENT
(Complete One Sheet for Each Task)

TASK DESCRIPTION

TASK 2A - SOIL SAMPLING

Members of the project team will collect soil samples from onsite, and offsite locations. Soil samples generally will be collected from 0 to 2 foot depths.

EQUIPMENT REQUIRED/USED
(Be specific, e.g., hand tools, heavy equipment, instruments, PPE)

FID-OVA (breathing zone)	Disposable plastic scoops
Logbook (waterproof)	Respirator (full face) w/cartidges GMC-H
Appropriate sample jars	Lightweight coveralls (or appropriate clothing ie. Tyvek)
Latex and Nitrile gloves	Booties
First Aid Kit/BBP kit	Steel Toed Boots
Fire Extinguisher	

POTENTIAL HAZARDS/RISKS

CHEMICAL

☒ Hazard Present Risk Level: ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as intrusive activities will be performed and unknown levels of contaminants are suspected on-site.

PHYSICAL

☒ Hazard Present Risk Level: ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate because the site contains objects which pose a tripping hazard.

BIOLOGICAL

☒ Hazard Present Risk Level: ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as animals, insects, and poisonous plants may be present on site, or in the adjacent wetland area.

RADIOLOGICAL

☐ Hazard Present Risk Level: ☐ H ☐ M ☐ L

What Justifies Risk Level? N/A

LEVELS OF PROTECTION/JUSTIFICATION

Initial level of protection will be Level D if justified by initial air monitoring. PPE will be worn by WESTON personnel to eliminate possibility of direct contact. If air monitoring instrument readings become elevated above corresponding action levels, the team will withdraw to the support zone immediately and upgrade appropriately to Level C to complete the work. Appropriate WESTON health and Safety Personnel will be contacted if no Level C supervisor is on site. Work will not be performed in Level B PPE unless this HASP is ammended.

SAFETY PROCEDURES REQUIRED AND/OR FIELD OPS UTILIZED

An inital air monitoring effort will be made at sample locations to determine if upgrades in the level of protections are needed. Refer to page 12 for action level upgrade.

TASK-BY-TASK RISK ASSESSMENT
(Complete One Sheet for Each Task)

TASK DESCRIPTION

TASK 2B - SEDIMENT SAMPLING

The Project Team will collect sediment samples from on-site and off-site locations. Sediment samples will be collected from 0 to 2 foot depths.

EQUIPMENT REQUIRED/USED
(Be specific, e.g., hand tools, heavy equipment, instruments, PPE)

FID-OVA 9breathing zone	Disposable plastic scoops
Logbook (waterproof)	Respirator (full face) w/cartidges GMC-H
Appropriate sample jars	Lightweight coveralls (or appropriate clothing ie. Tyvek)
Latex and Nitrile gloves	Booties
First Aid Kit/BBP Kit Steel Toed Boots	STEEL TOED BOOTS
Fire Extinguisher	

POTENTIAL HAZARDS/RISKS

CHEMICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as intrusive activities will be performed and unknown levels of contaminants are suspected on-site.

PHYSICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as access to the different sediment sampling locations may prove to be difficult.

BIOLOGICAL

☒ **Hazard Present** **Risk Level:** ☐ H ☒ M ☐ L

What Justifies Risk Level? The risk level is expected to be moderate as animals, insects, and poisonous plants may be present on site, or in the adjacent wetland area.

RADIOLOGICAL

☐ **Hazard Present** **Risk Level:** ☐ H ☐ M ☐ L

What Justifies Risk Level? N/A

LEVELS OF PROTECTION/JUSTIFICATION

Initial level of protection will be Level D if justified by initial air monitoring. PPE will be worn by WESTON personnel to eliminate possibility of direct contact. If air monitoring instrument readings become elevated above corresponding action levels, the team will withdraw to the support zone immediately and upgrade appropriately to Level C to complete the work. Appropriate WESTON health and Safety Personnel will be contacted if no Level C supervisor is on site. Work will not be performed in Level B PPE unless this HASP is ammended.

SAFETY PROCEDURES REQUIRED AND/OR FIELD OPS UTILIZED

An inital air monitoring effort will be made at sample locations to determine if upgrades in the level of protections are needed. Refer to page 12 for action level upgrade.

PERSONNEL PROTECTION PLAN

Engineering Controls
Describe Engineering Controls used as part of Personnel Protection Plan:

Task(s)	
ALL	Continuous air monitoring will be performed.

Administrative Controls
Describe Administrative controls used as part of Personnel Protection Plan:

Task(s)	
ALL	An initial safety meeting will be held at the site before work starts. Work will be completed in accordance with this HASP under the supervision/guidance of the SHSC.

Personnel Protective Equipment
Action Levels for Changing Levels of Protection. Define Action Levels for up or down grade for each task:

Action levels for the FID-OVA	Initial action levels are based on the benzene protocol which is outlined on the following page.

Description of Levels of Protection

Level D		Level D Modified	
Task(s):		**Task(s): 1**	
☒ Head	Hard Hat, if overhead structures are present or if deemed necessary by the SHSC.	☒ Head	Hard Hat, if overhead structures are present or if deemed necessary by the SHSC.
☒ Eye and Face	Safety glasses, if necessary	☒ Eye and Face	Safety glasses, if necessary
☒ Hearing	Earplugs, if necessary	☒ Hearing	Earplugs, if necessary
☐ Arms and Legs Only		☐ Arms and Legs Only	
☒ Appropriate Work Uniform	Coveralls, or appropriate clothing	☒ Whole Body	☒ Tyvek or appropriate clothing
☒ Hand - Gloves	Surgical, Nitril (Tasks 2B)	☐ Apron	
☒ Foot - Safety Boots	Steel Toe Boots, Overboots	☒ Hand - Gloves	
☐ Fall Protection		☒ Gloves (inner)	Surgical (latex)
☐ Flotation		☒ Gloves (outer)	Nitrile
☐ Other		☒ Foot - Safety Boots	☒ Steel toe boots, overboots
			☒ Booties

ACTION LEVEL PROTOCOL
(WESTWEGO LANDFILL)

From WESTON Safety Officer Field Manual *Benzene Action Level Guidelines:*
(All measurements are above background and in the breathing zone.)

OVA Reading < 1 unit — Level D / Modified Level D continues.

1 unit ≤ OVA Reading < 5 units — Upgrade to Level C or evacuate area and reapproach area to repeat measurements in 10 minutes.

- Test for Vinyl Chloride using Drager tube:
  - If < 0.5 ppm, then continue in Level C.
  - If ≥ 0.5 ppm, then evacuate area; and reapproach area to repeat measurements in 10 minutes. If readings remain ≥ 0.5 ppm, then upgrade to Level B (amend HASP or stop work).

OVA Reading ≥ 5 units (and Vinyl Chloride < 0.5 ppm)

- Test for Benzene using Drager tube:
  - If < 1.0 ppm, then continue in Level C.
  - If ≥ 1.0 ppm, then evacuate area; and reapproach area to repeat measurements in 10 minutes. If readings remain ≥ 1.0 ppm, then upgrade to Level B (amend HASP or stop work).

OVA Reading ≥ 315 units

- Immediate upgrade to Level B (regardless of Drager Tube measurements) if OVA Readings ≥ 315 units.

<u>Level C → B Action Levels:</u> (½ IDLH) (%R)

Toluene	=	½ (500) (126%)	=	315 units
Xylene	=	½ (900) (92%)	=	414 units
Ethylbenzene	=	½ (800) (111%)	=	444 units
Benzene	=	½ (500) (185%)	=	463 units
Vinyl Chloride	=	An IDLH has not yet been determined by OSHA or NIOSH.		

Description of Levels of Protection		
Level C		**Level B**
Task(s):	NA	Task(s):
☒ Head	Hard hat, if necessary	☐ Head
		☐ Eye and Face
☒ Hearing	Earplugs, if necessary	☐ Hearing
☐ Arms and Legs Only		☐ Arms and Legs Only
☒ Whole Body		☐ Whole Body
☒ Apron	2A, 2B - Tyvek	
☒ Hand - Gloves		☐ Hand - Gloves
☒ Gloves (latex)		
☒ Gloves (nitrile)		
☒ Foot - Boots		☐ Foot - Boots
☒ Boots	Steel Toed with overboots	
☐ Boots		
☐ Half Face		☐ SAR - Airline
☐ Cart./Canister		☐ SCBA
☒ Full Face	MSA Ultratwin	☐ Comb. Airline/SCBA
☒ Cart./Canister	GMC-H APR	☐ Cascade System
☐ PAPR		☐ Compressor
☐ Cart./Canister		☐ Fall Protection
☐ Type C		☐ Flotation
☐ Fall Protection		☐ Other
☐ Flotation		
☐ Other		

SITE OR PROJECT HAZARD MONITORING PROGRAM

Direct Reading Air Monitoring Instruments

Instrument Selection and Initial Check Record

Reporting Format: ☒ Field Notebook ☐ Field Data Sheets ☐ Air Monitoring Log ☐ Trip Report ☐ Other

Instrument	Task No.(s)	Number Required	Number Received	Checked Upon Receipt	Comment	Initials
☐ CGI				☐		
☐ O_2				☐		
☐ CGI/O_2				☐		
☐ CGI/O_2/tox-PPM, H_2S,H_2S/CO				☐		
☒ RAD-GM Micro R	1			☐		
☐ NaI				☐		
☐ ZnS				☐		
☐ Other _____				☐		
☐ PID				☐		
☐ HNU 10.2				☐		
☐ HNU 11.7				☐		
☐ Photovac, TMA				☐		
☐ OVM				☐		
☐ Other _____				☐		
☒ FID (Foxboro OVA)	ALL			☐		
☐ FOX 128				☐		
☐ Heath, AID, Other _____				☐		
☐ RAM, Mini-RAM, Other _____				☐		
☐ Monotox				☐		
☐ H_2S				☐		
☐ COCL				☐		
☐ SO_2				☐		
☐ HCN				☐		
☐ Other _____				☐		
☐ Bio-Aerosol Monitor				☐		
☒ Detector Tubes	ALL			☐		
☒ Pump - MSA, Drager, Sensidyne	ALL	1		☐		
☒ Tubes/type: Benzene	ALL	1 SET		☐		
☒ Tubes/type: Vinylchloride	ALL	1 SET		☐		
☐ Other _____				☐		

SITE OR PROJECT HAZARD MONITORING PROGRAM

Direct Reading Air Monitoring Instruments Calibration Record

Instrument, Mfg., Model, Equip. ID No.	Date	Time	Calib. Material	Calib. Method Mfg.'s	Other	Initial Setting and Reading	Final Setting and Reading	Calibrator's Initials

SITE AIR MONITORING PROGRAM

Direct Reading Air Monitoring Instruments

Air Monitoring Instrument: FID-Foxboro OVA

Air Monitoring Frequency: All Tasks

- ☐ Periodically:
- ☐ Periodically:
- ☒ Continuously:
- ☐ Other:

Monitoring Locations

- ☒ Upwind/downwind of site activities
- ☐ Near residents, etc.
- ☐ Key site activity locations:
  - ☐ Decon area
  - ☐ Staging area
  - ☐ Excavation area
  - ☐ Field lab area
  - ☐ Storage tanks
  - ☐ Lagoons
  - ☐ Drums
- ☐ Fixed stations
- ☒ Other: Monitor in breathing zone during reconnaissance AND DURING SAMPLING ACTIVITIES.

Air Monitoring Instrument: Micro - R

Air Monitoring Frequency: Site Reconnaissance

- ☐ Periodically:
- ☐ Periodically:
- ☐ Continuously:
- ☐ Other:

Monitoring Locations

- ☐ Upwind/downwind of site activities
- ☐ Near residents, etc.
- ☐ Key site activity locations:
  - ☐ Decon area
  - ☐ Staging area
  - ☐ Excavation area
  - ☐ Field lab area
  - ☐ Storage tanks
  - ☐ Lagoons
  - ☐ Drums
- ☐ Fixed stations
- ☒ Other: Landfill Area

SITE AIR MONITORING PROGRAM

Action Levels

These Action Levels, if not defined by regulation, are some percent (usually 50%) of the applicable PEL/REL/TLV. That number must also be adjusted to account for instrument response factors.

	Tasks	Action Level		Action
☐ **Explosive atmosphere**		Ambient Air Concentration	Confined Space Concentration	
		<10% LEL	0 to 1% LEL	Work may continue. Consider toxicity potential.
		10 to 25% LEL	1 to 10% LEL	Work may continue. Increase monitoring frequency.
		>25% LEL	>10% LEL	Work must stop. Ventilate area before returning.
☐ **Oxygen**		Ambient Air Concentration	Confined Space Concentration	
		<19.5% O_2	<19.5% O_2	Leave Area. Re-enter only with self-contained breathing apparatus.
		19.5% to 25% O2	19.5% to 23.5% O_2	Work may continue. Investigate changes from 21%.
		>25% O_2	>23.5% O_2	Work must stop. Ventilate area before returning.
☒ **Radiation**	1	< 3 times background		Continue Work
		3 Times Background to < 1 mR/hour		Radiation above background levels (normally 0.01-0.02 mR/hr)g signifies possible source(s) radiation present. Continue investigation with caution. Perform thorough monitoring. Consult with a Health Physicist.
		> 1 mrem/hour		Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of Health Physicist.
☒ **Organic gases and vapors**	ALL	The action level for organic gases and vapors is as follows:		
		OVA reading < 1 unit		Continue work in Level D
		OVA reading ≥ 1 unit (Sustained for 5 minutes in the breathing zone)		Evacuate area and follow protocole on Page #12
☒ **Inorganic gases, vapors and particulates**	ALL	Action levels for particulates will be visible dust which is approximately equivalent to 2.5 milligrams per cubic meter (mg/m^3).		The work teams will evacuate the area if visible dust appears.

SITE AIR MONITORING PROGRAM

Ambient Air Sampling

Check situations which will require or action levels which will apply to deciding to institute or increase scope of planned air sampling.

- [x] No air sampling is required on this site.
- [ ] An air sampling plan is incorporated in this HASP.

Meteorological Conditions

- [ ] Dry weather for ____ days
- [ ] Ambient temperature above ____ °F
- [ ] Wind increasing potential of more contaminant dispersion in or migration out of controlled area.

Activities which will require instituting or increasing scope of air sampling:

- [ ] Major spills
- [ ] New site activity resulting in potential presence of new chemical hazards.
- [ ] Site activity increases airborne contaminants possibilities.
- [ ] Air sampling documentation required for:
- [ ] Downgrading from stipulated level of protection
- [ ] Documenting no migration of contaminants offsite through air

Applicable Action Levels for instituting Air Sampling:

- [ ] Visible vapor/gas clouds or vapor levels, or
- [ ] Visible dust or particulate levels measured with Direct Reading Instrument, two-three times background or above action level, sustained over 10-15 minute period.

The following requirements apply to air sampling:

Sampling Matrix/Air Interface - Monitor matrix/air interface and breathing zone periodically with DRI. If vapor levels > 2-3 times background, monitor continuously. Follow No. 4.

Container Opening - Monitor opening and breathing zone periodically with DRI. If vapor levels > 2-3 times background, monitor opening and breathing zone continuously. Follow No. 4.

Excavation/Drilling/Intrusive Work - Monitor at ground level and breathing zone periodically with DRI. If vapor levels > 2-3 times background, monitor opening and breathing zone continuously. Follow No. 4.

Breathing Zone - Ensure level of protection specified in HASP is being used. Consult HASP or Corporate Health and Safety relative to instituting personnel, area, or perimeter sampling.

- [ ] Other

SITE AIR MONITORING PROGRAM

Sample Location		
	Locations	Substances Sampled For
☐ Ambient background		
☐ Personal samples, onsite		
☐ Personal samples, offsite		
☐ Fixed, onsite samples		
☐ Fixed, offsite samples		
☐ Mobile offsite samples		
☐ Mobile onsite samples		
☐ Background sample stations		

SITE AIR MONITORING PROGRAM

Air Sampling

Personal Sampling Pumps - Gilian, SKC, MSA No. __

Task(s)	Location	Duration	Frequency	Type	Analysis Method
Sampling Media - Sorbent Tubes					
Sampling Media - Filter					
Sampling Media - Impinger					
Sampling Media - Air Bag					

SITE AIR MONITORING PROGRAM

Air Sampling

Hi-Volume Pumps - Gilian, SKC, MSA

Sampling Media - Filter

Task(s)	Location	Duration	Frequency	Type	Analysis Method

Portable Gas Chromatograph Task(s): Type:

Portable GC Analytical Plan:

Passive Dosimeters

	Task(s)	Type	Location	Frequency	Duration
☐ Organic Vapor					
☐ Mercury Vapor					
☐ Paper Color Change					
☐ TLD					
☐ Film Badge					
☐ Liquid Media					

Wipe Sampling

Wipe Sampling Plan:

SITE AIR MONITORING PROGRAM

Physical Hazard and Miscellaneous Monitors and Detectors

	Task(s)	Calibration Required?/Method	Location	Frequency
☐ Sound Level Meter		☐		
☐ Noise Dosimeter(s)		☐		
☐ Octave Band Analyzer		☐		
☐ Electric Circ. Detector		☐		
☐ Thermometer		☐		
☐ Wind Speed Indicator		☐		
☐ Barometer		☐		
☐ Psychrometer		☐		
☐ Infrared Thermometer		☐		
☐ Microwave Detector		☐		
☐ pH Meter		☐		

Indicator Kits

	Task(s)	Location	Frequency
☐ pH Paper			
☐ Peroxide Paper			
☐ Chlor-N-Oil Kit			
☐ Hazard Categorizing Kit			
☐ Asbestos Test Kit			

SITE AIR MONITORING PROGRAM

Work Location Instrument Readings

Location:

% LEL	% O_2	PID (units)	FID (units)	Aerosol Monitor (mg/m^3)	GM: Shield Probe/ Thin Window		NaI (uR/hr)	ZnS (cpm)
					mR/hr	cpm		
Monitox (ppm)				Detector Tube(s)				
Sound Levels (dBA)		Illumination	pH	Other	Other	Other	Other	Other

Location:

% LEL	% O_2	PID (units)	FID (units)	Aerosol Monitor (mg/m^3)	GM: Shield Probe/ Thin Window		NaI (uR/hr)	ZnS (cpm)
					mR/hr	cpm		
Monitox (ppm)				Detector Tube(s)				
							---	-
Sound Levels (dBA)		Illumination	pH	Other	Other	Other	Other	Other

CONTINGENCIES

Emergency Contacts and Phone Numbers

Agency	Contact	Phone Number
Local Medical Emergency Facility (LMF)	West Jefferson Hospital	(504) 349-1533/347-5511
WESTON Medical Emergency Contact	EMR - Dr. Elayne Theriault	1-800-229-3674
WESTON Health and Safety	Corporate Health and Safety	(505)884-5050
WESTON Health and Safety	SCR Health and Safety - Darryl Drenon	Pager:(800)409-2261 or (713)621-1620
Fire Department		911
Police Department		911
Onsite Coordinator	Robert Beck	(210) 342-7810
Site Telephone	Camille Scardina/Troy Hile	TBD
Alternate LMF		

Local Medical Emergency Facility(s)

Name of Hospital: West Jefferson Hospital		
Address: 1101 Medical Center (Avenue D)		**Phone No.:(504)349-1533**
Name of Contact: Emergency Room		**Phone No.:(504)347-5511**
Type of Service: ☐ Physical trauma only ☐ Chemical exposure only ☒ Physical trauma and chemical exposure ☒ Available 24 hours	**Route to Hospital (written detail):** **Exit site and proceed southeast on Lapalco to Victory Dr. Head north on Victory (left) to BR 90 (West Bank Expresswaya). Take right on BR 90 to Hwy 45 (Barataria Blvd.) Exit BR 90 but stay on access road. Go one block to Medical Center (Ave. D) and take right-follow emergency room signs.**	**Travel time from site:** **10 minutes** **Distance to hospital:** **5 miles** **Name/No. of 24-hr Ambulance Service: 911**

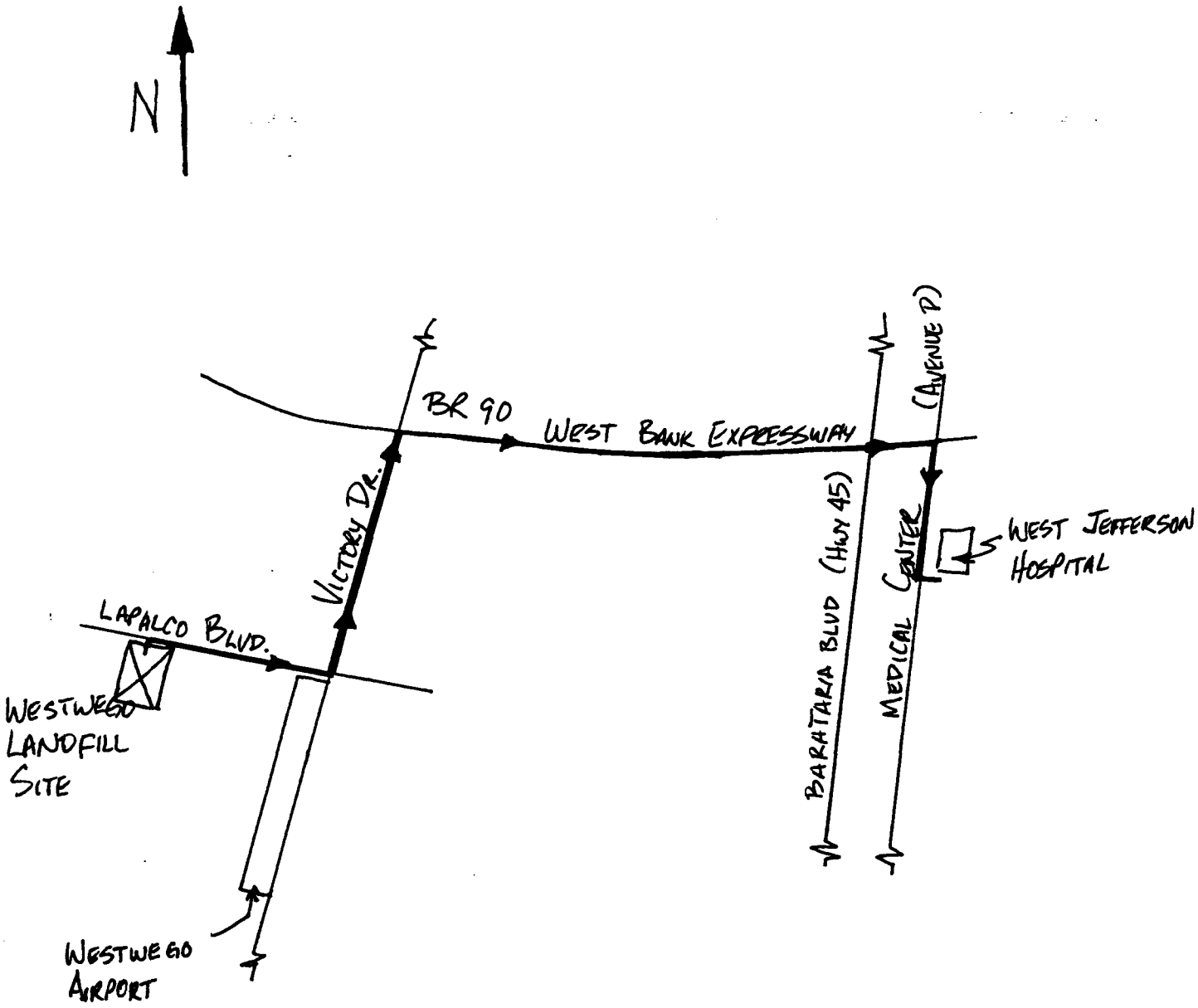

Figure 1 - Route to Hospital (Map)

CONTINGENCIES

Response Plans

Medical - General	First Aid Kit:	Type	Location	Special First Aid Procedures:
Provide First Aid as trained, assess and determine need for further medical assistance, Transport or arrange for transport after appropriate decontamination	(1) 25 man	General field first aid kit and bloodborne pathogen kit	WESTON vehicle or rental van	Cyanides on site ☐ Yes ☒ No. If yes, contact LMF. Do they have antidote kit? ☐ Yes ☒ No
	Eyewash required ☐ Yes ☒ No	Type	Location	HF on site ☐ Yes ☒ No. If yes, need neutralizing ointment for First Aid kit. Contact LMF.
	Shower required ☐ Yes ☒ No	Type	Location	

Plan for Response to Spill/Release		Plan for Response to Fire/Explosion		Fire Extinguishers
In the event of a spill or release, ensure safety, assess situation and perform containment and control measures as appropriate:	a. Clean up per MSDS if small or; Sound Alarm, call for assistance, Notify Emergency Coordinator b. Evacuate to pre-determined safe place c. Account for personnel d. Determine if Team can respond safely e. Mobilize per Site Spill Response Plan	In the event of a fire or explosion, ensure personal safety, assess situation and perform containment and control measures as appropriate:	a. Sound Alarm b. Evacuate c. Account for personnel d. Use fire extinguisher, only if situation is safe and trained personnel are available e. Standby to inform emergency responders of materials and conditions	Type/Location ABC WESTON vehicle or rental van
Description of Spill Response Gear	Location	Description (Other Fire Response Equipment)		Location

Plan to Response to Security Problems

Local police will be called in the event of a security problem - Dial 911.

DECONTAMINATION PLAN

Personnel Decontamination

Consistent with the levels of protection required, step-by-step procedures for personnel decontamination for each Level of Protection are attached.

Levels of Protection Required for Decontamination Personnel

The levels of protection required for personnel assisting with decontamination will be:

☐ Level B ☒ Level C ☒ Level D

Modifications include:

Disposition of Decontamination Wastes

Provide a description of waste disposition including indentification of storage area, hauler, and final disposal site, if applicable.

- Investigational derived wastes (IDWs) generated during site activities, which will include spent personal protective equipment (PPE) will be double bagged and disposed of off-site at proper disposal facility.

Equipment Decontamination

A procedure for decontamination steps required for non-sampling equipment and heavy machinery follows:

Non-sampling equipment, such as monitoring equipment, will not be directly exposed to sources of contamination. They will be cleaned with a damp towel. There will be no heavy machinery associated with the project other than a van/car. Vehicles will not be driven into areas of known or suspected contamination.

Sampling Equipment Decontamination

Sampling equipment will be decontaminated in accordance with the following procedure:

N/A

LEVEL D/MODIFIED LEVEL D DECONTAMINATION PLAN

Check indicated functions or add steps as necessary:

Function	Description of Process, Solution, and Container
☒ Segregated equipment drop	Clean with moist towel
☐ Boot cover and glove wash	
☐ Boot cover and glove rinse	
☐ Tape removal - outer glove and boot	
☒ Boot cover removal	Double bag for disposal
☒ Outer glove removal	Double bag for disposal
HOTLINE	
☐ Suit/safety boot wash	
☐ Suit/boot/glove rinse	
☒ Overboot removal	Bag for cleaning, if necessary
☒ Suit removal	Bag for cleaning, if necessary
☐ Inner glove wash	
☐ Inner glove rinse	
☐ Inner glove removal	
☐ Inner clothing removal	
CRC/SAFE ZONE BOUNDARY	
☒ Field wash	Hands and face thoroughly washed
☐ Redress	

Disposal Plan, End of Day:

All waste PPE will be double bagged in plastic trash bags. Waste PPE will be disposed of as indicated for End of Project disposal below.

Disposal Plan, End of Week:

Disposal Plan, End of Project:

Double bagged waste PPE will be disposed of in an appropriate trash dumpster. Alternatively, it will be left on site in a drum for subsequent disposal by EPA or WESTON.

LEVEL C DECONTAMINATION PLAN

Check indicated functions or add steps as necessary:

Function	*Description of Process, Solution, and Container*
☒ Segregated equipment drop	Plastic (visquene) sheet
☒ Boot cover and glove wash	Non-phosphate detergent in tub
☒ Boot cover and glove rinse	Potable water in tub
☒ Tape removal - outer glove and boot	Double bag for disposal
☒ Boot cover removal	Double bag for disposal
☒ Outer glove removal	Double bag for disposal
HOTLINE	
☒ Suit/safety boot wash	Non-phosphate detergent in tub
☒ Suit/boot/glove rinse	Potable water in tub
☒ Overboot removal	Plastic bag for cleaning
☒ Suit removal	Bag for disposal in tub
☒ Inner glove wash	Non-phosphate detergent in tub
☒ Inner glove rinse	Potable water in tub
☒ Face piece removal	Clean with respirator cleaning wipes and place in clean plastic bag on plastic sheet.
☒ Inner glove removal	Double bag for disposal
☐ Inner clothing removal	
CRC/SAFE ZONE BOUNDARY	
☒ Field wash	Wash hands and face thoroughly
☐ Redress	

Disposal Plan, End of Day:
See plan for Level D.

Disposal Plan, End of Week:
See plan for Level D.

Disposal Plan, End of Project:
See plan for Level D.

LEVEL B DECONTAMINATION PLAN

Check indicated functions or add steps as necessary:

Function	Description of Process, Solution, and Container
☐ Segregated equipment drop	
☐ Boot cover and glove wash	
☐ Boot cover and glove rinse	
☐ Tape removal - outer glove and boot	
☐ Boot cover removal	
☐ Outer glove removal	
HOTLINE	
☐ Suit/safety boot wash	
☐ Suit/SCBA/boot/glove rinse	
☐ Safety boot removal	
☐ Remove SCBA backpack w/o disconnecting	
☐ Splash suit removal	
☐ Inner glove wash	
☐ Inner glove rinse	
☐ SCBA disconnect and face piece removal	
☐ Inner glove removal	
☐ Inner clothing removal	
CRC/SAFE ZONE BOUNDARY	
☐ Field wash	
☐ Redress	

Disposal Plan, End of Day:

Disposal Plan, End of Week:

Disposal Plan, End of Project:

SITE PERSONNEL AND CERTIFICATION STATUS

WESTON

Name: Aimee Kambhu **Title:Assistant Geologist II** **Task(s): ALL** **Certification Level or Description:B-T,C-T,D-S** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:Camille Scardina** **Title:Assistant Project Scientist** **Task(s): ALL** **Certification Level or Description:B-T,C-T,D-T** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name:Billy Cress **Title:Associate Engineer** **Task(s): ALL** **Certification Level or Description:B-T,C-T,D-S** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:Troy Hile** **Title:Assistant Engineer II** **Task(s): ALL** **Certification Level or Description:B-T,C-T,D-T** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name:Richard Bost **Title:Assistant Engineer I** **Task(s): ALL** **Certification Level or Description:B-T,C-T,D-T** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name: Jeff Criner** **Title: Project Scientist** **Task(s): ALL** **Certification Level or Description: B-S,C-S,D-S** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

TRAINING CURRENT - Training: All personnel, including visitors, entering the exclusion or contamination reduction zones must have certifications of completion of training in accordance with OSHA 29 CFR 1910, 29 CFR 1926 or 29 CFR 1910.120.

FIT TEST CURRENT - Respirator Fit Testing: All persons, including visitors, entering any area requiring the use or potential use of any negative pressure respirator must have had as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI within the last 12 months. If site conditions require the use of a full face negative pressure, air purifying respirator for protection from Asbestos or Lead, employees must have had a quantitative fit test, administered according to OSHA 29 CFR 1910.1001 or 1025 within the last 6 months.

MEDICAL CURRENT - Medical Monitoring Requirements: All personnel, including visitors, entering the exclusion or contamination reduction zones must be certified as medically fit to work, and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910 or 29 CFR 1910.120.

The Site Health and Safety Coordinator is responsible for verifying all certifications and fit tests.

SITE PERSONNEL AND CERTIFICATION STATUS

Subcontractor's Health and Safety Program Evaluation

Name of Subcontractor:
Address:

Activities to Be Conducted by Subcontractor:

Evaluation Criteria

Medical program meets OSHA/WESTON criteria ☐ Acceptable ☐ Unacceptable Comments:	Personal protective equipment available ☐ Acceptable ☐ Unacceptable Comments:	Onsite monitoring equipment available, calibrated and operated properly ☐ Acceptable ☐ Unacceptable Comments:
Safe working procedures clearly specified ☐ Acceptable ☐ Unacceptable Comments:	Training meets OSHA/WESTON criteria ☐ Acceptable ☐ Unacceptable Comments:	Emergency procedures ☐ Acceptable ☐ Unacceptable Comments:
Decontamination procedures ☐ Acceptable ☐ Unacceptable Comments:	General health and safety program evaluation ☐ Acceptable ☐ Unacceptable Comments:	Additional comments: ☐ ☐

Evaluation Conducted by: **Date:**

Subcontractor

Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

HEALTH AND SAFETY PLAN APPROVAL/SIGNOFF FORM

Site Name: Westwego Landfill

WO# 04606-054-021-3076-03

Address: Marrero, Louisiana

I understand, agree to and will conform with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing(s).

Name	Signature	Date
TROY D. HILE	Troy Hile	3/15/96
JEFF CRAWOR	Jeffrey Crawor	3/15/96

TRAINING AND BRIEFING TOPICS	
The following items will be covered at the site specific training meeting, daily or periodically.	
☒ Site characterization and analysis, Sec. 3.0, 29 CFR 1910.120 i	☐ Level A
☒ Physical hazards, Table 3.2	☐ Level B
☒ Chemical hazards, Table 3.1	☒ Level C
☒ Animal bites, stings, and poisonous plants	☒ Level D
☐ Etiologic (infectious) agents	☒ Monitoring, Sec. 7.0; 29 CFR 1910.120 h
☒ Site control, Sec. 8.0; 29 CFR 1910.120 d	☒ Decontamination, Sec. 9.0; 29 CFR 1910.120 k
☒ Engineering controls and work practices, Sec. 8.5; 25 CFR 1910.120 g	☒ Emergency response, Sec. 10.0; 29 CFR 1910.120 l
☐ Heavy machinery	☒ Elements of an emergency response, Sec. 100; 29 CFR 1910.120 l
☐ Forklift	☒ Procedures for handling site emergency incidents, Sec. 10.0; 29 CFR 1910.120 l
☐ Backhoe	☐ Offsite emergency response, 29 CFR 1910.120 l
☐ Equipment	☐ Handling drums and containers, 29 CFR 1910.120 j
☐ Tools	☐ Opening drums and containers
☐ Ladder 29 CFR 1910.27 d	☐ Electrical material handling equipment
☐ Overhead and underground utilities	☐ Radioactive waste
☐ Scaffolds	☐ Shock sensitive waste
☐ Structural integrity	☐ Laboratory waste packs
☐ Unguarded openings - wall, floor, ceilings	☐ Sampling drums and containers
☐ Pressurized air cylinders	☐ Shipping and transport, 49 CFR 172.101
☒ Personnel protective equipment, Sec. 5.0; 25 CFR 1910.120 g; 29 CFR 1910.134	☐ Tank and vault procedures
☐ Respiratory protection, Sec. 5.8; 29 CFR 1910.120 g; Z88.2-1980	☐ Illumination, 29 CFR 1910.120 m
	☒ Sanitation, 29 CFR 1910.120 n

ATTACHMENT A
CHEMICAL CONTAMINANT
DATA SHEETS

HEALTH AND SAFETY EVALUATION - [1] CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure/ Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Vinyl Chloride	☐ Explosive ☒ Flammable ☐ Corrosive ☐ Reactive ☐ Water Reactive ☐ Oxidizer	☐ Solid ☐ Liquid ☒ Gas	☐ Solid ☐ Liquid ☒ Gas	pH: NA FP: NA LEL: ~~5.3%~~ 3.6% UEL: 33% Auto. Ig.: NA BP: 7°F	☒ CA ☒ PEL 1ppm ☒ TLV 5ppm (13 mg/m³) ☒ IDLH N.D. ☐ Only toxicological data available ☐ Other:	☒ Inhalation ☐ Ingestion ☐ Skin Absorption ☐ Contact ☐ Direct Penetration ☐ Other:	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA ☐ _____
CAS No: 75-01-4	☐ Radioactive ☒ Other COLORLESS, PLEASANT ODOR	Incompatible With: COPPER, OXIDIZERS, ALUMINUM, PEROXIDES, IRON, STEEL POLYMERIZES IN AIR, SUNLIGHT, OR HEAT UNLESS STABALIZED BY INHIBITORS SUCH AS PHENOL. ATTACKS IRON & STEEL IN PRESENCE OF MOISTURE.		MP: Sp. Gr.: NA Vap. D.: NA Vap. P.: ~~→ 1 ppm~~ 3.3 atm H_2O Sol.: ~~0.01%~~ 0.1% (77°F) Other: FRZ -256°F			
Synonyms: CHLOROETHENE; CHLOROETHYLENE; ETHYLENE MONOCHLORIDE; MONOCHLOROETHENE; MONOCHLOROETHYLENE; VC						Symptoms: weakness, abdominal pain, gi bleeding, hepatomegmy, pallor or cyanosis of extremetities	IP: 9.99 eV % Response: 35%

HEALTH AND SAFETY EVALUATION - [1] CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Methane	☒ Explosive ☐ Flammable ☐ Corrosive ☐ Reactive ☐ Water Reactive ☐ Oxidizer ☐ Radioactive ☐ Other	☐ Solid ☐ Liquid ☒ Gas	☐ Solid ☐ Liquid ☒ Gas	pH: NA FP: 296.5°F LEL: 5.3% UEL: 16% Auto. Ig.: 650 BP: 161°F MP: 187.6°F Sp. Gr.: 0.55 Vap. D.: .6 Vap. P.: NA H_2O Sol.: Miscible Other:	☐ CA ☐ PEL_____ ☒ TLV See Other ☒ IDLH Data not available ☐ Only toxicologicala data available ☒ Other: TLV is not pertinent as methane is an asphyxiant, and the limiting factor is available oxygen.	☒ Inhalation ☐ Ingestion ☐ Skin Absorption ☐ Contact ☐ Direct Penetration ☐ Other	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA ☐ _____
CAS No: 74-82-8		Incompatible with: Powerul oxidizers, halogens, or interhologens					
Synonyms: Marsh gas, Nautral gas						Symptoms: High concentrations may cause asphyxiation.	IP: % Response: 100%

HEALTH AND SAFETY EVALUATION - [1] CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Benzene 1910.1028	☐ Explosive ☒ Flammable ☐ Corrosive ☒ Reactive ☐ Water Reactive ☐ Oxidizer	☐ Solid ☒ Liquid ☐ Gas	☐ Solid ☒ Liquid ☐ Gas	pH: NA FP: 12°F LEL: 1.2% UEL: 7.8% Auto. Ig.: NA BP: 176°F	☒ CA ☒ PEL 1 ppm ☒ TLV 10 ppm ☒ IDLH 500 ppm ☐ Only toxicologicala data available	☒ Inhalation ☒ Ingestion ☒ Skin Absorption ☒ Contact ☐ Direct Penetration ☐ Other	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA ☐ _____
CAS No: 71-43-2	☐ Radioactive ☒ Other Class 1B Flammable Liquid	Incompatible with: Strong oxidizers, many fluorides, and perchlorates, nitric acid		MP: NA/FRZ: 42°F Sp. Gr.: 0.88 Vap. D.: NA Vap. P.: 75 mm H_2O Sol.: 0.07% Other: MW: 78.1	☐ Other: NIOSH REL = 0.1 ppm NIOSH STEL = 1 ppm		
Synonyms: Benzol Phenyl hydride						Symptoms: irrit. eyes, nose, respl sys.; gidd; head, nau, stg. gait, fatigue, anor, lass, derm.	IP: 9.24 eV % Response: 150%

HEALTH AND SAFETY EVALUATION - 1 CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Ethylbenzene	☐ Explosive ☒ Flammable ☐ Corrosive ☐ Reactive ☐ Water Reactive ☐ Oxidizer	☐ Solid ☒ Liquid ☐ Gas	☐ Solid ☒ Liquid ☐ Gas	pH: NA FP: 55°F LEL: 0.8% UEL: 6.7% Auto. Ig.: NA BP: 227°F	☐ CA ☒ PEL 100 ppm ☒ TLV 100 ppm ☒ IDLH 800 ppm ☐ Only toxicologicala data available	☒ Inhalation ☒ Ingestion ☐ Skin Absorption ☒ Contact ☐ Direct Penetration ☐ Other	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA ☐ _____
CAS No: 100-41-4	☐ Radioactive ☒ Other Class 1B Flammable Liquid	Incompatible with: Strong oxidizers		MP:NA/ FRZ:-139°F Sp. Gr.: 0.87 Vap. D.: NA Vap. P.: 7 mm H_2O Sol.: 0.01% Other: MW: 106.2	☐ Other: NIOSH REL = 100 ppm NIOSH STEL = 125 ppm		
Synonyms: Ethelbenzol Phenylethane						Symptoms: irrit. eyes, muc. memb. head, derm, narco, coma	IP: 8.76 eV % Response: 100%

HEALTH AND SAFETY EVALUATION - [1] CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Toluene	☐ Explosive ☒ Flammable ☐ Corrosive ☐ Reactive ☐ Water Reactive ☐ Oxidizer	☐ Solid ☒ Liquid ☐ Gas	☐ Solid ☒ Liquid ☐ Gas	pH: NA FP: 40°F LEL: 1.1% UEL: 7.1% Auto. Ig.: NA BP: 232°F	☐ CA ☒ PEL 200 ppm ☒ TLV 50 ppm ☒ IDLH 500 ppm ☐ Only toxicologicala data available	☒ Inhalation ☒ Ingestion ☒ Skin Absorption ☒ Contact ☐ Direct Penetration ☐ Other	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA
CAS No: 108-88-3	☐ Radioactive ☒ Other Class 1B Flammable Liquid	Incompatible with: Strong oxidizers		MP: -139°F Sp. Gr.: 0.87	☐ Other: NIOSH REL = 100 ppm NIOSH STEL = 150 ppm OSHA CEILING = 300 ppm		☐ _____
Synonyms: Methyl benzene Methyl benzol Phenyl methane Toluol				Vap. D.: NA Vap. P.: 21 mm (65°F) H_2O Sol.: 0.07% (74°F) Other: MW: 92.1		Symptoms: fatigue, weak; conf, euph, dizz, head, dilated pupils, lac; ner, musc. ftg.; insom; derm.	IP: 8.82 eV % Response: 110%

HEALTH AND SAFETY EVALUATION - 1 CHEMICAL HAZARDS

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Xylenes (o-, m-, p-isomers)	☐ Explosive ☒ Flammable ☐ Corrosive ☒ Reactive ☐ Water Reactive ☐ Oxidizer ☐ Radioactive ☒ Other Class 1C Flammable Liquid	☐ Solid ☒ Liquid ☐ Gas	☐ Solid ☒ Liquid ☐ Gas	pH: NA FP: 90/82/81°F LEL: 0.9/1.1/1.1% UEL: 6.7/7.0/7.0% Auto. Ig.: NA BP: 282/281°F MP: -13/-54/56°F Sp. Gr.: 0.88/0.86/0.86 Vap. D.: NA Vap. P.: 7/9/9 mm H_2O Sol.: 0.02/slight/0.02 Other: MW: 106.2	☐ CA ☒ PEL 100 ppm ☒ TLV 100 ppm ☒ IDLH 900 ppm ☐ Only toxicologicala data available ☐ Other: NIOSH REL = 100 ppm NIOSH STEL = 150 ppm	☒ Inhalation ☒ Ingestion ☒ Skin Absorption ☒ Contact ☐ Direct Penetration ☐ Other	☐ PID ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ CGI ☒ OVA ☐ _____
CAS No: 95-47-6 108-38-3 106-42-3		Incompatible with: Strong oxidizers, strong acids					
Synonyms: 1,2-Dimethylbenzene o-Xylol 1,3-Dimethylbenzene m-Xylol 1,4-Dimethylbenzene p-Xylol						Symptoms: dizz, excitement, drow, inco, irrit eyes, nose, throat, anor, nau, vomit, stag. gait, corneal vaculoization, abdominal pain, derm.	IP: 8.56/8.56/8.44 eV % Response: 111% (o) 116% (m) 116% (p)

1.6 BENZENE ACTION LEVEL GUIDELINES

1.6 Benzene Guideline - FLD41

Health and Safety Plan Operating Procedures

Field Operating Procedures - FLD41 - Benzene Guideline

This Operating Practice must be implemented as a strategy for air monitoring and upgrading Level of Protection (LOP) during activities where Benzene may be listed as a constituent of the contamination suspected. Activities of concern include, but are not limited to, gasoline spill response, and excavation or drilling activities where gasoline or petroleum constituents are encountered. During these activities air monitoring of the breathing zone should be conducted in the following manner:

1. Monitor contaminant concentrations with Direct Reading Instruments sensitive to aromatic compounds as specified in the Health And Safety Plan (HASP).

2. Level D protection is considered acceptable if Instrument readings remain below 1 unit above background.

3. Level C protection is required if Instrument readings are between 1 to 5 units above background.

4. An Instrument reading of 5 units above background shall be further characterized by taking a breathing zone air sample using a colorimetric detector tube (e.g. Drager, MSA). The colorimetric detector tube must be sensitive to 0.5 ppm Benzene.

5. Level C protection is considered acceptable if the colorimetric detector tube indicates less than 1.0 ppm Benzene. Periodic measurements should be taken with the colorimetric detector tube.

6. A colorimetric detector tube indication of 1.0 ppm Benzene or greater will be verified by a second measurement, using a colorimetric tube, at the end of a ten (10) minute interval.

7. Level B protection is required if both colorimetric detector tube measurements taken ten (10) minutes apart indicate 1.0 ppm Benzene or greater.

8. Irrespective of colorimetric detector tube indications Level B protection will be initiated at Direct Reading Instrument readings of ~~500~~ units above background.
250

The steps outlined above are a strategy for air monitoring and upgrading the LOP, air monitoring for combustible gas/vapor levels is in conjunction with this strategy, is continuous, and is not limited to the breathing zone.

As mentioned above **THIS OPERATING PROCEDURE IS FOR BENZENE AS A CONSTITUENT OF THE SUSPECTED CONTAMINANT** in the situation where **BENZENE IS A KNOWN MAJOR CONTAMINANT** colorimetric detector tube measurements shall be initiated when Direct Reading Instruments read 1 unit above background, steps 5-8 are followed.

Other on-site contaminants listed in the HASP may require LOP upgrades at or below the levels indicated in this document, this document is STRICTLY for BENZENE. Please refer to the HASP for LOP selection requirements regarding other on-site contaminants.

APPENDIX C

SAMPLING PROCEDURES

THIS DOCUMENT WAS PREPARED BY ROY F. WESTON, INC. EXPRESSLY FOR EPA. IT SHALL NOT BE RELEASED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE EXPRESS, WRITTEN PERMISSION OF EPA.

EPA/540/P-91/006
OSWER Directive 9360.4-02
January 1991

COMPENDIUM OF ERT SOIL SAMPLING AND SURFACE GEOPHYSICS PROCEDURES

Sampling Equipment Decontamination

Soil Sampling

Soil Gas Sampling

General Surface Geophysics

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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1.0 SAMPLING EQUIPMENT DECONTAMINATION: SOP #2006

1.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes methods used for preventing or reducing cross-contamination, and provides general guidelines for sampling equipment decontamination procedures at a hazardous waste site. Preventing or minimizing cross-contamination in sampled media and in samples is important for preventing the introduction of error into sampling results and for protecting the health and safety of site personnel.

Removing or neutralizing contaminants that have accumulated on sampling equipment ensures protection of personnel from permeating substances, reduces or eliminates transfer of contaminants to clean areas, prevents the mixing of incompatible substances, and minimizes the likelihood of sample cross-contamination.

1.2 METHOD SUMMARY

Contaminants can be physically removed from equipment, or deactivated by sterilization or disinfection. Gross contamination of equipment requires physical decontamination, including abrasive and non-abrasive methods. These include the use of brushes, air and wet blasting, and high-pressure water cleaning, followed by a wash/rinse process using appropriate cleaning solutions. Use of a solvent rinse is required when organic contamination is present.

1.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

1.4 INTERFERENCES AND POTENTIAL PROBLEMS

- The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free.
- An untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal water treatment system for mixing of decontamination solutions.
- Acids and solvents utilized in the decontamination sequence pose the health and safety risks of inhalation or skin contact, and raise shipping concerns of permeation or degradation.
- The site work plan must address disposal of the spent decontamination solutions.
- Several procedures can be established to minimize contact with waste and the potential for contamination. For example:
  - Stress work practices that minimize contact with hazardous substances.
  - Use remote sampling, handling, and container-opening techniques when appropriate.
  - Cover monitoring and sampling equipment with protective material to minimize contamination.
  - Use disposable outer garments and disposable sampling equipment when appropriate.

1.5 EQUIPMENT/APPARATUS

- appropriate personal protective clothing
- non-phosphate detergent
- selected solvents
- long-handled brushes
- drop cloths/plastic sheeting
- trash container
- paper towels
- galvanized tubs or buckets
- tap water

- distilled/deionized water
- metal/plastic containers for storage and disposal of contaminated wash solutions
- pressurized sprayers for tap and deionized/distilled water
- sprayers for solvents
- trash bags
- aluminum foil
- safety glasses or splash shield
- emergency eyewash bottle

1.6 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions and solvents. In general, the following solvents are utilized for decontamination purposes:

- 10% nitric acid[1]
- acetone (pesticide grade)[2]
- hexane (pesticide grade)[2]
- methanol

[1] Only if sample is to be analyzed for trace metals.
[2] Only if sample is to be analyzed for organics.

1.7 PROCEDURES

As part of the health and safety plan, develop and set up a decontamination plan before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- the number, location, and layout of decontamination stations
- which decontamination apparatus is needed
- the appropriate decontamination methods
- methods for disposal of contaminated clothing, apparatus, and solutions

1.7.1 Decontamination Methods

All personnel, samples, and equipment leaving the contaminated area of a site must be decontaminated. Various decontamination methods will either physically remove contaminants, inactivate contaminants by disinfection or sterilization, or do both.

In many cases, gross contamination can be removed by physical means. The physical decontamination techniques appropriate for equipment decontamination can be grouped into two categories: abrasive methods and non-abrasive methods.

Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The following abrasive methods are available:

- Mechanical: Mechanical cleaning methods use brushes of metal or nylon. The amount and type of contaminants removed will vary with the hardness of bristles, length of brushing time, and degree of brush contact.

- Air Blasting: Air blasting is used for cleaning large equipment, such as bulldozers, drilling rigs or auger bits. The equipment used in air blast cleaning employs compressed air to force abrasive material through a nozzle at high velocities. The distance between the nozzle and the surface cleaned, as well as the pressure of air, the time of application, and the angle at which the abrasive strikes the surface, determines cleaning efficiency. Air blasting has several disadvantages: it is unable to control the amount of material removed, it can aerate contaminants, and it generates large amounts of waste.

- Wet Blasting: Wet blast cleaning, also used to clean large equipment, involves use of a suspended fine abrasive delivered by compressed air to the contaminated area. The amount of materials removed can be carefully controlled by using very fine abrasives. This method generates a large amount of waste.

Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off of a surface with pressure. In general, less of the equipment surface is removed using non-abrasive methods. The following non-abrasive methods are available:

- High-Pressure Water: This method consists of a high-pressure pump, an operator-controlled directional nozzle, and a high pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) which relates to flow rates of 20 to 140 liters per minute.

- Ultra-High-Pressure Water: This system produces a pressurized water jet (from 1,000 to 4,000 atm). The ultra-high-pressure spray removes tightly-adhered surface film. The water velocity ranges from 500 m/sec (1,000 atm) to 900 m/sec (4,000 atm). Additives can enhance the method. This method is not applicable for hand-held sampling equipment.

Disinfection/Rinse Methods

- Disinfection: Disinfectants are a practical means of inactivating infectious agents.

- Sterilization: Standard sterilization methods involve heating the equipment. Sterilization is impractical for large equipment.

- Rinsing: Rinsing removes contaminants through dilution, physical attraction, and solubilization.

1.7.2 Field Sampling Equipment Cleaning Procedures

Solvent rinses are not necessarily required when organics are not a contaminant of concern and may be eliminated from the sequence specified below. Similarly, an acid rinse is not required if analysis does not include inorganics.

1. Where applicable, follow physical removal procedures specified in section 1.7.1.

2. Wash equipment with a non-phosphate detergent solution.

3. Rinse with tap water.

4. Rinse with distilled/deionized water.

5. Rinse with 10% nitric acid if the sample will be analyzed for trace organics.

6. Rinse with distilled/deionized water.

7. Use a solvent rinse (pesticide grade) if the sample will be analyzed for organics.

8. Air dry the equipment completely.

9. Rinse again with distilled/deionized water.

Selection of the solvent for use in the decontamination process is based on the contaminants present at the site. Use of a solvent is required when organic contamination is present on-site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. An acid rinse step is required if metals are present on-site. If a particular contaminant fraction is not present at the site, the nine-step decontamination procedure listed above may be modified for site specificity. The decontamination solvent used should not be among the contaminants of concern at the site.

Table 1 lists solvent rinses which may be required for elimination of particular chemicals. After each solvent rinse, the equipment should be air dried and rinsed with distilled/deionized water.

Sampling equipment that requires the use of plastic tubing should be disassembled and the tubing replaced with clean tubing, before commencement of sampling and between sampling locations.

1.8 CALCULATIONS

This section is not applicable to this SOP.

1.9 QUALITY ASSURANCE/ QUALITY CONTROL

One type of quality control sample specific to the field decontamination process is the rinsate blank. The rinsate blank provides information on the effectiveness of the decontamination process employed in the field. When used in conjunction with field blanks and trip blanks, a rinsate blank can detect contamination during sample handling, storage and sample transportation to the laboratory.

Table 1: Recommended Solvent Rinse for Soluble Contaminants

SOLVENT	SOLUBLE CONTAMINANTS
Water	• Low-chain hydrocarbons • Inorganic compounds • Salts • Some organic acids and other polar compounds
Dilute Acids	• Basic (caustic) compounds • Amines • Hydrazines
Dilute Bases – for example, detergent and soap	• Metals • Acidic compounds • Phenol • Thiols • Some nitro and sulfonic compounds
Organic Solvents[1] - for example, alcohols, ethers, ketones, aromatics, straight-chain alkanes (e.g., hexane), and common petroleum products (e.g., fuel, oil, kerosene)	• Nonpolar compounds (e.g., some organic compounds)

[1] - WARNING: Some organic solvents can permeate and/or degrade protective clothing.

A rinsate blank consists of a sample of analyte-free (i.e. deionized) water which is passed over and through a field decontaminated sampling device and placed in a clean sample container.

Rinsate blanks should be run for all parameters of interest at a rate of 1 per 20 for each parameter, even if samples are not shipped that day. Rinsate blanks are not required if dedicated sampling equipment is used.

1.10 DATA VALIDATION

This section is not applicable to this SOP.

1.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and specific health and safety procedures.

Decontamination can pose hazards under certain circumstances even though performed to protect health and safety. Hazardous substances may be incompatible with decontamination methods. For example, the decontamination solution or solvent may react with contaminants to produce heat, explosion, or toxic products. Decontamination methods may be incompatible with clothing or equipment: some solvents can permeate or degrade protective clothing. Also, decontamination solutions and solvents may pose a direct health hazard to workers through inhalation or skin contact, or if they combust.

The decontamination solutions and solvents must be determined to be compatible before use. Any method that permeates, degrades, or damages personal protective equipment should not be used. If decontamination methods pose a direct health hazard, measures should be taken to protect personnel or the methods should be modified to eliminate the hazard.

2.0 SOIL SAMPLING: SOP #2012

2.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures for collecting representative soil samples. Analysis of soil samples may determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of soil pollutants present a risk to public health, welfare, or the environment.

2.2 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed versus undisturbed), and the type of soil. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, a trier, a split-spoon, or, if required, a backhoe.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Refrigeration to 4°C, supplemented by a minimal holding time, is usually the best approach.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

2.5 EQUIPMENT/APPARATUS

- sampling plan
- maps/plot plan
- safety equipment, as specified in the health and safety plan
- compass
- tape measure
- survey stakes or flags
- camera and film
- stainless steel, plastic, or other appropriate homogenization bucket or bowl
- 1-quart mason jars w/Teflon liners
- Ziploc plastic bags
- logbook
- labels
- chain of custody forms and seals
- field data sheets
- cooler(s)
- ice
- decontamination supplies/equipment
- canvas or plastic sheet
- spade or shovel
- spatula
- scoop
- plastic or stainless steel spoons
- trowel
- continuous flight (screw) auger
- bucket auger
- post hole auger
- extension rods
- T-handle
- sampling trier
- thin-wall tube sampler
- Vehimeyer soil sampler outfit
  - tubes
  - points
  - drive head
  - drop hammer
  - puller jack and grip
- backhoe

2.6 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in

ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Use stakes, buoys, or flagging to identify and mark all sampling locations. Consider specific site factors, including extent and nature of contaminant, when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

2.7.2 Sample Collection

Surface Soil Samples

Collect samples from near-surface soil with tools such as spades, shovels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sampling team member. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. Avoid the use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

Follow these procedures to collect surface soil samples.

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled container(s) and secure the cap(s) tightly.

Sampling at Depth with Augers and Thin-Wall Tube Samplers

This system consists of an auger, a series of extensions, a "T" handle, and a thin-wall tube sampler (Appendix A, Figure 1). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin-wall tube sampler. The system is then lowered down the borehole, and driven into the soil at the completion depth. The system is withdrawn and the core collected from the thin-wall tube sampler.

Several types of augers are available. These include: bucket, continuous flight (screw), and posthole augers. Bucket augers are better for direct

sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights, which are usually at 5-feet intervals. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Posthole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil.

Follow these procedures for collecting soil samples with the auger and a thin-wall tube sampler.

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first 3 to 6 inches of surface soil for an area approximately 6 inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect sample after the auger is removed from boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin-wall tube sampler. Install proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container(s). Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into the appropriate, labeled container(s) and secure the cap(s) tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

Follow these procedures to collect soil samples with a sampling trier.

1. Insert the trier (Appendix A, Figure 2) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

PB91-921274

OSWER Directive 9360.4-03
January 1991

COMPENDIUM OF ERT SURFACE WATER AND SEDIMENT SAMPLING PROCEDURES

Sampling Equipment Decontamination

Surface Water Sampling

Sediment Sampling

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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2.0 SURFACE WATER SAMPLING: SOP #2013

2.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of representative liquid samples, both aqueous and nonaqueous from streams, rivers, lakes, ponds, lagoons, and surface impoundments. It includes samples collected from depth, as well as samples collected from the surface.

2.2 METHOD SUMMARY

Sampling situations vary widely and therefore no universal sampling procedure can be recommended.

However, sampling of both aqueous and non-aqueous liquids from the above mentioned sources is generally accomplished through the use of one of the following samplers or techniques:

- Kemmerer bottle
- bacon bomb sampler
- dip sampler
- direct method

These sampling techniques will allow for the collection of representative samples from the majority of surface waters and impoundments encountered.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Once samples have been collected, follow these procedures:

1. Transfer the sample(s) into suitable labeled sample containers.

2. Preserve the sample if appropriate, or use pre-preserved sample bottles.

3. Cap the container, put it in a Ziploc plastic bag and place it on ice in a cooler.

4. Record all pertinent data in the site logbook and on a field data sheet.

5. Complete the chain of custody form.

6. Attach custody seals to the cooler prior to shipment.

7. Decontaminate all sampling equipment prior to the collection of additional samples.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems with surface water sampling. These include cross-contamination of samples and improper sample collection.

- Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to ERT SOP #2006, Sampling Equipment Decontamination.

- Improper sample collection can involve using contaminated equipment, disturbance of the stream or impoundment substrate, and sampling in an obviously disturbed area.

Following proper decontamination procedures and minimizing disturbance of the sample site will eliminate these problems.

2.5 EQUIPMENT/APPARATUS

Equipment needed for collection of surface water samples includes:

- Kemmerer bottles
- bacon bomb sampler
- dip sampler
- line and messengers
- sample bottle preservatives
- Ziploc bags
- ice
- cooler(s)
- chain of custody forms, field data sheets

1. Using a properly decontaminated Kemmerer bottle, set the sampling device so that the sampling end pieces are pulled away from the sampling tube, allowing the substance to be sampled to pass through this tube.

2. Lower the pre-set sampling device to the predetermined depth. Avoid bottom disturbance.

3. When the Kemmerer bottle is at the required depth, send down the messenger, closing the sampling device.

4. Retrieve the sampler and discharge the first 10 to 20 mL to clear any potential contamination on the valve. Transfer the sample to the appropriate sample container.

Bacon Bomb Sampler

A bacon bomb sampler (Figure 2, Appendix A) may be used in similar situations to those outlined for the Kemmerer bottle. Sampling procedures are as follows:

1. Lower the bacon bomb sampler carefully to the desired depth, allowing the line for the trigger to remain slack at all times. When the desired depth is reached, pull the trigger line until taut.

2. Release the trigger line and retrieve the sampler.

3. Transfer the sample to the appropriate sample container by pulling the trigger.

Dip Sampler

A dip sampler (Figure 3, Appendix A) is useful for situations where a sample is to be recovered from an outfall pipe or along a lagoon bank where direct access is limited. The long handle on such a device allows access from a discrete location. Sampling procedures are as follows:

1. Assemble the device in accordance with the manufacturer's instructions.

2. Extend the device to the sample location and collect the sample.

3. Retrieve the sampler and transfer the sample to the appropriate sample container.

Direct Method

For streams, rivers, lakes, and other surface waters, the direct method may be utilized to collect water samples from the surface. This method is not to be used for sampling lagoons or other impoundments where contact with contaminants are a concern.

Using adequate protective clothing, access the sampling station by appropriate means. For shallow stream stations, collect the sample under the water surface pointing the sample container upstream. The container must be upstream of the collector. Avoid disturbing the substrate. For lakes and other impoundments, collect the sample under the water surface avoiding surface debris and the boat wake.

When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of preservative necessary for proper sample preservation.

2.8 CALCULATIONS

This section is not applicable to this SOP.

2.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA/QC procedures apply:

- All data must be documented on field data sheets or within site logbooks.

- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

2.10 DATA VALIDATION

This section is not applicable to this SOP.

3.0 SEDIMENT SAMPLING: SOP #2016

3.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of representative sediment samples. Analysis of sediment may determine whether concentrations of specific contaminants exceed established threshold action levels, or if the concentrations present a risk to public health, welfare, or the environment.

The methodologies discussed in this procedure are applicable to the sampling of sediment in both flowing and standing water. They are generic in nature and may be modified in whole or part to meet the handling and analytical requirements of the contaminants of concern, as well as the constraints presented by the sampling area. However, if modifications occur, they should be documented in the site logbook or report summarizing field activities.

For the purposes of this procedure, sediments are those mineral and organic materials situated beneath an aqueous layer. The aqueous layer may be either static, as in lakes, ponds, or other impoundments or flowing, as in rivers and streams.

3.2 METHOD SUMMARY

Sediment samples may be recovered using a variety of methods and equipment, depending on the depth of the aqueous layer, the portion of the sediment profile required (surface versus subsurface), the type of sample required (disturbed versus undisturbed) and the sediment type.

Sediment is collected from beneath an aqueous layer either directly, using a hand-held device such as a shovel, trowel, or auger, or indirectly using a remotely activated device such as an Ekman or Ponar dredge. Following collection, the sediment is placed into a container constructed of inert material, homogenized, and transferred to the appropriate sample containers. The homogenization procedure should not be used if sample analysis includes volatile organics.

3.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

- Chemical preservation of solids is generally not recommended. Cooling is usually the best approach, supplemented by the appropriate holding time.

- Wide-mouth glass containers with Teflon-lined caps are utilized for sediment samples. The sample volume is a function of the analytical requirements and will be specified in the work plan.

- Transfer sediment from the sample collection device to an appropriate sample container using a stainless steel or plastic lab spoon or equivalent. If composite samples are collected, place the sediment sample in a stainless steel, plastic or other appropriate composition (e.g.: Teflon) bucket, and mix thoroughly to obtain a homogeneous sample representative of the entire sampling interval. Then place the sediment sample into labeled containers.

- Samples for volatile organic analysis must be collected directly from the bucket, before mixing the sample, to minimize loss due to volatilization of contaminants.

- All sampling devices should be decontaminated, then wrapped in aluminum foil. The sampler should remain in this wrapping until it is needed. Each sampler should be used for only one sample. Dedicated samplers for sediment samples may be impractical due to the large number of sediment samples which may be required and the cost of the sampler. In this case, samplers should be cleaned in the field using the decontamination procedure described in ERT SOP# 2006, Sampling Equipment Decontamination.

tools such as spades, shovels, and scoops. Surface material can be removed to the required depth; then a stainless steel or plastic scoop should be used to collect the sample.

This method can be used to collect consolidated sediments but is limited somewhat by the depth of the aqueous layer. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel or plastic scoop or lab spoon will suffice in most applications. Care should be exercised to avoid the use of devices plated with chrome or other materials. Plating is particularly common with garden trowels.

Follow these procedures to collect sediment samples with a scoop or trowel:

1. Using a precleaned stainless steel scoop or trowel, remove the desired thickness of sediment from the sampling area.

2. Transfer the sample into an appropriate sample or homogenization container.

Sampling Surface Sediments with a Thin-Wall Tube Auger From Beneath a Shallow Aqueous Layer

This system consists of an auger, a series of extension rods, and a "T" handle (see Figure 4, Appendix A). The auger is driven into the sediment and used to extract a core. A sample of the core is taken from the appropriate depth.

Use the following procedure to collect sediment samples with a thin-walled auger:

1. Insert the auger into the material to be sampled at a 0° to 45° angle from vertical. This orientation minimizes spillage of the sample from the sampler. Extraction of samples may require tilting of the sampler.

2. Rotate the auger once or twice to cut a core of material.

3. Slowly withdraw the auger, making sure that the slot is facing upward.

4. An acetate core may be inserted into the auger prior to sampling, if characteristics of the sediments or body of water warrant. By using this technique, an intact core can be extracted.

5. Transfer the sample into an appropriate sample or homogenization container.

Sampling Deep Sediments with Augers and Thin-Wall Tube Samplers From Beneath a Shallow Aqueous Layer

This system uses an auger, a series of extension rods, a "T" handle, and a thin-wall tube sampler (Figure 4, Appendix A). The auger bores a hole to a desired sampling depth and then is withdrawn. The auger tip is then replaced with a tube core sampler, lowered down the borehole, and driven into the sediment at the completion depth. The core is then withdrawn and the sample collected. This method can be used to collect consolidated sediments, but is somewhat limited by the depth of the aqueous layer.

Several augers are available which include bucket and posthole augers. Bucket augers are better for direct sample recovery, are fast, and provide a large volume of sample. Posthole augers have limited utility for sample collection as they are designed more for their ability to cut through fibrous, rooted, swampy areas.

Follow these procedures to collect sediment samples with a hand auger:

1. Attach the auger bit to a drill extension rod, then attach the "T" handle to the drill extension rod.

2. Clear the area to be sampled of any surface debris.

3. Begin augering, periodically removing any accumulated sediment from the auger bucket.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. (When sampling directly from the auger, collect sample after the auger is removed from boring and proceed to Step 10.)

5. Remove auger tip from drill rods and replace with a precleaned thin-wall tube sampler. Install proper cutting tip.

6. Carefully lower tube sampler down borehole. Gradually force tube sampler into sediment.

subsurface sediments. It consists of a coring device, handle, and acetate core utilized in the following procedure:

1. Assemble the coring device by inserting the acetate core into the sampling tube.

2. Insert the "eggshell" check valve mechanisms into the tip of the sampling tube with the convex surface positioned inside the acetate core.

3. Screw the coring point onto the tip of the sampling tube.

4. Screw the handle onto the upper end of the sampling tube and add extension rods as needed.

5. Place the sampler in a perpendicular position on the material to be sampled.

6. This sampler may be used with either a drive hammer for firm consolidated sediments, or a "T" handle for soft sediments. If the "T" handle is used, place downward pressure on the device until the desired depth is reached. Rotate the sampler to shear off the core of the bottom, retrieve the device and proceed to Step 15.

7. If the drive hammer is selected, insert the tapered handle (drive head) of the drive hammer through the drive head.

8. With left hand holding the tube, drive the sampler into the material to the desired depth. Do not drive the tube further than the tip of the hammer's guide.

9. Record the length of the tube that penetrated the sample material, and the number of blows required to obtain this depth.

10. Remove the drive hammer and fit the keyhole-like opening on the flat side of the hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.

11. Rotate the sampler at least two revolutions to shear off the sample at the bottom.

12. Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head, and rotate about 90°.

13. Withdraw the sampler by pulling the handle (hammer) upwards and dislodging the hammer from the sampler.

14. Unscrew the coring point and remove the "eggshell" check valve.

15. Slide the acetate core out of the sampler tube. The acetate core may be capped at both ends. The sample may be used in this fashion, or the contents transferred to a stainless steel or plastic bucket and mixed thoroughly to obtain a homogeneous sample representative of the entire sampling interval.

16. Samples for volatile organic analysis must be collected directly from the bucket before mixing the sample to minimize volatilization of contaminants.

3.8 CALCULATIONS

This section is not applicable to this SOP.

3.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following QA/QC procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

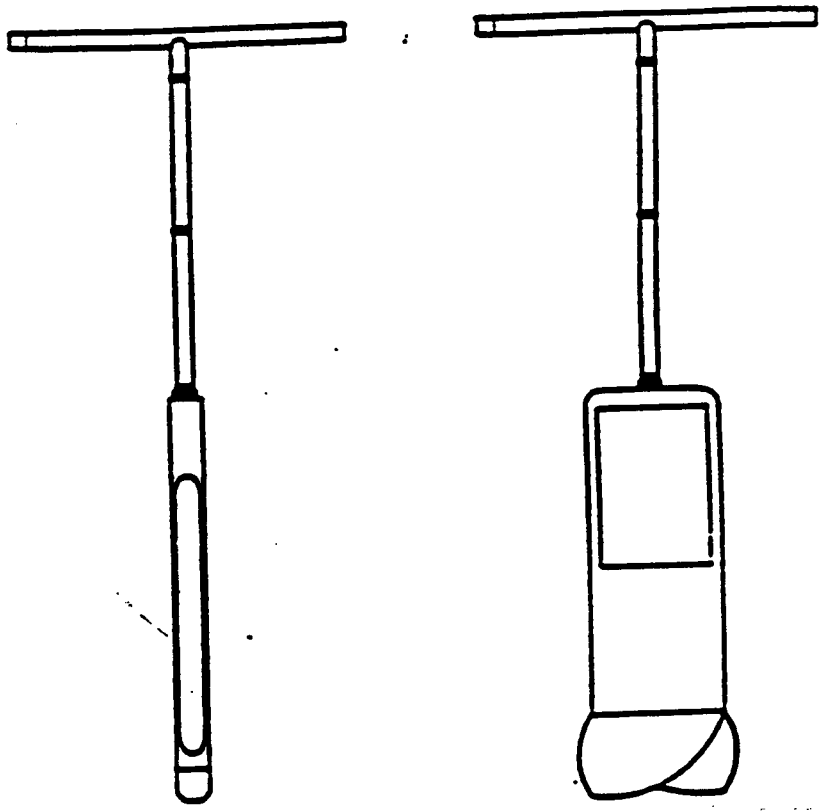
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

3.10 DATA VALIDATION

This section is not applicable to this SOP.

Figure 4: Sampling Auger

SOP #2016



TUBE AUGER

BUCKET AUGER

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EPA/540/P-91/007
OSWER Directive 9360.4-06
January 1991

COMPENDIUM OF ERT GROUNDWATER SAMPLING PROCEDURES

Sampling Equipment Decontamination

Groundwater Well Sampling

Soil Gas Sampling

Monitoring Well Installation

Water Level Measurement

Well Development

Controlled Pumping Test

Slug Test

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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2.0 GROUNDWATER WELL SAMPLING: SOP #2007

2.1 SCOPE AND APPLICATION

The objective of this Standard Operating Procedure (SOP) is to provide general reference information on sampling of groundwater wells. This guideline is primarily concerned with the collection of water samples from the saturated zone of the subsurface. Every effort must be made to ensure that the sample is representative of the particular zone of water being sampled. These procedures are designed to be used in conjunction with analyses for the most common types of groundwater contaminants (e.g., volatile and semi-volatile organic compounds, pesticides, metals, biological parameters).

2.2 METHOD SUMMARY

Prior to sampling a monitoring well, the well must be purged. This may be done with a number of instruments. The most common of these are the bailer, submersible pump, non-gas contact bladder pump and inertia pump. At a minimum, three well volumes should be purged, if possible. Equipment must be decontaminated prior to use and between wells. Once purging is completed and the correct laboratory-cleaned sample containers have been prepared, sampling may proceed. Sampling may be conducted with any of the above instruments, and need not be the same as the device used for purging. Care should be taken when choosing the sampling device as some will affect the integrity of the sample. Sampling equipment must also be decontaminated. Sampling should occur in a progression from the least to most contaminated well, if this information is known.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirements. Samples should be collected directly from the sampling device into appropriate laboratory-cleaned containers. Check that a Teflon liner is present in the cap, if required. Attach a sample identification label. Complete a field data sheet, a chain of custody form and record all pertinent data in the site logbook.

Samples shall be appropriately preserved, labelled, logged, and placed in a cooler to be maintained at 4°C. Samples must be shipped well before the holding time is over and ideally should be shipped within 24 hours of sample collection. It is imperative that these samples be shipped or delivered daily to the analytical laboratory in order to maximize the time available for the laboratory to perform the analysis. The bottles should be shipped with adequate packing and cooling to ensure that they arrive intact.

Certain conditions may require special handling techniques. For example, treatment of a sample for volatile organic (VOA) analysis with sodium thiosulfate preservative is required if there is residual chlorine in the water (such as public water supply) that could cause free radical chlorination and change the identity of the original contaminants. However, sodium thiosulfate should not be used if chlorine is not present in the water. Special requirements must be determined prior to conducting fieldwork.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

2.4.1 General

The primary goal of groundwater sampling is to obtain a representative sample of the groundwater body. Analysis can be compromised by field personnel in two primary ways: (1) taking an unrepresentative sample, or (2) by incorrect handling of the sample. There are numerous ways of introducing foreign contaminants into a sample, and these must be avoided by following strict sampling procedures and only utilizing trained field personnel.

2.4.2 Purging

In a non-pumping well, there will be little or no vertical mixing of the water, and stratification will

occur. The well water in the screened section will mix with the groundwater due to normal flow patterns, but the well water above the screened section will remain isolated, become stagnant and lack the VOAs representative of the groundwater. Sampling personnel should realize that stagnant water may contain foreign material inadvertently or deliberately introduced from the surface, resulting in an unrepresentative sample. To safeguard against collecting nonrepresentative stagnant water, follow these guidelines during sampling:

- As a general rule, all monitoring wells should be pumped or bailed prior to sampling. Purge water should be containerized on site or handled as specified in the site-specific project plan. Evacuation of a minimum of one volume of water in the well casing, and preferably three to five volumes, is recommended for a representative sample. In a high-yielding ground water formation and where there is no stagnant water in the well above the screened section, evacuation prior to sample withdrawal is not as critical. However, in all cases where the monitoring data is to be used for enforcement actions, evacuation is recommended.

- For wells that can be pumped or bailed to dryness with the equipment being used, the well should be evacuated and allowed to recover prior to sample withdrawal. If the recovery rate is fairly rapid and the schedule allows, evacuation of more than one volume of water is preferred. If recovery is slow, sample the well upon recovery after one evacuation.

- A nonrepresentative sample can also result from excessive pre-pumping of the monitoring well. Stratification of the leachate concentration in the groundwater formation may occur, or heavier-than-water compounds may sink to the lower portions of the aquifer. Excessive pumping can dilute or increase the contaminant concentrations from what is representative of the sampling point of interest.

2.4.3 Materials

Samplers and evacuation equipment (bladders, pumps, bailers, tubing, etc.) should be limited to those made with stainless steel, Teflon, and glass in areas where concentrations are expected to be at or near the detection limit. The tendency of organics to leach into and out of many materials make the selection of materials critical for trace analyses. The use of plastics, such as PVC or polyethylene, should be avoided when analyzing for organics. However, PVC may be used for evacuation equipment as it will not come in contact with the sample.

Table 2 on page 7 discusses the advantages and disadvantages of certain equipment.

2.5 EQUIPMENT/APPARATUS

2.5.1 General

- water level indicator
  - electric sounder
  - steel tape
  - transducer
  - reflection sounder
  - airline
- depth sounder
- appropriate keys for well cap locks
- steel brush
- HNU or OVA (whichever is most appropriate)
- logbook
- calculator
- field data sheets
- chain of custody forms
- forms and seals
- sample containers
- Engineer's rule
- sharp knife (locking blade)
- tool box (to include at least: screwdrivers, pliers, hacksaw, hammer, flashlight, adjustable wrench)
- leather work gloves
- appropriate health and safety gear
- 5-gallon pail
- plastic sheeting
- shipping containers
- packing materials
- bolt cutters
- Ziploc plastic bags
- containers for evacuation of liquids
- decontamination solutions
- tap water
- non-phosphate soap
- several brushes

Table 2: Advantages and Disadvantages of Various Groundwater Sampling Devices

Device	Advantages	Disadvantages
Bailer	• The only practical limitations are size and materials • No power source needed • Portable • Inexpensive; it can be dedicated and hung in a well reducing the chances of cross-contamination • Minimal outgassing of volatile organics while sample is in bailer • Readily available • Removes stagnant water first • Rapid, simple method for removing small volumes of purge water	• Time consuming, especially for large wells • Transfer of sample may cause aeration
Submersible Pump	• Portable; can be used on an unlimited number of wells • Relatively high pumping rate (dependent on depth and size of pump) • Generally very reliable; does not require priming	• Potential for effects on analysis of trace organics • Heavy and cumbersome, particularly in deeper wells • Expensive • Power source needed • Susceptible to damage from silt or sediment • Impractical in low yielding or shallow wells
Non-Gas Contact Bladder Pump	• Maintains integrity of sample • Easy to use	• Difficult to clean although dedicated tubing and bladder may be used • Only useful to approximately 100 feet in depth • Supply of gas for operation (bottled gas and/or compressor) is difficult to obtain and is cumbersome
Suction Pump	• Portable, inexpensive, and readily available	• Only useful to approximately 25 feet or less in depth • Vacuum can cause loss of dissolved gases and volatile organics • Pump must be primed and vacuum is often difficult to maintain • May cause pH modification
Inertia Pump	• Portable, inexpensive, and readily available • Rapid method for purging relatively shallow wells	• Only useful to approximately 70 feet or less in depth • May be time consuming to use • Labor intensive • WaTerra pump is only effective in 2-inch diameter wells

- pails or tubs
- aluminum foil
- garden sprayer
- preservatives
- distilled or deionized water

2.5.2 Bailer

- clean, decontaminated bailer(s) of appropriate size and construction material
- nylon line, enough to dedicate to each well
- Teflon-coated bailer wire
- sharp knife
- aluminum foil (to wrap clean bailers)
- 5-gallon bucket

2.5.3 Submersible Pump

- pump(s)
- generator (110, 120, or 240 volt) or 12-volt battery if inaccessible to field vehicle
- 1-inch black PVC coil pipe -- enough to dedicate to each well
- hose clamps
- safety cable
- tool box supplement
  - pipe wrenches, 2
  - wire strippers
  - electrical tape
  - heat shrink
  - hose connectors
  - Teflon tape
- winch or pulley
- gasoline for generator
- flow meter with gate valve
- 1-inch nipples and various plumbing (i.e., pipe connectors)

2.5.4 Non-Gas Contact Bladder Pump

- non-gas contact bladder pump
- compressor or nitrogen gas tank
- batteries and charger
- Teflon tubing -- enough to dedicate to each well
- Swagelock fitting
- toolbox supplements -- same as submersible pump

2.5.5 Suction Pump

- pump
- black coil tubing -- enough to dedicate to each well
- gasoline -- if required
- toolbox
- plumbing fittings
- flow meter with gate valve

2.5.6 Inertia Pump

- pump assembly (WaTerra pump, piston pump)
- 5-gallon bucket

2.6 REAGENTS

Reagents will be utilized for preservation of samples and for decontamination of sampling equipment. The preservation required is specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

2.7.2 Field Preparation

1. Start at the least contaminated well, if known.

2. Lay plastic sheeting around the well to minimize likelihood of contamination of equipment from soil adjacent to the well.

3. Remove locking well cap, note location, time of day, and date in field notebook or an appropriate log form.

4. Remove well casing cap.

5. Screen headspace of well with an appropriate monitoring instrument to determine the presence of volatile organic compounds and record in site logbook.

6. Lower water level measuring device or equivalent (i.e., permanently installed transducers or airline) into well until water surface is encountered.

7. Measure distance from water surface to reference measuring point on well casing or protective barrier post and record in site logbook. Alternatively, if there is no reference point, note that water level measurement is from top of steel casing, top of PVC riser pipe, from ground surface, or some other position on the well head.

8. Measure total depth of well (do this at least twice to confirm measurement) and record in site logbook or on log form.

9. Calculate the volume of water in the well and the volume to be purged using the calculations in Section 2.8.

10. Select the appropriate purging and sampling equipment.

2.7.3 Evacuation of Static Water (Purging)

The amount of flushing a well receives prior to sample collection depends on the intent of the monitoring program as well as the hydrogeologic conditions. Programs where overall quality determination of water resources are involved may require long pumping periods to obtain a sample that is representative of a large volume of that aquifer. The pumped volume can be determined prior to sampling so that the sample is a composite of known volume of the aquifer, or the well can be pumped until the stabilization of parameters such as temperature, electrical conductance, or pH has occurred.

However, monitoring for defining a contaminant plume requires a representative sample of a small volume of the aquifer. These circumstances require that the well be pumped enough to remove the stagnant water but not enough to induce flow from other areas. Generally, three well volumes are considered effective, or calculations can be made to determine, on the basis of the aquifer parameters and well dimensions, the appropriate volume to remove prior to sampling.

During purging, water level measurements may be taken regularly at 15- to 30-second intervals. This data may be used to compute aquifer transmissivity and other hydraulic characteristics.

The following well evacuation devices are most commonly used. Other evacuation devices are available, but have been omitted in this discussion due to their limited use.

Bailer

Bailers are the simplest purging device used and have many advantages. They generally consist of a rigid length of tube, usually with a ball check-valve at the bottom. A line is used to lower the bailer into the well and retrieve a volume of water. The three most common types of bailer are PVC, Teflon, and stainless steel.

This manual method of purging is best suited to shallow or narrow diameter wells. For deep, larger diameter wells which require evacuation of large volumes of water, other mechanical devices may be more appropriate.

Bailing equipment includes a clean decontaminated bailer, Teflon or nylon line, a sharp knife, and plastic sheeting.

1. Determine the volume of water to be purged as described in Section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of the bailer line with foreign materials.

3. Attach the line to the bailer and lower until the bailer is completely submerged.

4. Pull bailer out ensuring that the line either falls onto a clean area of plastic sheeting or never touches the ground.

5. Empty the bailer into a pail until full to determine the number of bails necessary to achieve the required purge volume.

6. Thereafter, pour the water into a container and dispose of purge waters as specified in the site-specific project plan.

Submersible Pump

Submersible pumps are generally constructed of plastic, rubber, and metal parts which may affect the analysis of samples for certain trace organics and inorganics. As a consequence, submersible pumps may not be appropriate for investigations requiring analyses of samples for trace contaminants. However, they are still useful for pre-sample purging. However, the pump must have a check valve to prevent water in the pump and the pipe from rushing back into the well.

Submersible pumps generally use one of two types of power supplies, either electric or compressed gas. Electric pumps can be powered by a 12-volt DC rechargeable battery, or a 110- or 220-volt AC power supply. Those units powered by compressed gas normally use a small electric compressor which also needs 12-volt DC or 110-volt AC power. They may also utilize compressed gas from bottles. Pumps differ according to the depth and diameter of the monitoring wells.

1. Determine the volume of water to be purged as described in section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of pumps, hoses or lines with foreign materials.

3. Assemble pump, hoses and safety cable, and lower the pump into the well. Make sure the pump is deep enough so that purging does not evacuate all the water. (Running the pump without water may cause damage.)

4. Attach flow meter to the outlet hose to measure the volume of water purged.

5. Attach power supply, and purge well until specified volume of water has been evacuated (or until field parameters, such as temperature, pH, conductivity, etc. have stabilized). Do not allow the pump to run dry. If the pumping rate exceeds the well recharge rate, lower the pump further into the well, and continue pumping.

6. Collect and dispose of purge waters as specified in the site-specific project plan.

Non-Contact Gas Bladder Pump

For this procedure, an all stainless-steel and Teflon Middleburg-squeeze bladder pump (e.g., IEA, TIMCO, Well Wizard, Geoguard, and others) is used to provide the least amount of material interference to the sample (Barcelona, 1985). Water comes into contact with the inside of the bladder (Teflon) and the sample tubing, also Teflon, that may be dedicated to each well. Some wells may have permanently installed bladder pumps (i.e., Well Wizard, Geoguard), that will be used to sample for all parameters.

1. Assemble Teflon tubing, pump and charged control box.

2. Use the same procedure for purging with a bladder pump as for a submersible pump.

3. Be sure to adjust flow rate to prevent violent jolting of the hose as sample is drawn in.

Suction Pump

There are many different types of suction pumps. They include: centrifugal, peristaltic and diaphragm. Diaphragm pumps can be used for well evacuation at a fast pumping rate and sampling at a low pumping rate. The peristaltic pump is a low-volume pump that uses rollers to squeeze the flexible tubing, thereby creating suction. This tubing can be dedicated to a well to prevent cross-contamination. Peristaltic pumps, however, require a power source.

1. Assemble the pump, tubing, and power source if necessary.

2. To purge with a suction pump, follow the exact procedures outlined for the submersible pump.

Inertia Pump

Inertia pumps, such as the WaTerra pump and piston pump, are manually operated. They are appropriate to use when wells are too deep to bail by hand, but are not inaccessible enough to warrant an automatic (submersible, etc.) pump. These

pumps are made of plastic and may be either decontaminated or discarded, after use.

1. Determine the volume of water to be purged as described in Section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of pumps or hoses with foreign materials.

3. Assemble pump, and lower to the appropriate depth in the well.

4. Begin pumping manually, discharging water into a 5-gallon bucket (or other graduated vessel). Purge until specified volume of water has been evacuated (or until field parameters such as temperature, pH, conductivity, etc. have stabilized).

5. Collect and dispose of purge waters as specified in the site-specific project plan.

2.7.4 Sampling

Sample withdrawal methods require the use of pumps, compressed air, bailers, and samplers. Ideally, purging and sample withdrawal equipment should be completely inert, economical to use, easily cleaned, sterilized, reusable, able to operate at remote sites in the absence of power resources, and capable of delivering variable rates for sample collection.

There are several factors to take into consideration when choosing a sampling device. Care should be taken when reviewing the advantages or disadvantages of any one device. It may be appropriate to use a different device to sample than that which was used to purge. The most common example of this is the use of a submersible pump to purge and a bailer to sample.

Bailer

The positive-displacement volatile sampling bailer (by GPI) is perhaps the most appropriate for collection of water samples for volatile analysis. Other bailer types (messenger, bottom fill, etc.) are less desirable, but may be mandated by cost and site conditions. Generally, bailers can provide an acceptable sample, providing that sampling personnel use extra care in the collection process.

1. Surround the monitoring well with clean plastic sheeting.

2. Attach a line to the bailer. If a bailer was used for purging, the same bailer and line may be used for sampling.

3. Lower the bailer slowly and gently into the well, taking care not to shake the casing sides or to splash the bailer into the water. Stop lowering at a point adjacent to the screen.

4. Allow bailer to fill and then slowly and gently retrieve the bailer from the well, avoiding contact with the casing, so as not to knock flakes of rust or other foreign materials into the bailer.

5. Remove the cap from the sample container and place it on the plastic sheet or in a location where it will not become contaminated. See Section 2.7.7 for special considerations on VOA samples.

6. Begin pouring slowly from the bailer.

7. Filter and preserve samples as required by sampling plan.

8. Cap the sample container tightly and place pre-labeled sample container in a carrier.

9. Replace the well cap.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to analytical laboratory.

Submersible Pump

Although it is recommended that samples not be collected with a submersible pump due to the reasons stated in Section 2.4, there are some situations where they may be used.

1. Allow the monitoring well to recharge after purging, keeping the pump just above the screened section.

2. Attach gate valve to hose (if not already fitted), and reduce flow of water to a manageable sampling rate.

3. Assemble the appropriate bottles.

4. If no gate valve is available, run the water down the side of a clean jar and fill the sample bottles from the jar.

5. Cap the sample container tightly and place pre-labeled sample container in a carrier.

6. Replace the well cap.

7. Log all samples in the site logbook and on the field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

10. Upon completion, remove pump and assembly and fully decontaminate prior to setting into the next sample well. Dedicate the tubing to the hole.

Non-Gas Contact Bladder Pump

The use of a non-gas contact positive displacement bladder pump is often mandated by the use of dedicated pumps installed in wells. These pumps are also suitable for shallow (less than 100 feet) wells. They are somewhat difficult to clean, but may be used with dedicated sample tubing to avoid cleaning. These pumps require a power supply and a compressed gas supply (or compressor). They may be operated at variable flow and pressure rates making them ideal for both purging and sampling.

Barcelona (1984) and Nielsen (1985) report that the non-gas contact positive displacement pumps cause the least amount of alteration in sample integrity as compared to other sample retrieval methods.

1. Allow well to recharge after purging.

2. Assemble the appropriate bottles.

3. Turn pump on, increase the cycle time and reduce the pressure to the minimum that will allow the sample to come to the surface.

4. Cap the sample container tightly and place pre-labeled sample container in a carrier.

5. Replace the well cap.

6. Log all samples in the site logbook and on field data sheets and label all samples.

7. Package samples and complete necessary paperwork.

8. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

9. On completion, remove the tubing from the well and either replace the Teflon tubing and bladder with new dedicated tubing and bladder or rigorously decontaminate the existing materials.

10. Collect non-filtered samples directly from the outlet tubing into the sample bottle.

11. For filtered samples, connect the pump outlet tubing directly to the filter unit. The pump pressure should remain decreased so that the pressure build-up on the filter does not blow out the pump bladder or displace the filter. For the Geotech barrel filter, no actual connections are necessary so this is not a concern.

Suction Pump

In view of the limitations of suction pumps, they are not recommended for sampling purposes.

Inertia Pump

Inertia pumps may be used to collect samples. It is more common, however, to purge with these pumps and sample with a bailer.

1. Following well evacuation, allow the well to recharge.

2. Assemble the appropriate bottles.

3. Since these pumps are manually operated, the flow rate may be regulated by the sampler. The sample may be discharged from the pump outlet directly into the appropriate sample container.

4. Cap the sample container tightly and place pre-labeled sample container in a carrier.

5. Replace the well cap.

6. Log all samples in the site logbook and on field data sheets and label all samples.

7. Package samples and complete necessary paperwork.

8. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

9. Upon completion, remove pump and decontaminate or discard, as appropriate.

2.7.5 Filtering

For samples that require filtering, such as samples which will be analyzed for total metals, the filter must be decontaminated prior to use and between uses. Filters work by two methods. A barrel filter such as the "Geotech" filter works with a bicycle pump, which is used to build up positive pressure in the chamber containing the sample. The sample is then forced through the filter paper (minimum size 0.45 μm) into a jar placed underneath. The barrel itself is filled manually from the bailer or directly via the hose of the sampling pump. The pressure must be maintained up to 30 psi by periodic pumping.

A vacuum type filter involves two chambers, the upper chamber contains the sample and a filter (minimum size 0.45 μm) divides the chambers. Using a hand pump or a Gilian type pump, air is withdrawn from the lower chamber, creating a vacuum and thus causing the sample to move through the filter into the lower chamber where it is drained into a sample jar, repeated pumping may be required to drain all the sample into the lower chamber. If preservation of the sample is necessary, this should be done after filtering.

2.7.6 Post Operation

After all samples are collected and preserved, the sampling equipment should be decontaminated prior to sampling another well. This will prevent cross-contamination of equipment and monitoring wells between locations.

1. Decontaminate all equipment.

2. Replace sampling equipment in storage containers.

3. Prepare and transport water samples to the laboratory. Check sample documentation and make sure samples are properly packed for shipment.

2.7.7 Special Considerations for VOA Sampling

The proper collection of a sample for volatile organics requires minimal disturbance of the sample to limit volatilization and therefore a loss of volatiles from the sample.

Sample retrieval systems suitable for the valid collection of volatile organic samples are: positive displacement bladder pumps, gear driven submersible pumps, syringe samplers and bailers (Barcelona, 1984; Nielsen, 1985). Field conditions and other constraints will limit the choice of appropriate systems. The focus of concern must be to provide a valid sample for analysis, one which has been subjected to the least amount of turbulence possible.

The following procedures should be followed:

1. Open the vial, set cap in a clean place, and collect the sample during the middle of the cycle. When collecting duplicates, collect both samples at the same time.

2. Fill the vial to just overflowing. Do not rinse the vial, nor excessively overfill it. There should be a convex meniscus on the top of the vial.

3. Check that the cap has not been contaminated (splashed) and carefully cap the vial. Place the cap directly over the top and screw down firmly. Do not overtighten and break the cap.

4. Invert the vial and tap gently. Observe vial for at least 10 seconds. If an air bubble appears, discard the sample and begin again. It is imperative that no entrapped air is in the sample vial.

5. Immediately place the vial in the protective foam sleeve and place into the cooler, oriented so that it is lying on its side, not straight up.

6. The holding time for VOAs is 7 days. Samples should be shipped or delivered to the laboratory daily so as not to exceed the holding time. Ensure that the samples remain at 4°C, but do not allow them to freeze.

2.8 CALCULATIONS

There are no calculations necessary to implement this procedure. However, if it is necessary to calculate the volume of the well, utilize the following equation:

$$\text{Well volume} = \pi r^2 h \ (cf) \qquad \text{[Equation 1]}$$

where:

- π = pi
- r = radius of monitoring well (feet)
- h = height of the water column (feet) [This may be determined by subtracting the depth to water from the total depth of the well as measured from the same reference point.]
- cf = conversion factor (gal/ft^3) = 7.48 gal/ft^3 [In this equation, 7.48 gal/ft^3 is the necessary conversion factor.]

Monitoring wells are typically 2, 3, 4, or 6 inches in diameter. If you know the diameter of the monitoring well, there are a number of standard conversion factors which can be used to simplify the equation above.

The volume, in gallons per linear foot, for various standard monitoring well diameters can be calculated as follows:

$$v = \pi r^2 \ (cf) \qquad \text{[Equation 2]}$$

where:

- v = volume in gallons per linear foot
- π = pi
- r = radius of monitoring well (feet)
- cf = conversion factor (7.48 gal/ft^3)

For a 2-inch diameter well, the volume in gallons per linear foot can be calculated as follows:

$$\begin{aligned} v &= \pi r^2 \ (cf) \qquad \text{[Equation 2]} \\ &= 3.14\ (1/12\ ft)^2\ \ 7.48\ gal/ft^3 \\ &= 0.1632\ gal/ft \end{aligned}$$

Remember that if you have a 2-inch diameter, well you must convert this to the radius in feet to be able to use the equation.

The volume in gallons per linear foot for the common size monitoring wells are as follows:

Well Diameter	v (volume in gal/ft.)
2 inches	0.1632
3 inches	0.3672
4 inches	0.6528
6 inches	1.4688

If you utilize the conversion factors above, Equation 1 should be modified as follows:

$$\text{Well volume} = (h)(v) \qquad \text{[Equation 3]}$$

where:

- h = height of water column (feet)
- v = volume in gallons per linear foot as calculated from Equation 2

2.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

- All data must be documented on field data sheets or within site logbooks.

- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless

5.0 WATER LEVEL MEASUREMENT: SOP #2151

5.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to set guidelines for the determination of the depth to water in an open borehole, cased borehole, monitoring well or piezometer.

Generally, water level measurements from boreholes, piezometers, or monitoring wells are used to construct water table or potentiometric surface maps. Therefore, all water level measurements at a given site should be collected within a 24-hour period. Certain situations may necessitate that all water level measurements be taken within a shorter time interval. These situations may include:

- the magnitude of the observed changes between wells appears too large
- atmospheric pressure changes
- aquifers which are tidally influenced
- aquifers affected by river stage, impoundments, and/or unlined ditches
- aquifers stressed by intermittent pumping of production wells
- aquifers being actively recharged due to precipitation events

5.2 METHOD SUMMARY

A survey mark should be placed on the casing for use as a reference point for measurement. Many times the lip of the riser pipe is not flat. Another measuring reference should be located on the grout apron. The measuring point should be documented in the site logbook and on the groundwater level data form (see Appendix C).

Water levels in piezometers and monitoring wells should be allowed to stabilize for a minimum of 24 hours after well construction and development, prior to measurement. In low yield situations, recovery may take longer.

Working with decontaminated equipment, proceed from the least to the most contaminated wells. Open the well and monitor headspace with the appropriate monitoring instrument to determine the presence of volatile organic compounds. Lower the water level measurement device into the well until water surface or bottom of casing is encountered. Measure distance from water surface to the reference point on the well casing and record in the site logbook and/or groundwater level data form. Remove all downhole equipment, decontaminate as necessary, and replace well casing cap.

5.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

This section is not applicable to this SOP.

5.4 INTERFERENCES AND POTENTIAL PROBLEMS

- The chalk used on steel tape may contaminate the well.
- Cascading water may obscure the water mark or cause it to be inaccurate.
- Many types of electric sounders use metal indicators at 5-foot intervals around a conducting wire. These intervals should be checked with a surveyor's tape to ensure accuracy.
- If there is oil present on the water, it can insulate the contacts of the probe on an electric sounder or give false readings due to thickness of the oil. Determining the thickness and density of the oil layer may be warranted, in order to determine the correct water level.
- Turbulence in the well and/or cascading water can make water level determination difficult with either an electric sounder or steel tape.

- An airline measures drawdown during pumping. It is only accurate to 0.5 foot unless it is calibrated for various "drawdowns".

5.5 EQUIPMENT/APPARATUS

There are a number of devices which can be used to measure water levels, such as steel tape or airlines. The device should be adequate to attain an accuracy of 0.01 feet.

The following equipment is needed to measure water levels:

- air monitoring equipment
- water level measurement device
- electronic water level indicator
- metal tape measure
- airline
- steel tape
- chalk
- ruler
- notebook
- paper towels
- decontamination solution and equipment
- groundwater level data forms

5.6 REAGENTS

No chemical reagents are used in this procedure, with the exception of decontamination solutions. Where decontamination of equipment is required, refer to ERT SOP #2006, Sampling Equipment Decontamination and the site-specific work plan.

5.7 PROCEDURES

5.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

5.7.2 Procedures

1. Make sure water level measuring equipment is in good operating condition.

2. If possible and where applicable, start at those wells that are least contaminated and proceed to those wells that are most contaminated.

3. Clean all equipment entering the well by the following decontamination procedure:

   - Triple rinse equipment with deionized water.

   - Wash equipment with an Alconox solution followed by a deionized water rinse.

   - Rinse with an approved solvent (e.g., methanol, isopropyl alcohol, acetone) as per the work plan, if organic contamination is suspected.

   - Place equipment on clean surface such as a Teflon or polyethylene sheet.

4. Remove locking well cap, note location, time of day, and date in site notebook or an appropriate groundwater level data form.

5. Remove well casing cap.

6. If required by site-specific condition, monitor headspace of well with PID or FID to determine presence of volatile organic compounds and record in site logbook.

7. Lower electric water level measuring device or equivalent (i.e., permanently installed tranducers or airline) into the well until water surface is encountered.

8. Measure the distance from the water surface to the reference measuring point on the well casing or protective barrier post and record in the field logbook. In addition, note that the

water level measurement was from the top of the steel casing, top of the PVC riser pipe, from the ground surface, or from some other position on the well head.

9. The groundwater level data form in Appendix C should be completed as follows:

   - site name
   - logger name: person taking field notes
   - date: the date when the water levels are being measured
   - location: monitor well number and physical location
   - time: the military time at which the water level measurement was recorded
   - depth to water: the water level measurement in feet, or in tenths or hundreds of feet, depending on the equipment used
   - comments: any information the field personnel feels to be applicable
   - measuring point: marked measuring point on PVC riser pipe, protective steel casing or concrete pad surrounding well casing from which all water level measurements for individual wells should be measured. This provides consistency in future water level measurements.

10. Measure total depth of well (at least twice to confirm measurement) and record in site notebook or on log form.

11. Remove all downhole equipment, replace well casing cap and lock steel caps.

12. Rinse all downhole equipment and store for transport to next well.

13. Note any physical changes such as erosion or cracks in protective concrete pad or variation in total depth of well in field notebook and on field data sheets.

14. Decontaminate all equipment as outlined in Step 3 above.

5.8 CALCULATIONS

To determine groundwater elevation above mean sea level, use the following equation:

$$Ew = E - D$$

where:

Ew = Elevation of water above mean sea level
E = Elevation above sea level at point of measurement
D = Depth to water

5.9 QUALITY ASSURANCE/ QUALITY CONTROL

The following general quality assurance procedures apply:

- All data must be documented on standard chain of custody forms, field data sheets or within personal/site logbooks.
- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.
- Each well should be tested at least twice in order to compare results.

5.10 DATA VALIDATION

This section is not applicable to this SOP.

5.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and specific health and safety procedures.

APPENDIX D

CLP GUIDELINES

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January 1991

COMPENDIUM OF ERT WASTE SAMPLING PROCEDURES

Sampling Equipment Decontamination

Drum Sampling

Tank Sampling

Chip, Wipe, and Sweep Sampling

Waste Pile Sampling

Interim Final

Environmental Response Team
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2.0 DRUM SAMPLING: SOP #2009

2.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide technical guidance on safe and cost-effective response actions at hazardous waste sites containing drums with unknown contents. Container contents are sampled and characterized for disposal, bulking, recycling, grouping, and/or classification purposes.

2.2 METHOD SUMMARY

Prior to sampling, drums must be inventoried, staged, and opened. An inventory entails recording visual qualities of each drum and any characteristics pertinent to the contents' classification. Staging involves the organization, and sometimes consolidation of drums which have similar wastes or characteristics. Opening of closed drums can be performed manually or remotely. Remote drum opening is recommended for worker safety. The most widely used method of sampling a drum involves the use of a glass thief. This method is quick, simple, relatively inexpensive, and requires no decontamination.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples collected from drums are considered waste samples. No preservatives should be added since there is a potential reaction of the sample with the preservative. Samples should, however, be cooled to 4°C and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample.

Sample bottles for collection of waste liquids, sludges, or solids are typically wide-mouth amber jars with Teflon-lined screw caps. Actual volume required for analysis should be determined in conjunction with the laboratory performing the analysis.

Follow these waste sample handling procedures:

1. Place sample container in two Ziploc plastic bags.
2. Place each bagged container in a 1-gallon covered can containing absorbent packing material. Place the lid on the can.
3. Mark the sample identification number on the outside of the can.
4. Place the marked cans in a cooler, and fill remaining space with absorbent packing material.
5. Fill out chain of custody form for each cooler, place in plastic, and affix to inside lid of cooler.
6. Secure and custody seal the lid of cooler.
7. Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

The practice of tapping drums to determine their contents is neither safe nor effective and should not be used if the drums are visually overpressurized or if shock-sensitive materials are suspected. A laser thermometer may be used instead.

Drums that have been overpressurized, to the extent that the head is swollen several inches above the level of the chime, should not be moved. A number of devices have been developed for venting critically swollen drums. One method that has proven to be effective is a tube and spear device. A light aluminum tube (3 meters long) is positioned at the vapor space of the drum. A rigid, hooking device attached to the tube goes over the chime and holds the tube securely in place. The spear is inserted in the tube and positioned against the drum wall. A sharp blow on the end of the spear drives the sharpened tip through the drum and the gas vents along the grooves. The venting should be done from behind a wall or barricade. This device can be cheaply and easily designed and constructed where needed. Once the pressure has been relieved, the bung can be removed and the drum sampled.

2.5 EQUIPMENT/APPARATUS

The following are standard materials and equipment required for sampling:

- personal protection equipment
- wide-mouth glass jars with Teflon cap liner, approximately 500 mL volume
- uniquely numbered sample identification labels with corresponding data sheets
- 1-gallon covered cans half-filled with absorbent (vermiculite)
- chain of custody forms
- decontamination materials
- glass thief tubes or Composite Liquid Waste Samplers (COLIWASA)
- laser thermometer
- drum opening devices

Drum opening devices include the following:

2.5.1 Bung Wrench

A common method for opening drums manually is using a universal bung wrench. These wrenches have fittings made to remove nearly all commonly encountered bungs. They are usually constructed of cast iron, brass, or a bronze-beryllium, non-sparking alloy formulated to reduce the likelihood of sparks. The use of a non-sparking bung wrench does not completely eliminate the possibility of a spark being produced. (See Figure 1, Appendix B.)

2.5.2 Drum Deheader

When a bung is not removable with a bung wrench, a drum can be opened manually by using a drum deheader. This tool is constructed of forged steel with an alloy steel blade and is designed to cut the lid of a drum off or part way off by means of a scissors-like cutting action. A limitation of this device is that it can be attached only to closed head drums. Drums with removable heads must be opened by other means. (See Figure 2, Appendix B.)

2.5.3 Hand Pick, Pickaxe, and Hand Spike

These tools are usually constructed of brass or a non-sparking alloy with a sharpened point that can penetrate the drum lid or head when the tool is swung. The hand picks or pickaxes that are most commonly used are commercially available; whereas the spikes are generally uniquely fabricated 4-foot long poles with a pointed end. (See Figure 3, Appendix B.)

2.5.4 Backhoe Spike

The most common means used to open drums remotely for sampling is the use of a metal spike attached or welded to a backhoe bucket. In addition to being very efficient, this method can greatly reduce the likelihood of personal exposure. (See Figure 4, Appendix B.)

2.5.5 Hydraulic Drum Opener

Another remote method for opening drums is with remotely operated hydraulic devices. One such device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump which pressurizes soil through a length of hydraulic line. (See Figure 5, Appendix B.)

2.5.6 Pneumatic Devices

A pneumatic bung remover consists of a compressed air supply that is controlled by a heavy-duty, two-stage regulator. A high-pressure air line of desired length delivers compressed air to a pneumatic drill, which is adapted to turn a bung fitting selected to fit the bung to be removed. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. This remote bung opener does not permit the slow venting of the container, and therefore appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed with this device. (See Figure 6, Appendix B.)

2.6 REAGENTS

Reagents are not typically required for preserving drum samples. However, reagents are used for decontaminating sampling equipment. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

2.7.2 Drum Inspection

Appropriate procedures for handling drums depend on the contents. Thus, prior to any handling, drums should be visually inspected to gain as much information as possible about their contents. Those in charge of inspections should be on the look-out for:

- drum condition, corrosion, rust, and leaking contents
- symbols, words, or other markings on the drum indicating hazards (i.e., explosive, radioactive, toxic, flammable)
- signs that the drum is under pressure
- shock sensitivity

Monitor around the drums with radiation instruments, organic vapor monitors (OVA) and combustible gas indicators (CGI).

Classify the drums into categories, for instance:

- radioactive
- leaking/deteriorating
- bulging
- drums containing lab packs
- explosive/shock sensitive

All personnel should assume that unmarked drums contain hazardous materials until their contents have been categorized, and that labels on drums may not accurately describe their contents.

If it is presumed that there are buried drums on-site, geophysical investigation techniques such as magnetometry, ground penetrating radar, and metal detection can be employed in an attempt to determine depth and location of the drums. See ERT SOP #2159, General Surface Geophysics.

2.7.3 Drum Staging

Prior to sampling, the drums should be staged to allow easy access. Ideally, the staging area should be located just far enough from the drum opening area to prevent a chain reaction if one drum should explode or catch fire when opened.

While staging, physically separate the drums into the following categories: those containing liquids, those containing solids, lab packs, or gas cylinders, and those which are empty. This is done because the strategy for sampling and handling drums/containers in each of these categories will be different. This may be achieved by:

- Visual inspection of the drum and its labels, codes, etc. Solids and sludges are typically disposed of in open-top drums. Closed-head drums with a bung opening generally contain liquid.

- Visual inspection of the contents of the drum during sampling followed by restaging, if needed.

Once a drum has been excavated and any immediate hazard has been eliminated by overpacking or transferring the drum's contents, affix a numbered tag to the drum and transfer it to a staging area. Color-coded tags, labels, or bands should be used to mark similar waste types. Record a description of each drum, its condition, any unusual markings, and the location where it was buried or stored, on a drum data sheet (Appendix A). This data sheet becomes the principal

recordkeeping tool for tracking the drum onsite.

Where there is good reason to suspect that some drums contain radioactive, explosive, and shock-sensitive materials, these drums should be staged in a separate, isolated area. Placement of explosives and shock-sensitive materials in diked and fenced areas will minimize the hazard and the adverse effects of any premature detonation of explosives.

Where space allows, the drum opening area should be physically separated from the drum removal and drum staging operations. Drums are moved from the staging area to the drum opening area one at a time using forklift trucks equipped with drum grabbers or a barrel grappler. In a large-scale drum handling operation, drums may be conveyed to the drum opening area using a roller conveyor.

2.7.4 Drum Opening

There are three basic techniques available for opening drums at hazardous waste sites:

- Manual opening with non-sparking bung wrenches,
- Drum deheading, and
- Remote drum puncturing or bung removal.

The choice of drum opening techniques and accessories depends on the number of drums to be opened, their waste contents, and physical condition. Remote drum opening equipment should always be considered in order to protect worker safety. Under OSHA 1910.120, manual drum opening with bung wrenches or deheaders should be performed only with structurally sound drums having contents that are known to be (1) not shock sensitive, (2) non-reactive, (3) non-explosive, and (4) non-flammable.

Manual Drum Opening with a Bung Wrench

Manual drum opening with bung wrenches (Figure 1, Appendix B) should not be performed unless the drums are structurally sound (no evidence of bulging or deformation) and their contents are known to be non-explosive. If opening the drum with bung wrenches is deemed reasonably cost-effective and safe, then follow these procedures to minimize the hazard:

1. Fully outfit field personnel with protective gear.
2. Position drum upright with the bung up, or, for drums with bungs on the side, lay the drum on its side with the bung plug up.
3. Wrench the bung with a slow, steady pulling motion across the drum. If the length of the bung wrench handle provides inadequate leverage for unscrewing the plug, attach a "cheater bar" to the handle to improve leverage.

Manual Drum Opening with a Drum Deheader

Drums are opened with a drum deheader (Figure 2, Appendix B) by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw so that the deheader is held against the side of the drum. Moving the handle of the deheader up and down while sliding the deheader along the chime will cut off the entire top. If the top chime of a drum has been damaged or badly dented, it may not be possible to cut off the entire top. Since there is always the possibility that a drum may be under pressure, make the initial cut very slowly to allow for the gradual release of any built-up pressure. A safer technique would be to use a remote method to puncture the drum prior to using the deheader.

Self-propelled drum openers which are either electrically or pneumatically driven can be used for quicker and more efficient deheading.

Manual Drum Opening with a Hand Pick, Pickaxe, or Spike

When a drum must be opened and neither a bung wrench nor a drum deheader is suitable, the drum can be opened for sampling by using a hand pick, pickaxe, or spike (Figure 3, Appendix B). Often the drum lid or head must be hit with a great deal of force in order to penetrate it. The potential for splash or spraying is greater than with other opening methods and, therefore, this method of drum opening is not recommended, particularly when opening drums containing liquids. Some spikes used have been modified by the addition of a circular splash plate near the penetrating end. This plate acts as a shield and reduces the amount of splash in the direction of the person using the spike. Even with this shield, good splash gear is essential.

Since drums cannot be opened slowly with these tools, spray from drums is common requiring appropriate safety measures. Decontaminate the pick or spike after each drum is opened to avoid cross-contamination and/or adverse chemical reaction from incompatible materials.

Remote Drum Opening with a Backhoe Spike

Remotely operated drum opening tools are the safest available means of drum opening. Remote drum opening is slow, but is much safer compared to manual methods of opening.

Drums should be "staged" or placed in rows with adequate aisle space to allow ease in backhoe maneuvering. Once staged, the drums can be quickly opened by punching a hole in the drum head or lid with the spike.

The spike (Figure 4, Appendix B) should be decontaminated after each drum is opened to prevent cross-contamination. Even though some splash or spray may occur when this method is used, the operator of the backhoe can be protected by mounting a large shatter-resistant shield in front of the operator's cage. This, combined with the required level of personal protection gear, should be sufficient to protect the operator. Additional respiratory protection can be afforded by providing the operator with an on-board airline system.

Remote Drum Opening with Hydraulic Devices

A piercing device with a metal point is attached to the end of a hydraulic line and is pushed into the drum by hydraulic pressure (Figure 5, Appendix B). The piercing device can be attached so that the sampling hole can be made on either the side or the head of the drum. Some of the metal piercers are hollow or tube-like so that they can be left in place if desired and serve as a permanent tap or sampling port. The piercer is designed to establish a tight seal after penetrating the container.

Remote Drum Opening with Pneumatic Devices

Pneumatically-operated devices utilizing compressed air have been designed to remove drum bungs remotely (Figure 6, Appendix B).

2.7.5 Drum Sampling

After the drum has been opened, monitor headspace gases using an explosimeter and organic vapor analyzer. In most cases it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, take a sample that represents the entire depth of the vessel.

When sampling a previously sealed vessel, check for the presence of a bottom sludge. This is easily accomplished by measuring the depth to the apparent bottom, then comparing it to the known interior depth.

Glass Thief Sampler

The most widely used implement for sampling is a glass tube commonly referred to as a glass thief (Figure 7, Appendix B). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate. Glass thieves are typically 6mm to 16mm I.D. and 48 inches long.

Procedures for using a glass thief are as follows:

1. Remove cover from sample container.
2. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About one foot of tubing should extend above the drum.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring liquid does not come into contact with stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.
6. Release stopper and allow the glass thief to drain until the container is approximately 2/3 full.
7. Remove tube from the sample container, break it into pieces and place the pieces in the drum.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the drum.

10. Log all samples in the site logbook and on field data sheets.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

In many instances a drum containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by the use of a stainless steel lab spoon.

It should be noted that in some instances disposal of the tube by breaking it into the drum may interfere with eventual plans for the removal of its contents. This practice should be cleared with the project officer or other disposal techniques evaluated.

COLIWASA Sampler

Some equipment is designed to collect a sample from the full depth of a drum and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) and modifications thereof. The COLIWASA (Figure 8, Appendix B) is a much cited sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end.

Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper. One model of the COLIWASA is shown in Appendix B; however, the design can be modified and/or adapted somewhat to meet the needs of the sampler.

The major drawbacks associated with using a COLIWASA concern decontamination and costs. The sampler is difficult, if not impossible to decontaminate in the field and its high cost in relation to alternative procedures (glass tubes) make it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

Follow these procedures for using the COLIWASA:

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

2. Slowly lower the sampler into the liquid waste. Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

4. Slowly withdraw the sample from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.

5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.

6. Cap the sample container tightly and place prelabeled sample container in a carrier.

7. Replace the bung or place plastic over the drum.

8. Log all samples in the site logbook and on field data sheets.

3.0 TANK SAMPLING: SOP #2010

3.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide protocols for sampling tanks and other confined spaces from outside the vessel.

3.2 METHOD SUMMARY

The safe collection of a representative sample should be the criterion for selecting sample locations. A representative sample can be collected using techniques or equipment that are designed for obtaining liquids or sludges from various depths. The structure and characteristics of storage tanks present problems with collection of samples from more than one location; therefore, the selection of sampling devices is an important consideration.

Depending on the type of vessel and characteristics of the material to be sampled, one can choose a bailer, glass thief, bacon bomb sampler, sludge judge, COLIWASA, or subsurface grab sampler to collect the sample. For depths of less than 5-feet, a bailer, COLIWASA, or sludge judge can be used. A sludge judge, subsurface grab sampler, bailer, or bacon bomb sampler can be used for depths greater than 5-feet. A sludge judge or bacon bomb can be used to determine if the tank consists of various strata.

All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with an LEL reading greater than 25%.

All personnel involved in tank sampling should be advised as to the hazards associated with working in unfavorable conditions.

3.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples collected from tanks are considered waste samples and, as such, addition of preservatives is not required due to the potential reaction of the sample with the preservative. Samples should, however, be cooled to 4°C and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample.

Sample bottles for collection of waste liquids, sludges, or solids are typically wide-mouth amber jars with Teflon-lined screw caps. Actual volume required for analysis should be determined in conjunction with the laboratory performing the analysis.

Waste sample handling procedures should be as follows:

1. Place sample container in two Ziploc plastic bags.
2. Place each bagged container in a 1-gallon covered can containing absorbent packing material. Place the lid on the can.
3. Mark the sample identification number on the outside of the can.
4. Place the marked cans in a cooler, and fill remaining space with absorbent packing material.
5. Fill out a chain of custody form for each cooler, place it in plastic, and affix it to the inside lid of the cooler.
6. Secure and custody seal the lid of cooler.
7. Arrange for the transportation appropriate for the type of hazardous waste involved.

3.4 INTERFERENCES AND POTENTIAL PROBLEMS

Sampling a storage tank requires a great deal of manual dexterity, often requiring the sampler to climb to the top of the tank upon a narrow vertical or spiral stairway or ladder while wearing protective clothing and carrying sampling equipment.

Before climbing onto the vessel, perform a structural survey of the tank to ensure the sampler's

safety and accessibility prior to initiating field activities.

As in all opening of containers, take extreme caution to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.

All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with an LEL reading greater than 25%.

3.5 EQUIPMENT/APPARATUS

Storage tank materials include liquids, sludges, still bottoms, and solids of various structures. The type of sampling equipment chosen should be compatible with the waste. Samplers commonly used for tanks include: the bacon bomb sampler, the sludge judge, glass thief, bailer, COLIWASA, and subsurface grab sampler.

- sampling plan
- safety equipment
- tape measure
- weighted tape line or equivalent
- camera/film
- stainless steel bucket or bowl
- sample containers
- Ziploc plastic bags
- logbook
- labels
- field data sheets
- chain of custody forms
- flashlight (explosion proof)
- coolers
- ice
- decontamination supplies
- bacon bomb sampler
- sludge judge
- glass thief
- bailer
- COLIWASA
- subsurface grab sampler
- water/oil level indicator
- OVA (organic vapor analyzer or equivalent)
- explosimeter/oxygen meter
- high volume blower

3.6 REAGENTS

Reagents are not typically required for the preservation of waste samples. However, reagents will be utilized for decontamination of equipment. Decontamination solutions required are specified in ERT SOP #2006, Sampling Equipment Decontamination.

3.7 PROCEDURES

3.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or precleaa equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

3.7.2 Preliminary Inspection

1. Inspect the external structural characteristics of each tank and record in the site logbook. Potential sampling points should be evaluated for safety, accessibility, and sample quality.

2. Prior to opening a tank for internal inspection, the tank sampling team should:

   - Review safety procedures and emergency contingency plans with the Safety Officer.

   - Ensure that the tank is properly grounded.

   - Remove all sources of ignition from the immediate area.

3. Each tank should be mounted using appropriate means. Remove manway covers using non-sparking tools.

APPENDIX D

CLP GUIDELINES

THIS DOCUMENT WAS PREPARED BY ROY F. WESTON, INC. EXPRESSLY FOR EPA. IT SHALL NOT BE RELEASED OR DISCLOSED IN WHOLE OR IN PART WITHOUT THE EXPRESS, WRITTEN PERMISSION OF EPA.

ROUTINE ANALYTICAL SERVICES

(RAS)

Contract Laboratory Program

USEPA Sample Management Office

Low/Medium Concentration Inorganic RAS

- Target Analyte List
  - Total Metals (Unfiltered)
  - Dissolved Metals (Field Filtered)
  - Cyanide
- AA or ICP Methods
- 35-day Data Turnaround

High Concentration Inorganic RAS

- Target Analyte List
  - Total Metals
  - Cyanide
- Hydride ICP
- Lab Screens for Concentration
- 35-Day Data Turnaround

Laboratory Quality Control (QC)
High Concentration Inorganic RAS

- Matrix Spike
- Duplicate
- Lab Control Sample
- Double Volume Field Sample for Waters
- QC Needed for Each SDG

CLP Samples

A Sample is *All* Volume:

1) Of One Matrix
2) From One Station Location
3) For One Analytical Program
4) For One Laboratory

Each Sample is Assigned a Unique Sample Number

RAS Requests - Required Information

- Site Name
- Location: City and State
- Site/Spill Code
- Type of Activity
- Sampling Organization, Contact, and Phone Number
- Sampling and Shipping Dates
- Number of Samples By Concentration and Matrix
- Parameters Required
- Known or Suspected Hazards

Sample Documentation

- Creates a Legal "Paper Trail" for Enforcement
- Data Base on Sample Level
- CLP Paperwork and Tracking Systems Audited
- Case Numbers, SAS Numbers Reflect Different Contracts
- Contract Compliance Screening
- Late Data Tracking
- Billing and Accounting

Potential Problems with Sample Shipment and Analysis

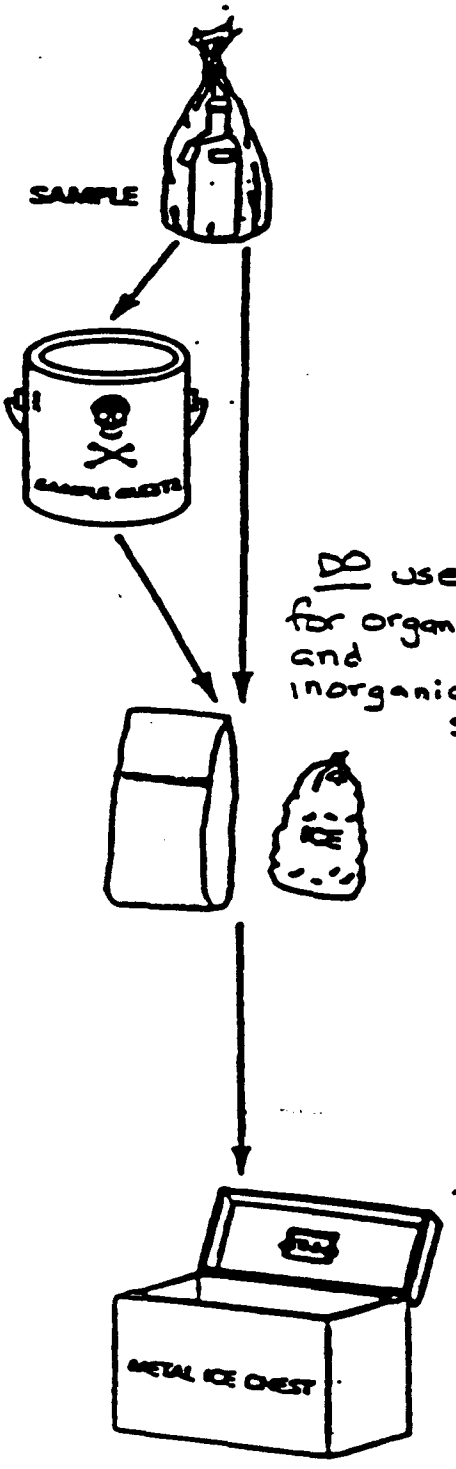
- Incorrect or Incomplete Paperwork
- Laboratory Receipt of Incorrect Samples
- Insufficient Volume for Analysis Requested
- Broken or Leaking Samples
- Matrices other than Water or Soil (i.e., Rocks, Leaves, Sticks, Oil, Etc.)
- Non-Homogeneous/Multi-Phase Water or Soil Samples
- Analytical Problems with Samples
- Laboratory Accidents Involving Samples

If Any of These Problems Are Encountered, Contact SMO Immediately

RAS Summary

- Standardized Analyses for Organics and Inorganics
- Low/Medium Concentration Waters and Soils
- High Concentration Multi-Phase Samples
- One Week Leadtime
- Projects Designated by a Case Number, Example: Case No. 17000

SAMPLE PACKAGING SUMMARY



DO use ice for organics and inorganics.

- ENCLOSE ALL SAMPLE CONTAINERS IN CLEAR PLASTIC BAGS.
- PACK ALL MEDIUM AND HIGH LEVEL WATER AND SOIL SAMPLES IN METAL PAINT CANS.
- LABEL PAINT CANS WITH SAMPLE NUMBER OF SAMPLE CONTAINED INSIDE.
- SURROUND CONTENTS OF CAN WITH NON-COMBUSTIBLE, ABSORBENT PACKING MATERIAL.
- USING FREEZER PACKAGES OR ICE SEALED IN PLASTIC BAGS, COOL ORGANIC LOW OR MEDIUM SAMPLES AND INORGANIC SAMPLES TO BE ANALYZED FOR CYANIDE TO 4°C.
- ICE IS NOT REQUIRED IN SHIPPING LOW LEVEL SOIL SAMPLES, BUT MAY BE UTILIZED AT THE DISCRETION OF THE SAMPLER.
- DO NOT COOL DIOXIN, INORGANIC LOW LEVEL WATER, INORGANIC MEDIUM/HIGH LEVEL WATER OR SOIL, OR ORGANIC HIGH LEVEL WATER OR SOIL SAMPLES.
- PACK SEALED PAINT CANS OR PLASTIC-ENCLOSED SAMPLE BOTTLES IN SHIPMENT CONTAINER.
- USE A METAL ICE CHEST FOR SHIPMENT (DO NOT USE CARDBOARD OR STYROFOAM CONTAINERS TO SHIP SAMPLES).
- SURROUND CONTENTS WITH NON-COMBUSTIBLE, ABSORBENT PACKING MATERIAL (DO NOT USE EARTH OR ICE PACKING MATERIALS).
- TAPE PAPERWORK IN PLASTIC BAGS UNDER COOLER LID.
- CLOSE COOLER AND SEAL WITH CUSTODY SEALS.

Project Code	Account Code
6-85231	SF-05

Regional Information: —

Non-Superfund Program: —

Site Name: DIOXINS 'R' US

City, State: DALLAS, TX

Site Spill ID: 77

2. Region No: VI

Sampling Co.: VIAR + CO.

Sampler (Name): KEVIN K. CONNELL

Sampler Signature: K.K. Connell

3. Type of Activity: Lead / Pre-Remedial / Remedial / Removal

SF, PRP, ST, FED — PA, SSI, LSI — RIFS, RD, RA, O&M, NPLD — CLEM, REMA, REM, OIL, UST

4. Date Shipped: 11/13/91

Carrier: FEDERAL EXPRESS

Airbill Number: 3758921237

5. Ship To: NATEX / GULF SOUTH ENVIRON. LAB, 6801 PRESS DR., EAST BLDG., NEW ORLEANS, LA 70126

ATTN: KAREN BRANDT

6. Preservative (Enter in Column D): 1. HCl 2. HNO3 3. NaHSO4 4. H2SO4 5. Other (SAS) (Specify) 6. Ice only N. Not preserved

7. Sample Description (Enter in Column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil (SAS) 7. Waste (SAS) 8. Other (SAS) (Specify)

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp/Grab	D Preservative from Box 6	E RAS Analysis: VOA	BNA	Pest/PCB	High ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg. Samp. No.	K Designated Field QC
FL 140	5	L	G	N			X		6-14738	SS-01	11/13/91, 9:15	KC	MFL 140	
FL 141	5	L	G	N	X		X		6-14739	SS-02	11/13/91, 9:30	KC	MFL 141	
FL 142	1	L	G	N	X	X	X		6-14740	SW-01	11/13/91, 11:00	KC	MFL 142	
FL 142	1	L	G	N	X	X	X		6-14741	SW-01	11/13/91, 11:00	KC	MFL 142	
FL 142	1	L	G	N		X	X		6-14742	SW-01	11/13/91, 11:00	KC	MFL 142	
FL 143	2	L	G	N			X		6-14743	GW-01	11/13/91, 1:45	KC	MFL 143	
FL 144	1	L	G	N	X				6-14744			KC	—	TRIP BLANK

Shipment for Case complete? (Y/N): Y

Page 1 of 1

Sample used for a spike and/or duplicate: FL 140; FL 142

Additional Sampler Signatures: —

Chain of Custody Seal Number: 789462

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
K.K. Connell	11/13/91 4:20				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: Is custody seal intact? Y/N/none	

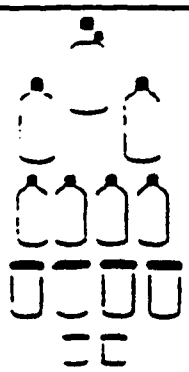
Split Samples: ☐ Accepted (Signature) ☐ Declined

EPA Form 9110-2 (Rev. 5-91) Replaces EPA Form (2075-7), previous edition which may be used

DISTRIBUTION: Blue - Region; Pink - SMO Copy; White - Lab Copy; Yellow - Lab Copy for Return to SMO

"This form replaces both the individual Traffic Report and EPA Chain of Custody Record. If the sampling team elects to use an alternative chain-of-custody form, cross out the bottom portion of this record and indicate that chain-of-custody information is recorded on an alternative form."

Water Samples	Required Volume	Container Type
Extractable Analysis (Low Level)	1 Gallon	1 X 4-Liter Amber Glass Bottle OR 2 X 80-oz. Amber Glass Bottle OR 4 X 1-Liter Amber Glass Bottles
Extractable Analysis (Medium Level*)	1 Gallon	32-oz. Wide-Mouth Glass Jars
Volatile Analysis (Low or Medium Level*)	80 ml	2 X 40-ml. Glass Vials



*All Medium and High Level Samples to be Sealed in Metal Can for Shipment

Soil/Sediment Samples	Required Volume	Container Type
Extractable Analysis (Low or Medium Level*)	6 oz.	~~1 X 8-oz. Wide-Mouth Glass Jar~~ ~~OR~~
	240 ml	2 X 4-oz. Wide-Mouth Glass Jars
Volatile Analysis (Low or Medium Level*)		~~2 X 120-ml Wide-Mouth Glass Vials~~

*Soil VOA Vials under study, subject to change, check to ensure proper sealing

HIGH CONCENTRATION SAMPLE COLLECTION REQUIREMENTS

Liquid or Solid Samples	Required Volume	Container Type
Extractable and Volatile Analysis	6 oz.	1 X 8-oz. Wide-Mouth Glass Jar

1. **Organic Sample Collection Requirements**
   - Please indicate sample to spike and/or duplicate.
   - Ship medium and high concentration samples in paint cans.
   - Aqueous samples require one triple-volume sample per twenty for Matrix Spike/Matrix Spike Duplicate.
   - Oily samples must be analyzed under the Special Analytical Services (SAS) program.
   - Confirmatory analysis and Special Analytical Services (SAS) parameters may require extra volume: for SAS consult specified SAS methods for requirements.
   - Additional sample volume not required for method OLC01.

2. **Cooler and Sample Documentation**
   - Complete all sections of the Traffic Report/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
   - Please remember to complete the Chain of Custody information on the form.
   - Seal the two sets of laboratory Traffic Report/Chain of Custody form copies in a plastic bag. Include a return address for the cooler. Tape bag under cooler lid.
   - Overlap the lid and bottle and bottle of each sample container with custody seals.
   - Seal each container in a plastic bag.
   - Pack medium and high concentration samples in metal cans.
   - Cool low waters to 4° C. Cooling of low soils is optional. Do not cool medium or high concentration waters and soils.
   - Separate and surround cooler contents with vermiculite or equivalent packaging.
   - Seal the cooler, overlapping the lid and body with custody seals.
   - FAX SMO a copy of the Traffic Report/Chain of Custody Form as soon as possible. Send SMO the pink copy of the Traffic Report within 5 days.
   - In column E RAS analysis indicate number of sample bottles sent for analysis.

3. **Sample Shipment Reporting**
   - PHONE IN ALL SHIPMENTS IMMEDIATELY TO SMO (or to RSCC, if instructed)

     Required information:

     Case (and/or SAS) Number
     Date shipped
     Number of samples by concentration and matrix
     Carrier and airbill number
     Next planned shipment

     Leave your name and a number where you can be reached.
   - Information for SATURDAY DELIVERIES must be phoned in by 3:00 PM (Eastern) the preceding FRIDAY.
   - Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
   - CALL IF YOU HAVE ANY QUESTIONS

     USEPA Contract Laboratory Program
     Sample Management Office
     P.O. Box 818
     Alexandria, VA 22313
     Phone: (703) 557-2490
     (703) 684-5678
     FAX: (703) 683-0378

1 Sample Description (Enter in Column A)	2 Preservative (Enter in Column D)
1 Surface Water	1 HCl
2 Ground Water	2 HNO3
3 Leachate	3 NaOH
4 Rinsate	4 H_2SO_4
5 Soil/Sediment	5 $K_2CR_2O_7$
6 Oil (SAS)	6 Ice only
7 Waste (SAS)	7 Other (SAS) (Specify)
8 Other (SAS) (Specify)	N Not preserved

1 Region No | Sampling Co | 5 Date Shipped | Carrier

Sampler (Name) | Airbill Number | Laboratory Contract Number | Unit Price

Sampler Signature | 6. Ship To | 8. Transfer to | Date Received

4 Type of Activity

Lead		Pre Remedial		Remedial		Removal	
SF		PA		RIFS		CLEM	
PRP		SSI		RD		REMA	
ST		LSI		RA		REM	
FED				O&M		OIL	
				NPLD		UST	

Received by

Contract Number | Price

CLP Sample Numbers (from labels)	A Enter # from Box 1	B Conc Low Med High	C Sample Type Comp / Grab	D Preservative from Box 6	E - RAS Analysis: Metals: Total	Metals: Dissolved	Cyanide	Low Conc: Nitrate/Nitrite	Low Conc: Fluoride	High: pH	High: Conductivity	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No	K Sample Condition on Receipt	L High Conc. Phase (Check below): Solids	Water - MIS Liq.	Non Water - MIS Liq.

Shipment for Case complete? (Y/N) | Page 1 of | Sample used for a spike and/or duplicate | Additional Sampler Signatures | Chain of Custody Seal Number

CHAIN OF CUSTODY RECORD

Relinquished by (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by (Signature)
Relinquished by (Signature)	Date / Time	Received by: (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
Received by (Signature)	Date / Time	Received for Laboratory by (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

Split Samples [ ] Accepted (Signature)

[ ] Declined

EPA Form 9110-1 (Rev. 5-91) Replaces EPA Form (2075-6) previous edition which may be used

DISTRIBUTION

Green Region Pink SMO Copy White Lab Copy Yellow Lab Copy for Return to SMO

EXHIBIT C

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

LOW / MEDIUM CONC
RAS ORGANIC

NOTE: The values in these tables are quantitation limits, not absolute detection limits. The amount of material necessary to produce a detector response that can be identified and reliably quantified is greater than that needed to simply be detected above the background noise. The quantitation limits in these tables are set at the concentrations in the sample equivalent to the concentration of the lowest calibration standard analyzed for each analyte.

Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

The CRQL values listed on the following pages are based on the analysis of samples according the specifications given in Exhibit D. For each fraction and matrix, a brief synopsis of the sampling handling and analysis steps is given, along with an example calculation for the CRQL value. All CRQL values are rounded to two significant figures. For soil samples, the moisture content of the samples is not considered in these example calculations.

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Pesticides/Aroclors	CAS Number	Quantitation Limits* Water ug/L	Soil ug/Kg	On Column (pg)
98. alpha-BHC	319-84-6	0.05	1.7	5
99. beta-BHC	319-85-7	0.05	1.7	5
100. delta-BHC	319-86-8	0.05	1.7	5
101. gamma-BHC (Lindane)	58-89-9	0.05	1.7	5
102. Heptachlor	76-44-8	0.05	1.7	5
103. Aldrin	309-00-2	0.05	1.7	5
104. Heptachlor epoxide	1024-57-3	0.05	1.7	5
105. Endosulfan I	959-98-8	0.05	1.7	5
106. Dieldrin	60-57-1	0.10	3.3	10
107. 4,4'-DDE	72-55-9	0.10	3.3	10
108. Endrin	72-20-8	0.10	3.3	10
109. Endosulfan II	33213-65-9	0.10	3.3	10
110. 4,4'-DDD	72-54-8	0.10	3.3	10
111. Endosulfan sulfate	1031-07-8	0.10	3.3	10
112. 4,4'-DDT	50-29-3	0.10	3.3	10
113. Methoxychlor	72-43-5	0.50	17.0	50
114. Endrin ketone	53494-70-5	0.10	3.3	10
115. Endrin aldehyde	7421-36-3	0.10	3.3	10
116. alpha-Chlordane	5103-71-9	0.05	1.7	5
117. gamma-Chlordane	5103-74-2	0.05	1.7	5
118. Toxaphene	8001-35-2	5.0	170.0	500
119. Aroclor-1016	12674-11-2	1.0	33.0	100
120. Aroclor-1221	11104-28-2	1.0	33.0	100
121. Aroclor-1232	11141-16-5	2.0	67.0	200
122. Aroclor-1242	53469-21-9	1.0	33.0	100
123. Aroclor-1248	12672-29-6	1.0	33.0	100
124. Aroclor-1254	11097-69-1	1.0	33.0	100
125. Aroclor-1260	11096-82-5	1.0	33.0	100

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of Pesticides/Aroclors.

3.0 TANK SAMPLING: SOP #2010

3.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide protocols for sampling tanks and other confined spaces from outside the vessel.

3.2 METHOD SUMMARY

The safe collection of a representative sample should be the criterion for selecting sample locations. A representative sample can be collected using techniques or equipment that are designed for obtaining liquids or sludges from various depths. The structure and characteristics of storage tanks present problems with collection of samples from more than one location; therefore, the selection of sampling devices is an important consideration.

Depending on the type of vessel and characteristics of the material to be sampled, one can choose a bailer, glass thief, bacon bomb sampler, sludge judge, COLIWASA, or subsurface grab sampler to collect the sample. For depths of less than 5-feet, a bailer, COLIWASA, or sludge judge can be used. A sludge judge, subsurface grab sampler, bailer, or bacon bomb sampler can be used for depths greater than 5-feet. A sludge judge or bacon bomb can be used to determine if the tank consists of various strata.

All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with an LEL reading greater than 25%.

All personnel involved in tank sampling should be advised as to the hazards associated with working in unfavorable conditions.

3.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples collected from tanks are considered waste samples and, as such, addition of preservatives is not required due to the potential reaction of the sample with the preservative. Samples should, however, be cooled to 4°C and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample.

Sample bottles for collection of waste liquids, sludges, or solids are typically wide-mouth amber jars with Teflon-lined screw caps. Actual volume required for analysis should be determined in conjunction with the laboratory performing the analysis.

Waste sample handling procedures should be as follows:

1. Place sample container in two Ziploc plastic bags.
2. Place each bagged container in a 1-gallon covered can containing absorbent packing material. Place the lid on the can.
3. Mark the sample identification number on the outside of the can.
4. Place the marked cans in a cooler, and fill remaining space with absorbent packing material.
5. Fill out a chain of custody form for each cooler, place it in plastic, and affix it to the inside lid of the cooler.
6. Secure and custody seal the lid of cooler.
7. Arrange for the transportation appropriate for the type of hazardous waste involved.

3.4 INTERFERENCES AND POTENTIAL PROBLEMS

Sampling a storage tank requires a great deal of manual dexterity, often requiring the sampler to climb to the top of the tank upon a narrow vertical or spiral stairway or ladder while wearing protective clothing and carrying sampling equipment.

Before climbing onto the vessel, perform a structural survey of the tank to ensure the sampler's

4. Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O_2) reading and an OVA/HNU for an organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

5. Prior to sampling, the tank headspace should be cleared of any toxic or explosive vapor concentration using a high volume blower. No work should start if LEL readings exceed 25%. At 10% LEL, work can continue but with extreme caution.

3.7.3 Sampling Procedures

1. Determine the depth of any and all liquid-solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.

2. Collect liquid samples from 1-foot below the surface, from mid-depth of liquid, and from 1-foot above the bottom sludge layer. This can be accomplished with a subsurface grab sampler or bacon bomb. For liquids less than 5-feet in depth, use a glass thief or COLIWASA to collect the sample.

   If sampling storage tanks, vacuum trucks, or process vessels, collect at least one sample from each compartment in the tank. Samples should always be collected through an opened hatch at the top of the tank. Valves near the bottom should not be used, because of their questionable or unknown integrity. If such a valve cannot be closed once opened, the entire tank contents may be lost to the ground surface. Also, individual strata cannot be sampled separately through a valve near the bottom.

3. Compare the three samples for visual phase differences. If phase differences appear, systematic iterative sampling should be performed. By halving the distance between two discrete sampling points, one can determine the depth of the phase change.

4. If another sampling port is available, sample as above to verify the phase information.

5. Measure the outside diameter of the tank and determine the volume of wastes using the depth measurements. (See Appendix C for calculations.)

6. Sludges can be collected using a bacon bomb sampler, glass thief, or sludge judge.

7. Record all information on the sample data sheet or site logbook. Label the container with the appropriate sample tag.

8. Decontaminate sampling equipment as per ERT SOP #2006, Sampling Equipment Decontamination.

3.7.4 Sampling Devices

Bacon Bomb Sampler

The bacon bomb sampler (Figure 9, Appendix B) is designed to collect material from various levels within a storage tank. It consists of a cylindrical body, usually made of chrome-plated brass and bronze with an internal tapered plunger that acts as a valve to admit the sample. A line attached to the top of the plunger opens and closes the valve. A line is attached to the removable top cover which has a locking mechanism to keep the plunger closed after sampling.

1. Attach the sample line and the plunger line to the sampler.

2. Measure and then mark the sampling line at the desired depth.

3. Gradually lower the bacon bomb sampler by the sample line until the desired level is reached.

4. When the desired level is reached, pull up on the plunger line and allow the sampler to fill before releasing the plunger line to seal off the sampler.

5. Retrieve the sampler by the sample line. Be careful not to pull up on the plunger line and thereby prevent accidental opening of the bottom valve.

6. Rinse or wipe off the exterior of the sampler body.

7. Position the sampler over the sample container and release its contents by pulling up on the plunger line.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the tank.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Sludge Judge

A sludge judge (Figure 10, Appendix B) is used for obtaining an accurate reading of solids which can settle, in any liquid, to any depth. The sampler consists of 3/4-inch plastic pipe in 5-foot sections, marked at 1-foot increments, with screw-style fittings. The top section includes a nylon line for raising the sampler.

1. Lower the sludge judge to the bottom of the tank.

2. When the bottom has been reached, and the pipe has filled to surface level, tug slightly on the rope as you begin to raise the unit. This will seat the check valve, trapping the column of material.

3. When the unit has been raised clear of the tank liquid, the amount of sludge in the sample can be read using the 1-foot increments marked on the pipe sections.

4. By touching the pin extending from the bottom section against a hard surface, the material is released from the unit.

5. Cap the sample container tightly and place prelabeled sample container in a carrier.

6. Replace the bung or place plastic over the tank.

7. Log all samples in the site logbook and on field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Subsurface Grab Sampler

Subsurface grab samplers (Figure 11, Appendix B) are designed to collect samples of liquids at various depths. The sampler is usually constructed of aluminum or stainless steel tubing with a polypropylene or Teflon head that attaches to a 1-liter sample container.

1. Screw the sample bottle onto the sampling head.

2. Lower the sampler to the desired depth.

3. Pull the ring at the top which opens the spring-loaded plunger in the head assembly.

4. When the bottle is full, release the ring, lift sampler, and remove sample bottle.

5. Cap the sample container tightly and place prelabeled sample container in a carrier.

6. Replace the bung or place plastic over the tank.

7. Log all samples in the site logbook and on field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Glass Thief

The most widely used implement for sampling is a glass tube commonly referred to as a glass thief (Figure 7, Appendix B). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate. Glass thieves are typically 6mm to 16mm I.D. and 48 inches long.

1. Remove cover from sample container.

2. Insert glass tubing almost to the bottom of the

tank or until a solid layer is encountered. About 1 foot of tubing should extend above the tank.

3. Allow the waste in the tank to reach its natural level in the tube.

4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring liquid does not come into contact with stopper.

5. Carefully remove the capped tube from the tank and insert the uncapped end in the sample container. Do not spill liquid on the outside of the sample container.

6. Release stopper and allow the glass thief to drain until the container is approximately 2/3 full.

7. Remove tube from the sample container, break it into pieces and place the pieces in the tank.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the tank.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

In many instances a tank containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by the use of a stainless steel lab spoon.

Bailer

The positive-displacement volatile sampling bailer (manufactured by GPI or equivalent) (Figure 12, Appendix B) is perhaps the most appropriate for collecting water samples for volatile analysis. Other bailer types (messenger, bottom fill, etc.) are less desirable, but may be mandated by cost and site conditions. Generally, bailers can provide an acceptable sample, providing that the sampling personnel use extra care in the collection process.

1. Make sure clean plastic sheeting surrounds the tank.

2. Attach a line to the bailer.

3. Lower the bailer slowly and gently into the tank so as not to splash the bailer into the tank contents.

4. Allow the bailer to fill completely and retrieve the bailer from the tank.

5. Begin slowly pouring from the bailer.

6. Cap the sample container tightly and place prelabeled sample container in a carrier.

7. Replace the bung or place plastic over the tank.

8. Log all samples in the site logbook and on field data sheets and label all samples.

9. Package samples and complete necessary paperwork.

10. Transport sample to decontamination zone to prepare it for transport to an analytical laboratory.

COLIWASA

Some equipment is designed to collect a sample from the full depth of a tank and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) (Figure 8, Appendix B) and modifications thereof. The COLIWASA is a much cited sampler designed to permit representative sampling of multiphase wastes from tanks and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end. Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper.

7/13/94 Delta Shipyard Pete Ruy

0920 Team arrives onsite. Team consists of Pete Ruy (PR) and Duane Williams (DW). Conditions outside are warm, cloudy, humid, with intermittent light and heavy rain. Held Health & Safety meeting.

0935 Meet Mr Kenneth Sevigne Delta Shipyard, was station in late 1980's. Lynn Dean bought the property for the Elevated Boat Industry (EBI) during that time and manufactured boats out of the facility. Mr Dean bought 110 acres of the old facility. OLD Delta Shipyard actually encompasses alot more than the 110 acres owned by EBI (EBI). The site is surrounded by Tenants: Gonzco to the North, Christi Industries to the Southeast, A diving Salvage dive company and a blasting

Company to the west. EBI has 20 workers onsite.

10:00 Team & Mr Sevigne depart for pits. There is healthy vegetation all around the pits. Mr. Sevigne called in some people to cut a path back to the pits. Team calibrated OVA to 96 ppm methane using 99ppm gas. North side of actually pit devoid of most vegetation. There appears to be some black staining upon the brol black soils. Pit has no standing water. OVA breathing zone registered 1-3 ppm over background. Stained soils registered over 1080ppm background. Crusty topsoil with seemingly softer and more liquid soils below it. 20x40' area devoid of most vegetation.

1041 Team moves to Southern pit

7/13/94 Delta Petroleum

entrance. This is the second pit in the 3 North to South series. 2nd pit is 80'x100' approximately and looks the same as #1 black local soils stained with black stains, faint hydrocarbon odor (also present near #1), and mostly devoid of vegetation. Crusty top soils with soft, gooey soils underneath. Breathing zone OVA 1-3 above background. Stains soils and and small hole punched in recieved over 1000ppm on OVA. ~~Four~~

10:51 Move to Southern most pit #3. Low lear running water? DIMENSIONS ARE SAME AS #2. HOWEVER, WATER WAS STANDING ON PIT. ~~RUNNING~~ DRY WATER was running of the

top of the pond (standing water possibly from rain. There is an oily sheen on this water. Soils ~~were~~ are blackened & stained. OVA readings near the surface are over 1000ppm. Water draining opposite pools into a drainage ditch between the pit & the road. Drainage ditch flows south towards Salinge company

11:20 South cut to pit #4 on the southern end. Standing water on pit, oily stains, blackened soils. Pit appears to be 150'x200' approximately.

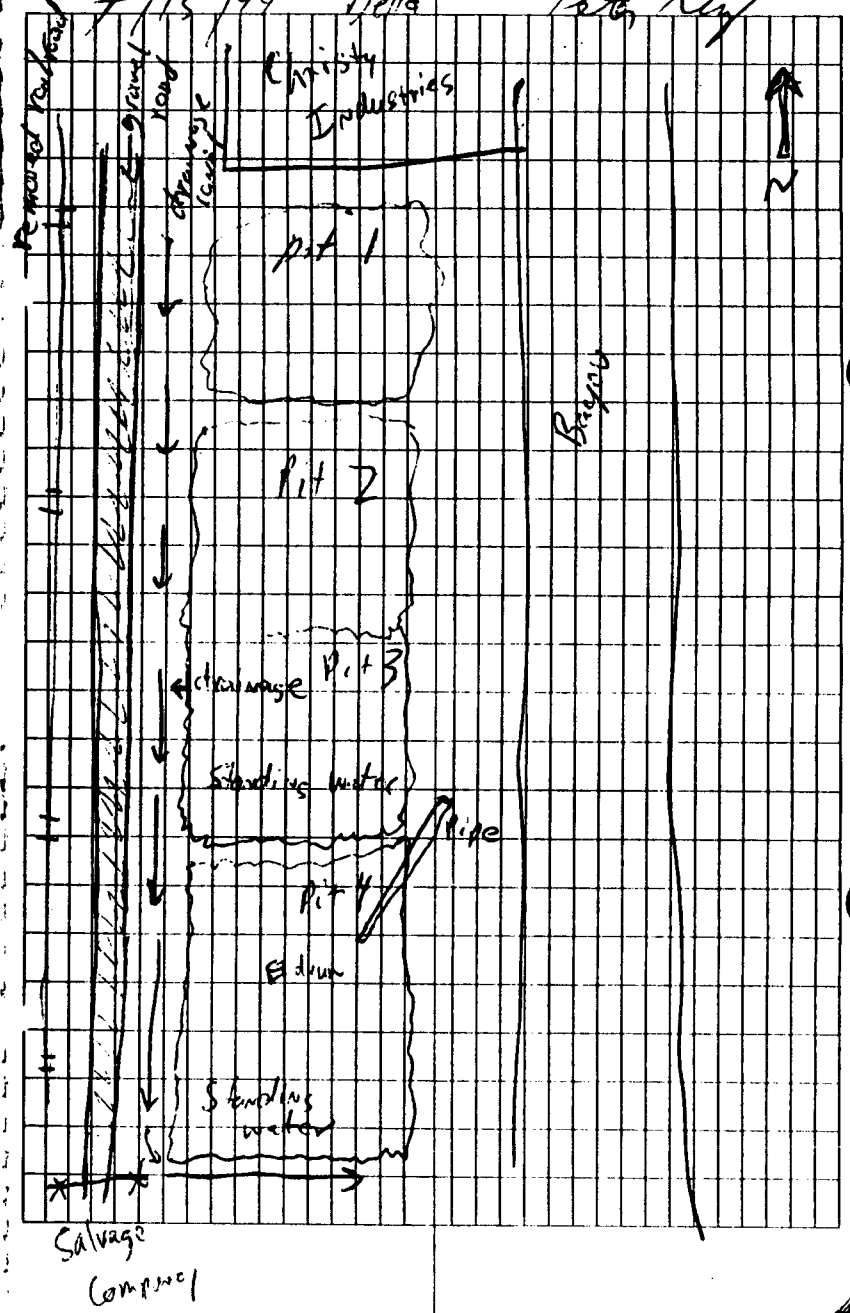
11:40 Return to base to speak with Mr. Serigne. (Switch to black pen)

12:00 Two old separation pits are now a parking lot directly east of fabrication plant. One monitoring well (NE) is still apparent. This seems to be the

pits that were originally closed out by Delta Shipyard.

12

1:00 Team departs site



REFERENCE 2

3012 site

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

REGION	SITE NUMBER (to be assigned by HQ)
VI	LA 01317

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (*Section II*). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (*EN-335*); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
Delta Shipyard	202 Industrial Boulevard		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Houma	LA	70361	Terrebonne

G. SITE OPERATOR INFORMATION

1. NAME	2. TELEPHONE NUMBER
Ralph Arceneaux, President Delta Shipyard	(504) 868-7450

3. STREET	4. CITY	5. STATE	6. ZIP CODE
P.O. Box 101	Houma	LA	70361

H. REALTY OWNER INFORMATION (*If different from operator of site*)

1. NAME	2. TELEPHONE NUMBER
Delta Services Industries	(504) 868-7450

3. CITY	4. STATE	5. ZIP CODE
Houma (P.O. Box 101)	LA	70361

I. SITE DESCRIPTION

see attachment

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE

II. TENTATIVE DISPOSITION (*complete this section last*)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (*mo., day, & yr.*)

B. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☒ 4. NONE

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Thomas Myers	(201) 560-1650	9/12/84

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME	2. TITLE
Thomas Myers	Geologist

3. ORGANIZATION	4. TELEPHONE NO. (area code & no.)
The Earth Technology Corporation	(201) 560-1650

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
None		

C. SITE REPRESENTATIVES INTERVIEWED (*corporate officials, workers, residents*)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
Ralph Arceneaux	President (504) 868-7450	P.O. Box 101, Houma, LA 70361

SUPERFUND FILE

APR 30 1992

REORGANIZE

LAD 058475419

Reviewed by 6AW-SC

Continued From Front

III. INSPECTION INFORMATION (continued)

D. GENERATOR INFORMATION (sources of waste)

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED
Delta Shipyard	(504) 868-7450	P.O. Box 101, Houma, LA 70361	oily waste-recovered and sold to recyclers

E. TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED
None			

F. IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES, IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO.	3. ADDRESS
None		

G. DATE OF INSPECTION (mo., day, & yr.)	H. TIME OF INSPECTION	I. ACCESS GAINED BY: (credentials must be shown in all cases)
9/12/84	1:30-4:00	[X] 1. PERMISSION [ ] 2. WARRANT

J. WEATHER (describe)

sunny, high in the 90's

IV. SAMPLING INFORMATION

A. Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN (mark 'X')	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER			
b. SURFACE WATER			
c. WASTE			
d. AIR			
e. RUNOFF			
f. SPILL			
g. SOIL			
h. VEGETATION			
i. OTHER (specify) None		see attachment	

B. FIELD MEASUREMENTS TAKEN (e.g., radioactivity, explosivity, PH, etc.)

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS
None		

 Continue On Page 3

Continued From Page 2

IV. SAMPLING INFORMATION (continued)

C. PHOTOS

1. TYPE OF PHOTOS: [XX] a. GROUND [ ] b. AERIAL

2. PHOTOS IN CUSTODY OF: see attachment

D. SITE MAPPED?

[XX] YES. SPECIFY LOCATION OF MAPS: see attachment

E. COORDINATES

1. LATITUDE (deg.-min.-sec.): 29° 34' 02" N

2. LONGITUDE (deg.-min.-sec.): 90° 42' 18" W

V. SITE INFORMATION

A. SITE STATUS

[ ] 1. ACTIVE (Those inductrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

[X] 2. INACTIVE (Those sites which no longer receive wastes.) 2 closed oil pits

[ ] 3. OTHER (specify): _____ (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

[ ] 1. NO [X] 2. YES (specify generator's four-digit SIC Code): None

C. AREA OF SITE (in acres): 36

D. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES (specify): Office and administration building

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

'X'	A. TRANSPORTER	'X'	B. STORER	'X'	C. TREATER	'X'	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify):		(closed under LA DEQ supervision)

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for..

[ ] 1. STORAGE [ ] 2. INCINERATION [ ] 3. LANDFILL [X] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL

[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[XX] 1. LIQUID [ ] 2. SOLID [ ] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[ ] 1. CORROSIVE [ ] 2. IGNITABLE [ ] 3. RADIOACTIVE [ ] 4. HIGHLY VOLATILE

[XX] 5. TOXIC [ ] 6. REACTIVE [ ] 7. INERT [X] 8. FLAMMABLE

[ ] 9. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Yes, manifests.

Continue On Reverse

Continued From Front

VII. WASTE RELATED INFORMATION (continued)

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT: None	AMOUNT: 125	AMOUNT: None	AMOUNT: None	AMOUNT: None	AMOUNT: None
UNIT OF MEASURE	UNIT OF MEASURE: bbl /month	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY, PHARMACEUT.
(2) METALS SLUDGES	X (2) OTHER (specify): Leaded tank bottoms	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW	NOTE: all waste oil is sold to reclaimers	(3) OTHER (specify):	(3) CAUSTICS	(3) MILLING/MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMELTING WASTES	(4) MUNICIPAL
(5) OTHER (specify):			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER (specify):
			(6) CYANIDE	(6) OTHER (specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER (specify):		

D. LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE (place in descending order of hazard)

1. SUBSTANCE	2. FORM (mark 'X')			3. TOXICITY (mark 'X')				4. CAS NUMBER	5. AMOUNT	6. UNIT
	a. SOLID	b. LIQ.	c. VAPOR	a. HIGH	b. MED.	c. LOW	d. NONE			
Leaded tank bottoms	X	X		X				68476-53-9	62.5	bbl/mo
Slop oil		X			X			68477-26-9	62.5	bbl/mo

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

☐ A. HUMAN HEALTH HAZARDS

Continue On Page 5

Continued From Page 4

VIII. HAZARD DESCRIPTION *(continued)*

☐ B. NON-WORKER INJURY/EXPOSURE

☐ C. WORKER INJURY/EXPOSURE

☐ D. CONTAMINATION OF WATER SUPPLY

☐ E. CONTAMINATION OF FOOD CHAIN

☐ F. CONTAMINATION OF GROUND WATER

☐ G. CONTAMINATION OF SURFACE WATER

Continue On Reverse

Continued From Front

VIII. HAZARD DESCRIPTION (contin

☐ H. DAMAGE TO FLORA/FAUNA

☐ I. FISH KILL

☐ J. CONTAMINATION OF AIR

☐ K. NOTICEABLE ODORS

☐ L. CONTAMINATION OF SOIL

☐ M. PROPERTY DAMAGE

Continue On Page 7

Continued From Page 6

VIII. HAZARD DESCRIPTION (continued)

☐ N. FIRE OR EXPLOSION

☐ O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

☐ P. SEWER, STORM DRAIN PROBLEMS

☐ Q. EROSION PROBLEMS

☐ R. INADEQUATE SECURITY

☐ S. INCOMPATIBLE WASTES

 Continue On Reverse

VIII. HAZARD DESCRIPTION *(continued)*

☐ T. MIDNIGHT DUMPING

☐ U. OTHER *(specify)*:

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE *(specify units)*
1. IN RESIDENTIAL AREAS	1,000	1,000	300	1 mile
2. IN COMMERCIAL OR INDUSTRIAL AREAS	2,500	2,500	25	1 mile
3. IN PUBLICLY TRAVELLED AREAS	0	0	0	1 mile
4. PUBLIC USE AREAS *(parks, schools, etc.)*	0	0	0	1 mile

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER *(specify unit)*	B. DIRECTION OF FLOW	C. GROUNDWATER USE IN VICINITY
2 feet	South	None
D. POTENTIAL YIELD OF AQUIFER	**E. DISTANCE TO DRINKING WATER SUPPLY** *(specify unit of measure)*	**F. DIRECTION TO DRINKING WATER SUPPLY**
Unknown	0.5 miles	West

G. TYPE OF DRINKING WATER SUPPLY

☐ 1. NON-COMMUNITY < 15 CONNECTIONS ☒ 2. COMMUNITY *(specify town)*: > 15 CONNECTIONS Houma Water Dept. - Bayou Black

☒ 3. SURFACE WATER ☐ 4. WELL

 Continue On Page 9

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')
None				

I. RECEIVING WATER

1. NAME: Houma Navigation Canal

☐ 2. SEWERS ☒ 3. STREAMS/RIVERS ☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify):

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

Secondary contact recreation and propagation of fish and wildlife.

XI. SOIL AND VEGITATION DATA

LOCATION OF SITE IS IN:

☐ A. KNOWN FAULT ZONE ☐ B. KARST ZONE ☒ C. 100 YEAR FLOOD PLAIN ☐ D. WETLAND

☐ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
X	1. SAND				
X	2. CLAY				
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ C. HIGH (1000 to 10 cm/sec.)

☐ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☒ F. VERY LOW (.001 to .00001 cm/sec.)

G. RECHARGE AREA

☐ 1. YES ☒ 2. NO 3. COMMENTS:

H. DISCHARGE AREA

☐ 1. YES ☒ 2. NO 3. COMMENTS:

I. SLOPE

1. ESTIMATE % OF SLOPE: 0%

2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC.: South

J. OTHER GEOLOGICAL DATA

Fresh water may be contained in buried distributary channels along Bayou Lafourche but any development of these reservoirs would be very limited due to salt water encroachment. Pleistocene terrace deposits beneath these Holocene deltaic sequences are connected to surface waters and any contamination of these aquifers could reach surface reservoirs.

 Continue On Reverse

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X')		
					1. YES	2. NO	3. UNKNOWN
State	HWMP	GD 343I1	10/22/80	Interim	X		
RCRA	EPA	LAD 058473413	Unknown	None	X		

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

[XX] NONE [ ] YES (summarize in this space)

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition (Section II) information on the first page of this form.

ATTACHMENT A

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT SUPPLEMENT SHEET

LA 01317

Instruction - This sheet is provided to give additional information in explanation of a question on the form T2070-3.

Corresponding number on form	Additional Remark and/or Explanation
I., I.	This facility cleans and repairs oil barges. Two oil/water separator pits were utilized to recover the waste oil generated from the barge cleaning operations. Earlier this year the pits were drained and the bottom sludge was sampled. The test results from this sampling were reviewed by the LA DEQ Hazardous Waste Division, and closure of the pits by backfilling was approved. The oil sludge remaining in the pits was mixed with 30 cubic yards of sandy soil. An above ground steel tank separator has replaced the pits.
IV., A., i.	Since closure of the pits was approved by the State Hazardous Waste Division, no samples will be collected.

LA01317

ATTACHMENT B

REJECTION FORM

HAZSIT #	SITE NAME	FORM # and DATE COMPLETED by STATE
LA 1317	Delta Shipyard	2070-3 / 9/12/84

EXPLANATION FOR REJECTION:
(DEFICIENCIES)

* Report does not reflect the existence of the two monitoring wells other than a site map.
  - If well samples were taken during the time of the State-approved closure, provide this data and any other data pertinent to site closure. ⊙ Review state files.
* VICINITY MAP EXHIBIT "B" is very poor in quality.

SUGGESTED REMEDY FOR DEFICIENCIES:

(As NOTED.)

Provide a superior reproduction or a different map of sufficient quality. (must be able to read elevations)
⊙ Contact U.S.G.S. or L.G.S. for assistance.

SIGNATURE: Gary W. Gunn

NAME OF REVIEWER

DATE: 18DEC84

SURFACE IMPOUNDMENTS SITE INSPECTION REPORT
(Supplemental Report) LA 01317

INSTRUCTION
Answer and Explain as Necessary.

1. TYPE OF IMPOUNDMENT
Two secondary oil/water separator pits.

2. STABILITY/CONDITION OF EMBANKMENTS
The pits have been backfilled and closed.

3. EVIDENCE OF SITE INSTABILITY *(Erosion, Settling, Sink Holes, etc.)*
☐ YES ☒ NO

4. EVIDENCE OF DISPOSAL OF IGNITABLE OR REACTIVE WASTE
☐ YES ☒ NO

5. ONLY COMPATIBLE WASTES ARE STORED OR DISPOSED OF IN THE IMPOUNDMENT
☒ YES ☐ NO

6. RECORDS CHECKED FOR CONTENTS AND LOCATION OF EACH SURFACE IMPOUNDMENT
☒ YES ☐ NO

7. IMPOUNDMENT HAS LINER SYSTEM
☒ YES ☐ NO located in clay soil

7a. INTEGRITY OF LINER SYSTEM CHECKED
☐ YES ☒ NO

7b. FINDINGS
Subsurface soils have a permeability of 10^{-7} to 10^{-8} cm/sec.

8. SOIL STRUCTURE AND SUBSTRUCTURE
Silty clay with traces of sand extend to a depth of 40-50 feet.

9. MONITORING WELLS
☒ YES ☐ NO 2 wells

10. LENGTH, WIDTH, AND DEPTH
LENGTH 75' (each) WIDTH 40' (each) DEPTH 5' (each)

11. CALCULATED VOLUMETRIC CAPACITY
15,000 cubic feet

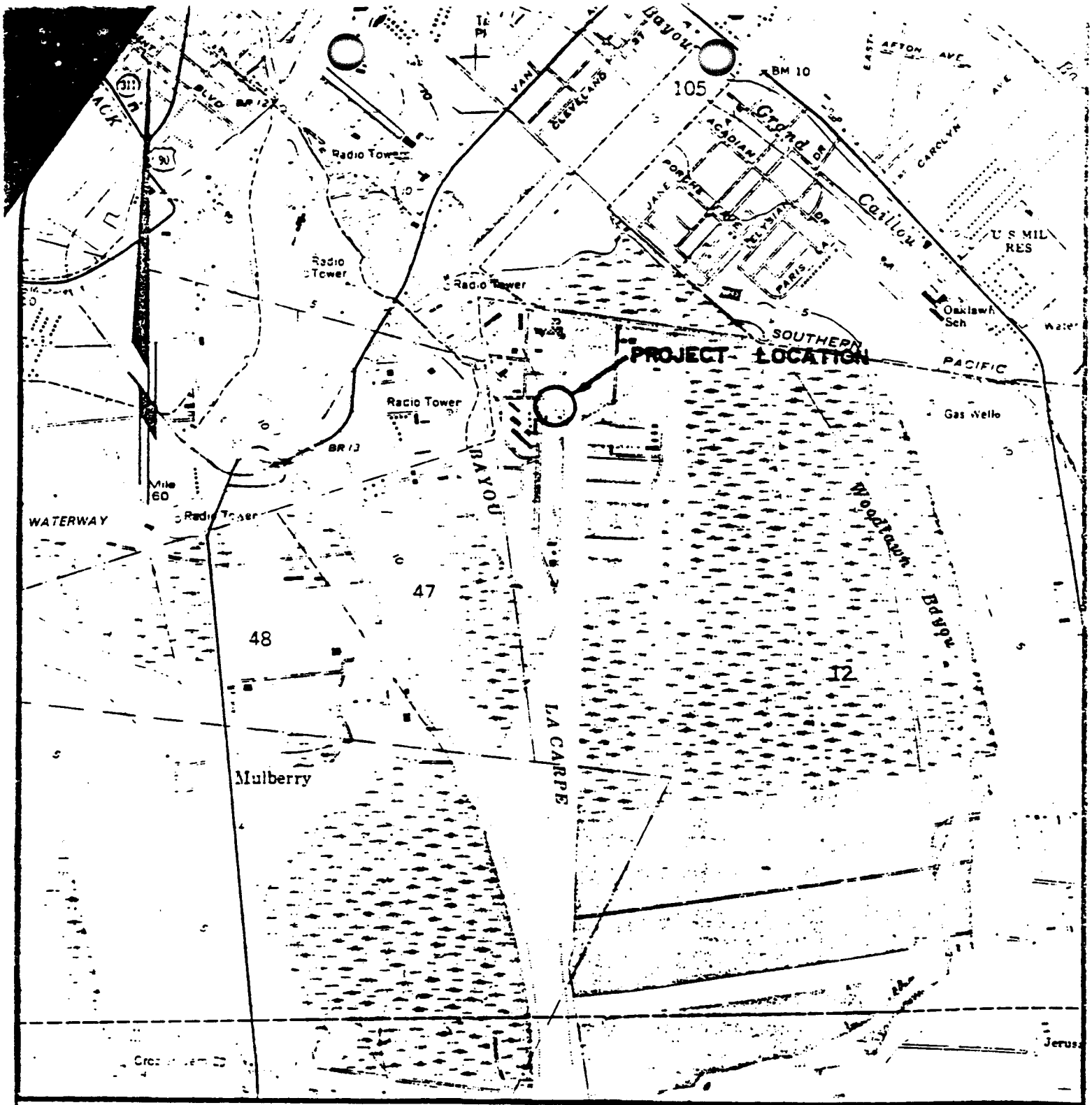
12. PERCENT OF CAPACITY REMAINING
Closed pits - N/A

13. ESTIMATE FREEBOARD
N/A

14. SOLIDS DEPOSITION
☒ YES ☐ NO Low solids deposited

15. DREDGING DISPOSAL METHOD
None

16. OTHER EQUIPMENT
None

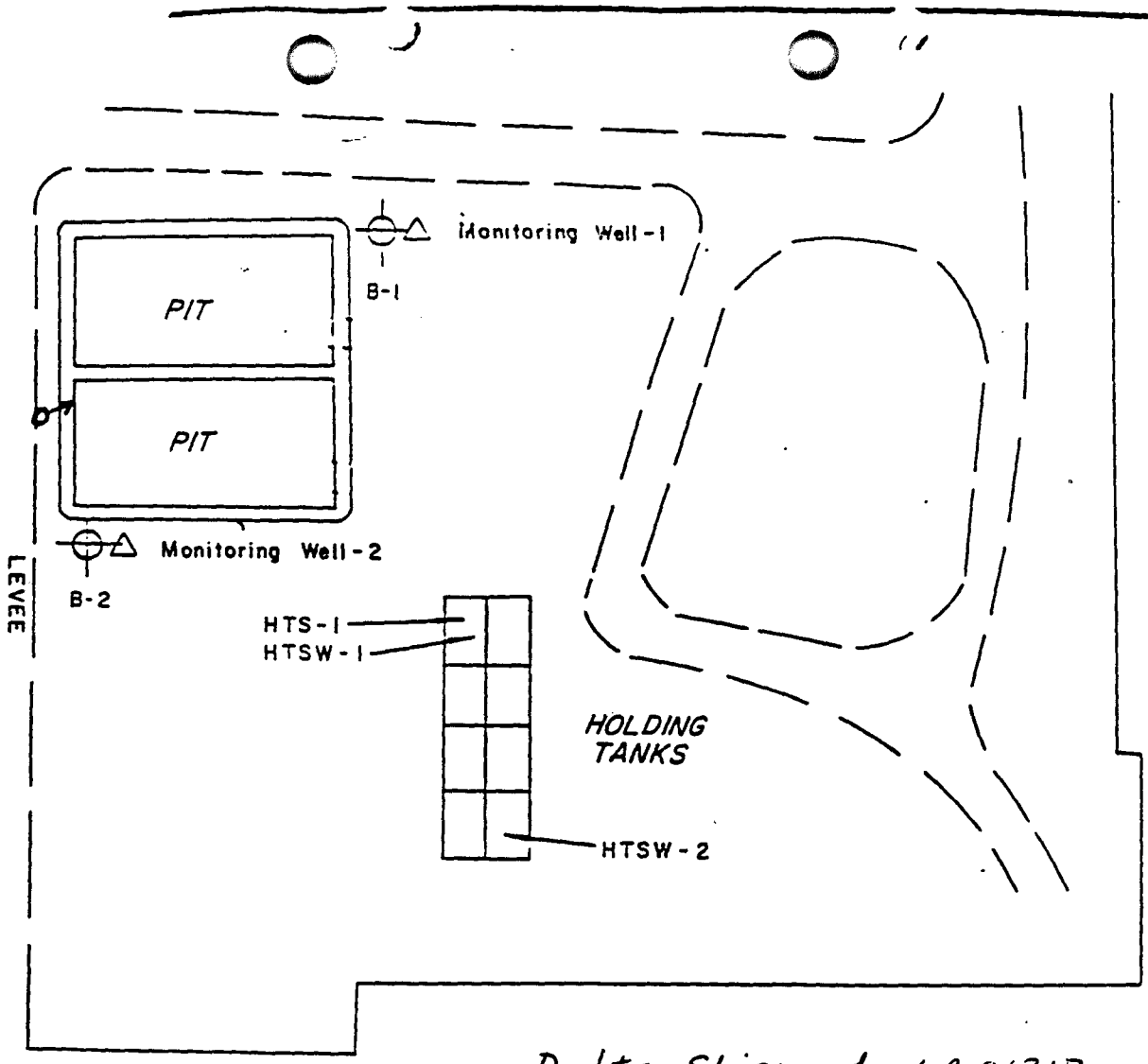


TAKEN FROM U.S.G.S. HOUMA, LA. QUADRANGLE MAP, 1963.

SCALE IN FEET

1000 0 1000 2000 3000 4000 5000 6000 7000

VICINITY MAP
EXHIBIT "B"



Delta Shipyard LA 01317

Site Map

MONITORING WELLS
B-1 (3" by 13')
B-2 (3" by 20')

Photograph Location and direction

Delta Shipyard
LA 013[illegible]

Photographer / Witness

Thomas [illegible]

Date / Time / Direction

9/2/[illegible] 3:00pm [illegible]

Comments: [illegible]

separator [illegible]

Photographer / Witness

Date / Time / Direction

Comments:

Photographer / Witness

Date / Time / Direction

Comments:

REFERENCE 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 16 APR 1981

SUBJECT: Potential Hazardous Waste Site

FROM: Charles A. Gazda, Chief cab
Compliance Section (6ASASC)

TO: Bruce Elliot, Chief
General Enforcement Branch (6AEG)

Site Name Delta Shipyards
Location Houma La
Hazit No. LA 1317
TDD No. F-6-8101-27

A. Field Report:

1. T2070-2 attached (X) forwarded on _____
T2070-3 recon sampling attached (X) forwarded on _____

2. §311 potential yes ( ) no (X)

Priority _____

analytical results attached yes ( ) no (X)

Proposed §311 action (Emergency Response Branch) _____

3. ISS inspection conducted yes ( ) no (X)

ISS Compliance Report attached yes ( ) no (X)

ISS Non-notifier Report attached yes ( ) no (X)

4. Suggested further action request company to provide copies of any analytical data from monitoring well samples

B. Analytical Results: no samples collected

1. Contract lab results attached ( ) est. completion date _____
Houston Lab results attached ( ) est. completion date _____

2. Drinking water wells samples yes ( ) no ( )

3. Suggested further action _____

SUPERFUND FILE

APR 30 1992

~~cc: Adele Mitchell (6AWS)~~

REORGANIZED

LAD 058 475 419

EPA Form 1320-6 (Rev. 3-76)

8101-27

EPA

POTENTIAL HAZARDOUS WASTE SITE —SITE INSPECTION REPORT

REGION	SITE NUMBER (to be assigned by Hq)
6	LA01317

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition *(Section II)*. File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Tack Force *(EN-335)*; 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
DELTA SHIPYARD (Formerly a division of Delta Ironworks)	Industrial Blvd.		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Houma	LA	70360	Terrebonne Parish

G. SITE OPERATOR INFORMATION

1. NAME	2. TELEPHONE NUMBER
Ralph Arceneaux, Vice President	(504)868-7450

3. STREET	4. CITY	5. STATE	6. ZIP CODE
Industrial Blvd.	Houma	LA	70360

H. REALTY OWNER INFORMATION *(if different from operator of site)*

1. NAME	2. TELEPHONE NUMBER
Leon Toups, President, Delta Services Industries	(504)868-7450

3. CITY	4. STATE	5. ZIP CODE
Houma (P. O. Box 101)	LA	70361

I. SITE DESCRIPTION

See Attachment "A"

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE

II. TENTATIVE DISPOSITION *(complete this section last)*

A. ESTIMATE DATE OF TENTATIVE DISPOSITION *(mo., day, & yr.)*

B. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☒ 3. LOW ☐ 4. NONE

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Deborah Vaughn	(214)742-4521	3/11/81

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME	2. TITLE
Deborah A. Vaughn *Deborah A. Vaughn*	FIT, Geologist

3. ORGANIZATION	4. TELEPHONE NO. (area code & no.)
Ecology & Environment, Inc., 1509 N. Main, Suite 814, Dallas, TX 75201	(214)742-4521

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
Gordon Duncan	Ecology & Environment	(214)742-4521
		LAD 058 475419

C. SITE REPRESENTATIVES INTERVIEWED *(corporate officials, workers, residents)*

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
Leon Toups	President (504)868-7450	Industrial Blvd., Houma, LA 70360
Louis E. Talbot	Exec. Vice President, Delta Svcs. (504)868-7450	" " "
Ralph Arceneaux	Vice President (504)868-7450	" " "
Chris Olivier	Engineer, Delta Shipyard (504)868-7450	" " "

SUPERFUND FILE

APR 30 1992

REORGANIZED

REVIEWED BY (6ASASC): K Solari (4-16-81)

REVIEWED BY (6AEGH) DATE 4/20/81

Continued From Page 2

IV. SAMPLING INFORMATION *(continued)*

C. PHOTOS

1. TYPE OF PHOTOS

[X] a. GROUND [ ] b. AERIAL

2. PHOTOS IN CUSTODY OF: EPA Region VI (see attached photos)

D. SITE MAPPED?

[X] YES. SPECIFY LOCATION OF MAPS: EPA Region VI (see attached map and sketches)

E. COORDINATES

1. LATITUDE *(deg.-min.-sec.)* 29°34'02" N

2. LONGITUDE *(deg.-min.-sec.)* 90°42'18" W

V. SITE INFORMATION

A. SITE STATUS

[X] 1. ACTIVE *(Those inductrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)*

[ ] 2. INACTIVE *(Those sites which no longer receive wastes.)*

[ ] 3. OTHER *(specify)*: _____ *(Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)*

B. IS GENERATOR ON SITE?

[ ] 1. NO [X] 2. YES *(specify generator's four-digit SIC Code)*: 3731, 3732

C. AREA OF SITE *(in acres)*: Approx. 40

D. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES *(specify)*:

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity*(ies)* and details relating to each activity by marking 'X' in the appropriate boxes.

'X'	A. TRANSPORTER	'X'	B. STORER	'X'	C. TREATER	'X'	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP	X	2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
X	4. TRUCK	X	4. TANK, ABOVE GROUND	X	4. RECYCLING/RECOVERY		4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER *(specify)*:		6. OTHER *(specify)*:		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER *(specify)*:
					9. OTHER *(specify)*:		

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for..

[X] 1. STORAGE [ ] 2. INCINERATION [ ] 3. LANDFILL [X] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL

[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[X] 1. LIQUID [ ] 2. SOLID [ ] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[ ] 1. CORROSIVE [X] 2. IGNITABLE [ ] 3. RADIOACTIVE [X] 4. HIGHLY VOLATILE

[ ] 5. TOXIC [ ] 6. REACTIVE [ ] 7. INERT [ ] 8. FLAMMABLE

[ ] 9. OTHER *(specify)*:

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Yes.. Manifests and records are kept at the shipyard office.

Continued From Page 4

VIII. HAZARD DESCRIPTION *(continued)*

☐ B. NON-WORKER INJURY/EXPOSURE

☐ C. WORKER INJURY/EXPOSURE

☐ D. CONTAMINATION OF WATER SUPPLY

☐ E. CONTAMINATION OF FOOD CHAIN

☒ F. CONTAMINATION OF GROUND WATER

Contamination of ground water could occur due to infiltration of oil contaminated waters generated in the oil/water separation process. This contamination should be minimal because soil permeabilities at the site are very low (10^{-7} to 10^{-8} cm/sec). See Attachment "C". Sampling of monitoring wells would determine whether contamination has occurred.

☐ G. CONTAMINATION OF SURFACE WATER

Continue On Reverse

Continued From Page 6

VIII. HAZARD DESCRIPTION *(continued)*

☐ N. FIRE OR EXPLOSION

☐ O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

☐ P. SEWER, STORM DRAIN PROBLEMS

☐ Q. EROSION PROBLEMS

☐ R. INADEQUATE SECURITY

☐ S. INCOMPATIBLE WASTES

Continue On Reverse

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')
None				

I. RECEIVING WATER

1. NAME: Houma Navigation Canal

☐ 2. SEWERS ☒ 3. STREAMS/RIVERS ☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify):

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

Fish, wildlife and other aquatic and semi-aquatic life, secondary contact recreations. Part of the Terrebonne Watershed.

XI. SOIL AND VEGITATION DATA

LOCATION OF SITE IS IN:

☐ A. KNOWN FAULT ZONE ☐ B. KARST ZONE ☒ C. 100 YEAR FLOOD PLAIN ☒ D. WETLAND

☒ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
X					
	1. SAND	X	Quaternary Terrace & Alluvial Deposits		
X	2. CLAY	X	"		
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ C. HIGH (1000 to 10 cm/sec.)

☐ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☒ F. VERY LOW (.001 to .00001 cm/sec.)

G. RECHARGE AREA

☒ 1. YES ☐ 2. NO 3. COMMENTS: Only in that it is a coastal wetland

H. DISCHARGE AREA

☒ 1. YES ☐ 2. NO 3. COMMENTS: Only in that it is a coastal wetland.

I. SLOPE

1. ESTIMATE % OF SLOPE: 0 - .5%

2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC.: South

J. OTHER GEOLOGICAL DATA

See Attachment "C"

 Continue On Reverse

STORAGE FACILITIES SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. STORAGE AREA HAS CONTINUOUS IMPERVIOUS BASE
[X] YES [ ] NO

2. STORAGE AREA HAS A CONFINEMENT STRUCTURE
[X] YES [ ] NO

3. EVIDENCE OF LEAKAGE/OVERFLOW *(If "Yes", document where and how much runoff is overflowing or leaking from containment)*
[ ] YES [X] NO

4. ESTIMATE TYPE AND NUMBER OF BARRELS/CONTAINERS
5 above ground storage tanks for recycled oil. See photos 1 & 5.

5. GLASS OR PLASTIC STORAGE CONTAINERS USED
[ ] YES [X] NO

6. ESTIMATE NUMBER AND CAPACITY OF STORAGE TANKS
Approx. 100,000 gallons.

7. NOTE LABELING ON CONTAINERS
Storage tanks are labeled with safety notices.

8. EVIDENCE OF LEAKAGE CORROSION OR BULGING OF BARRELS/CONTAINERS/STORAGE TANKS *(If "Yes", document evidence. Describe location and extent of damage. Take PHOTOGRAPHS)*
[ ] YES [X] NO

9. DIRECT VENTING OF STORAGE TANKS
[X] YES [ ] NO

10. CONTAINERS HOLDING INCOMPATIBLE SUBSTANCES *(If "Yes", document evidence. Describe location and identity of hazardous waste. Take PHOTOGRAPHS.)*
[ ] YES [X] NO

11. INCOMPATIBLE SUBSTANCES STORED IN CLOSE PROXIMITY *(If "Yes", document evidence. Describe location and identity of hazardous waste. Take PHOTOGRAPHS.)*
[ ] YES [X] NO

12. ADEQUATE CONTAINER WASHING AND REUSE PRACTICES
[X] YES [ ] NO

13. ADEQUATE PRACTICES FOR DISPOSAL OF EMPTY STORAGE CONTAINERS
[X] YES [ ] NO Non-disposable storage containers.

SURFACE IMPOUNDMENTS SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain as Necessary.

1. TYPE OF IMPOUNDMENT

Two identical impoundments in filled marsh area. See photo #5.

2. STABILITY/CONDITION OF EMBANKMENTS

Good. See photo #4.

3. EVIDENCE OF SITE INSTABILITY *(Erosion, Settling, Sink Holes, etc.)*

☐ YES ☒ NO

4. EVIDENCE OF DISPOSAL OF IGNITABLE OR REACTIVE WASTE

☐ YES ☒ NO

5. ONLY COMPATIBLE WASTES ARE STORED OR DISPOSED OF IN THE IMPOUNDMENT

☒ YES ☐ NO

6. RECORDS CHECKED FOR CONTENTS AND LOCATION OF EACH SURFACE IMPOUNDMENT

☐ YES ☒ NO

7. IMPOUNDMENT HAS LINER SYSTEM

☐ YES ☒ NO

7a. INTEGRITY OF LINER SYSTEM CHECKED

☐ YES ☐ NO N/A

7b. FINDINGS

Subsurface soils have permeability of 10^{-7} to 10^{-8} cm/sec. See Attachment "C".

8. SOIL STRUCTURE AND SUBSTRUCTURE

Medium gray organic clay at surface to soft gray silty clay with sand traces at 40 to 50 feet.

9. MONITORING WELLS

☒ YES ☐ NO Two (2) wells installed. (See Attachment "C" - monitoring well logs.)

10. LENGTH, WIDTH, AND DEPTH

LENGTH 75' (each) WIDTH 40' (each) DEPTH 5' (each) Two impoundments.

11. CALCULATED VOLUMETRIC CAPACITY

15,000 $ft.^3$

12. PERCENT OF CAPACITY REMAINING

30%

13. ESTIMATE FREEBOARD

1.5 ft.

14. SOLIDS DEPOSITION

☒ YES ☐ NO Low solids deposited.

15. DREDGING DISPOSAL METHOD

Unknown

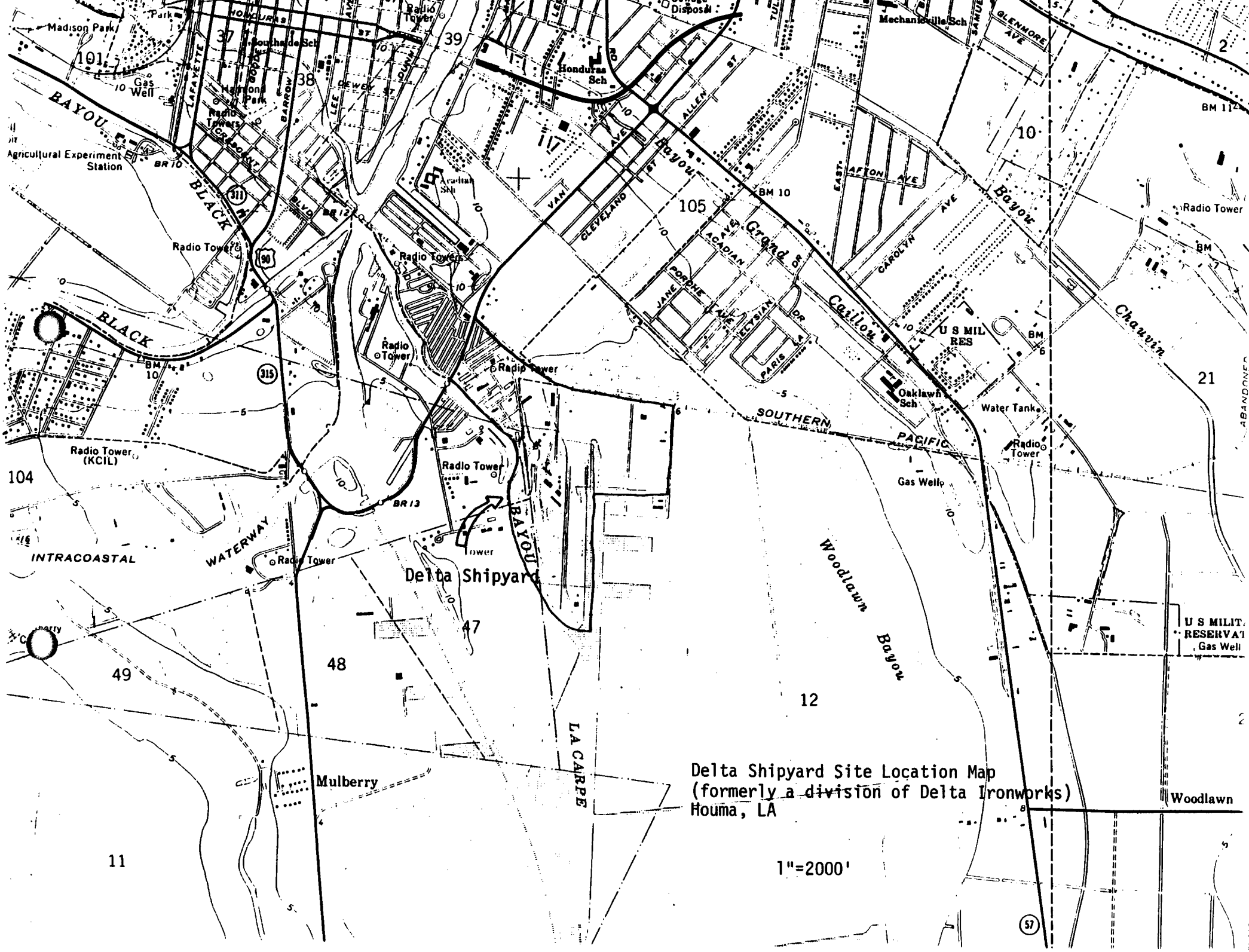
16. OTHER EQUIPMENT

ATTACHMENT A

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT SUPPLEMENT SHEET

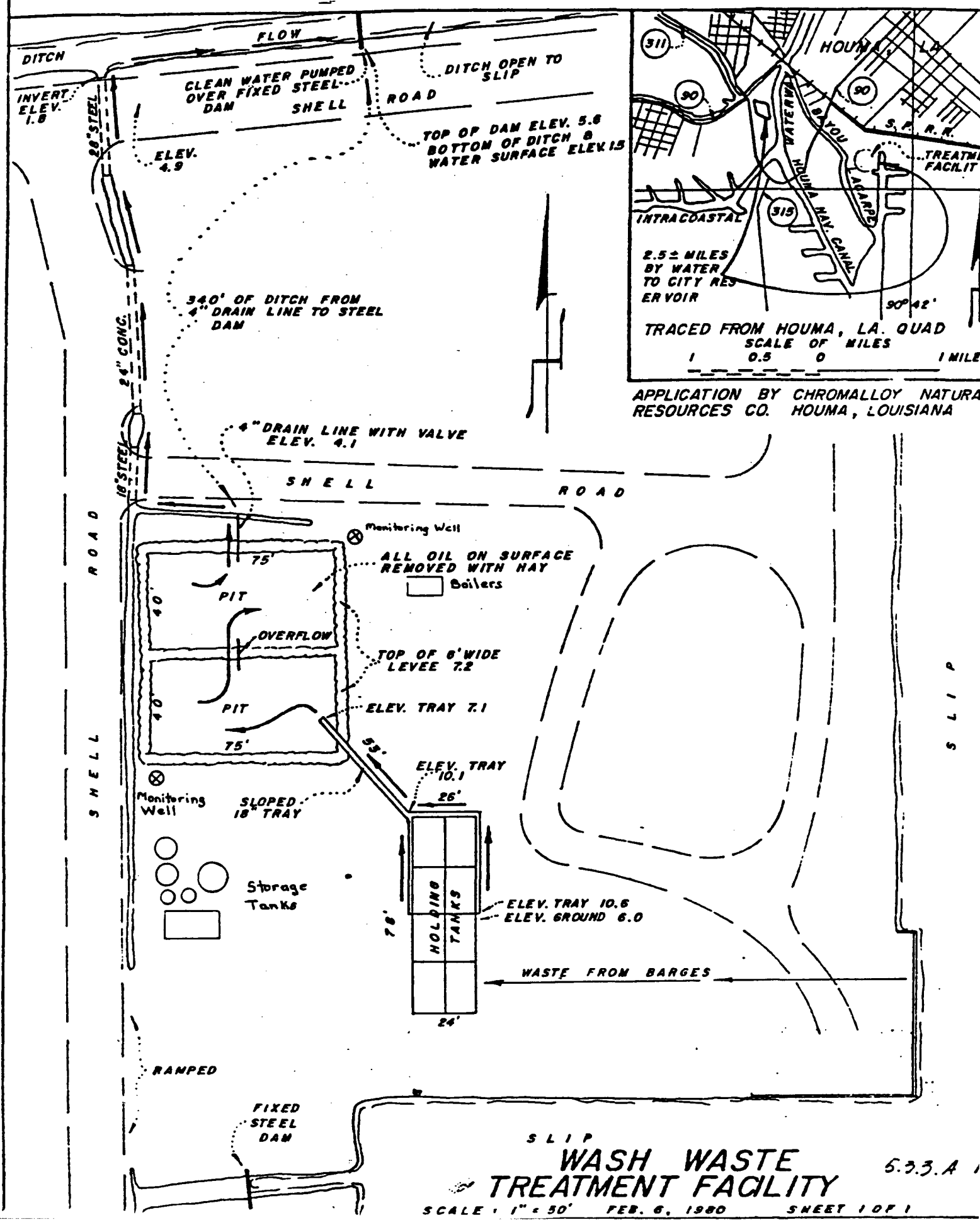
Instruction - This sheet is provided to give additional information in explanation of a question on the form T2070-3.

Corresponding number on form	Additional Remark and/or Explanation
I, i.	Delta Ironwords was a large industrial park (approximate 165 acre located on Industrial Blvd. in southeast Houma, LA. . The corpo ration of Delta Ironworks owned and operated 7 divisions, all located within the Delta Ironworks industrial facilities. These 7 divisions were: (1) Delta Shipyard - repair and painting of ships. (2) Delta Fabrication - produces offshore oil support equipment (platforms). (3) Delta Construction - produces pipes. (4) Delta Safety & Supply - distributes safety equipment and constructs fire safety equipment. (5) Heldenbrand - inspection, repair and modification of drill pipes. (6) Delta mud & chemical - distributor of drilling muds. (7) Gemoco - construction of offshore oil drill support equipmen In 1969, Delta Ironworks was sold to Chromalloy American Corp., St. Louis, MO. Chromalloy maintained all 7 divisions until 1980. In November 1980 Chromalloy sold 5 of the divisions to Delta Services Industries, keeping Delta Mud & Chemical and Gemoco. At the present time the old Delta Ironworks (LA 01317) area house the same 7 divisions listed above, but has two owners: (1) Delta Services Industries, Houma, LA and (2) Chromalloy American Corp., Upon inspecting the facilities, the FIT representatives found tha only Delta Shipyard, owned by Delta Services Industries, may deal with hazardous wastes that could potentially pose a contamination problem. Delta Shipyard consists of cleaning and repair facilities for sma cargo and fishing vessels. Before any repair work may commence t vessels must be certified vapor free by the Coast Guard. The vessels are steam cleaned and the oily wastes are removed. The generated oils and waste waters are sent through a separation process after which the waste oil is recovered and sold. The wastes are stored in evaporation ponds (surface impoundments).
III, E.	Clayton L. Holden, P.O. Box 151, Chalmette, LA. (no longer used because he refuses to handle a manifest), Oily Wastes J & L Oils, P. O. Box 209, Geismar, LA 70734, (504)673-6785, Oily Wastes M. K. Fuels, Inc., P. O. Box 2802, Baton Rouge, LA 70821, (504)343-4662, Oily Wastes



Delta Shipyard Site Location Map
(formerly a division of Delta Ironworks)
Houma, LA

1"=2000'


DITCH
FLOW
INVERT ELEV. 1.8
28" STEEL
CLEAN WATER PUMPED OVER FIXED STEEL DAM
SHELL ROAD
DITCH OPEN TO SLIP
TOP OF DAM ELEV. 5.6
BOTTOM OF DITCH 8
WATER SURFACE ELEV. 1.5
ELEV. 4.9
340' OF DITCH FROM 4" DRAIN LINE TO STEEL DAM
24" CONC.
18" STEEL
4" DRAIN LINE WITH VALVE ELEV. 4.1
SHELL ROAD
Monitoring Well
ALL OIL ON SURFACE REMOVED WITH HAY
Boilers
75'
PIT
40'
OVERFLOW
TOP OF 6' WIDE LEVEE 7.2
PIT
40'
ELEV. TRAY 7.1
75'
53'
ELEV. TRAY 10.1
26'
Monitoring Well
SLOPED 18" TRAY
Storage Tanks
78'
HOLDING TANKS
ELEV. TRAY 10.6
ELEV. GROUND 6.0
WASTE FROM BARGES
24'
RAMPED
FIXED STEEL DAM
SLIP
SHELL ROAD
SLIP
311
90
HOUMA, LA
WATERWAY
BAYOU LAGARPE
HOUMA NAV. CANAL
S.P. R.R.
TREATMENT FACILITY
INTRACOASTAL
315
2.5± MILES BY WATER TO CITY RESERVOIR
90° 42'
TRACED FROM HOUMA, LA. QUAD
SCALE OF MILES
1 0.5 0 1 MILE
APPLICATION BY CHROMALLOY NATURAL RESOURCES CO. HOUMA, LOUISIANA
WASH WASTE TREATMENT FACILITY
5.3.3.A
SCALE: 1" = 50' FEB. 6, 1980 SHEET 1 OF 1

SOIL TESTING ENGINEERS, INC.

CONSULTING GEOTECHNICAL ENGINEERS

P. O. BOX 80379 • 316 HIGHLANDIA DRIVE • BATON ROUGE, LOUISIANA 70808 • PHONE (504) 292-4790

ON P. BOUTWELL, JR. PHD
RD B. ADAMS, ME
T L. BRYANT, ME
ETH DERICK, MS
ERED PROFESSIONAL ENGINEERS

BROWN, MS

November 26, 1980

T. Baker Smith and Sons, Inc.
Environmental Research Division
P. O. Box 2266
Houma, Louisiana 70361

Attention: Mr. Horace J. Thibodaux, RS
Director of Environmental Research

Re: Preliminary Soil Borings
and Laboratory Testing
Delta Shipyard Disposal Pit
Houma, Louisiana
File: 80-173

Gentlemen:

We have completed the field work and laboratory tests performed on samples obtained from two borings completed during the period November 3 and 4, 1980, at the Delta Shipyard disposal pit. Additionally, two observation wells with caps, were installed close to the borings (see Figure 2). The findings of the borings and the results of the laboratory testing are presented herein. The approximate locations of the borings are shown on the Boring Plan, Figure 1. The soil data on this cross section has been interpolated between the borehole locations and does not define continuity of the strata. For details, refer to the individual logs of the borings. The field and laboratory procedures used in this investigation are discussed below.

It should be noted that a geotechnical/geologic report was not requested at this stage. If such a report is later required, then necessary additional borings and testing, as well as engineering analyses can be performed.

FIELD EXPLORATION

General. The borings were made with tractor-mounted, rotary-type drilling equipment. Samples were obtained continuously in the upper 20 feet; below the 20 foot level, samples were generally obtained on 3 to 5 foot centers. The total exploration program consisted of 100 lineal feet of borings, 40 feet of which were sampled continuously. Logs of the borings are attached. The boreholes were grouted with a thick bentonite/cement grout. Two observation wells were installed as indicated on the Monitoring Well logs (W-1 and W-2) and Figure 1.

ATTACHMENT C

Sampling Procedures. In the cohesive and semi-cohesive soils, relatively undisturbed samples were secured using a 3 inch diameter, thin-wall Shelby Tube sampler. In this sampling procedure, the borehole is advanced to the desired level, and the tube is lowered to the bottom of the boring. It is then forced about 2 feet into the undisturbed soil in one continuous stroke. The tube is retrieved and the sample extruded by a hydraulic piston. The sample is then visually classified and a penetrometer relative strength test performed. Any disturbed portions are discarded, and the sample protected for transportation to the laboratory.

LABORATORY PROCEDURES

Some samples from the various strata were tested in the laboratory to determine their classifications and permeability characteristics. The samples and types of tests performed were selected by a geotechnical engineer. The testing program conducted is described below.

Classification Tests. Thirteen (13) Atterberg Limit Determinations, and one Separate Moisture Content Determination were conducted to classify the soil types.

Consolidation/Permeability Tests. Two (2) Standard Consolidation tests were performed. These were used in determining the Coefficient of Permeability of fine grained soils. The results are given below.

Boring No.	Depth (feet)	Perm. Coef. (cm/sec.)	Soil Description
B-1	6-8	4.3×10^{-8}	Gray organic clay
B-2	12-14	1.2×10^{-7}	Dark gray organic clay (peat)

Chemical Tests. Fourteen (14) pH determinations were performed to determine soil acidity/alkalinity. The results are give on Table I.

The results of the consolidation test are presented on Figure A-I through A-II; the remainder of the testing program is summarized in the appropriate columns of the boring logs.

We will be happy to answer any questions which may arise concerning this information. It has been a pleasure to work with Mr. Thibodaux on this project, and we look forward to serving T. Baker Smith and Sons again in the future.

Sincerely,

Narendra Dave

Narendra M. Dave
Project Engineer

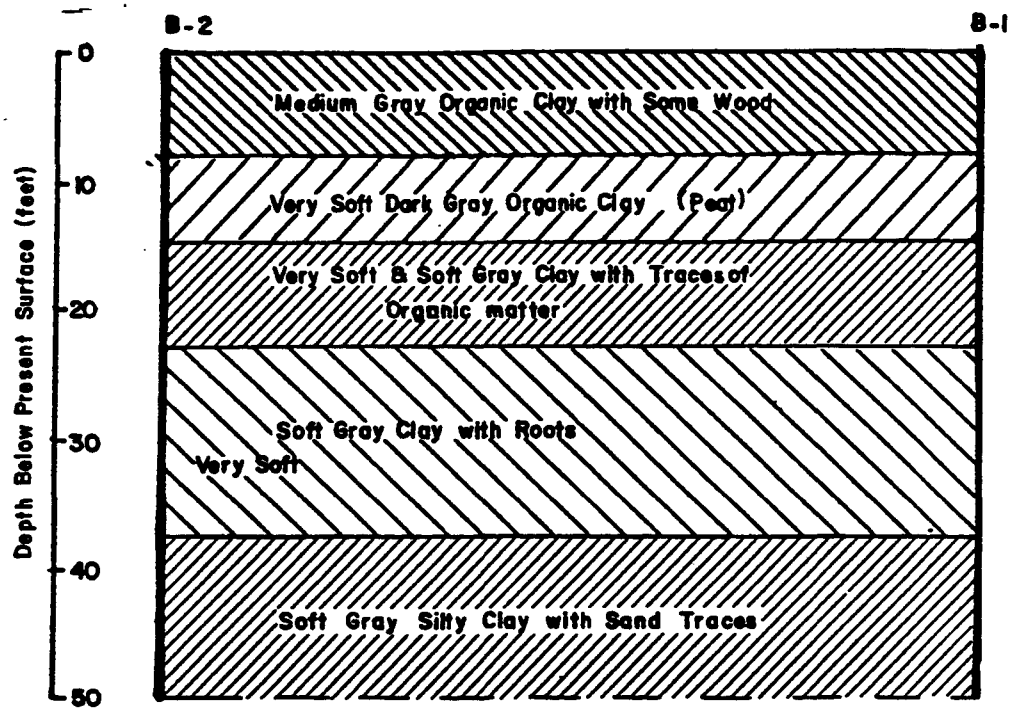
Richard B. Adams

Richard B. Adams, P.E.

/llt

Enclosures

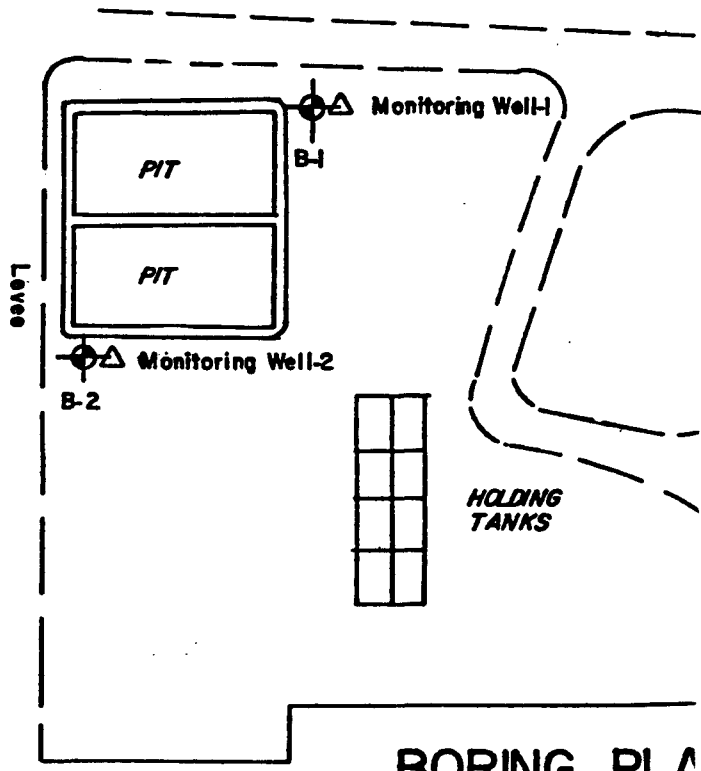
Copies submitted: (4)



SOIL PROFILE

No Horiz. Scale

NOTE:
Strata interpolated betw
not define continuity be



BORING PLA

No Scale

SOIL BORING LOG

Project Delta Disposal Pit
Houma, Louisiana

Client T. Baker Smith & Sons, Inc.
Houma, Louisiana

Boring No. B-1

Sheet 1 **of** 2

File No. 80-173

Date 11/03/80

Tech. Chenevert

FIELD DATA				LABORATORY DATA					Boring Advance Method:
Ground Water Levels	Depth (feet)	Sampling	Standard Penetration Test (blows/foot) or Penetrometer (P) (tons/sq.ft)	Compressive Strength (tons/sq.ft.)	Moisture Content (%)	Dry Density (lbs./cu.ft.)	Liquid Limit (%)	Plasticity Index (%)	Wash 0' to 50'
			1.2 (P)						Medium gray organic clay, w/wood
			0.8 (P)		52		102	74	
	5		0.7 (P)						
			0.5 (P)		78		140	93	
	10		N.P.						Very soft dark gray organic clay (peat)
			0.1 (P)		140		218	135	
			0.1 (P)						
	15		0.5 (P)						Very soft gray clay, w/traces of organic matter
			0.2 (P)		37		66	37	
	20		0.7 (P)						
	25		0.6 (P)						Soft gray clay, w/roots
	30		0.1 (P)		50		77	42	--very soft
	35		0.0 (P)						
	40		1.1 (P)		31				Medium gray silty clay, w/sand traces

SYMBOL

Standard Penetration Test
140 lb. hammer-30" fall

Undisturbed Sample
3 in. dia. Shelby Tube

No Recovery

Compressive Strength from Unconfined Compression Test
Unless Noted Otherwise

Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

Project Delta Disposal P
Houma, Louisiana

Client T. Baker Smith & Sons, Inc.
Houma, Louisiana

Boring No. B-1

Sheet 2 of 2

File No. 80-173

Date 11/03/80

Tech. Chenevert

Depth (feet)	Sampling	Standard Penetration Test (blows/foot) or Penetrometer (P) (tons/sq. ft)	Compressive Strength (tons/sq. ft.)	Moisture Content (%)	Dry Density (lbs./cu. ft.)	Liquid Limit (%)	Plasticity Index (%)	
								Soft gray silty clay, w/sand traces
45		0.6 (P)						
50		0.5 (P)		38		38	14	
								Boring terminated @ 50'

SYMBOL

Standard Penetration Test
140 lb. hammer - 30" fall

Undisturbed Sample
3 in. dia. Shelby Tube

No Recovery

Compressive Strength from Unconfined Compression Test
Unless Noted Otherwise
Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

Project Delta Disposal Pi
Houma, Louisiana

Client T. Baker Smith & Sons, Inc.
Houma, Louisiana

Boring No. B-2
Sheet 1 of 2

File No. 80-173
Date 11/04/80
Tech. A. Kahn

Boring Advance Method:
Auger 0' to 2'
Wash 2' to 50'

Water Levels	Depth (feet)	Sampling	Standard Penetration Test (blows/foot) or Penetrometer(P) (tons/sq.ft)	Compressive Strength (tons/sq.ft.)	Moisture Content (%)	Dry Density (lbs./cu.ft.)	Liquid Limit (%)	Plasticity Index (%)	Description
▽			1.2 (P)		41		107	68	Medium gray organic clay, w/some wood
▽			0.7 (P)		54		101	54	
	5		0.6 (P)						
			N.P.						
			0.3 (P)		131		154	107	Very soft dark gray organic clay (peat)
	10		0.3 (P)						
			0.4 (P)		110		284	162	
	15		0.5 (P)						Soft gray clay, w/traces of organic matter
			0.2 (P)						
	20		1.2 (P)		39		88	60	
	25		0.5 (P)						Soft gray clay, w/wood & roots
	30		0.4 (P)						
	35		0.1 (P)		35		63	38	--very soft
	40		0.3 (P)						Soft gray silty clay, w/sand traces

Symbol

Standard Penetration Test
140 lb. hammer-30" fall

Undisturbed Sample
3 in. dia. Shelby Tube

No Recovery

Compressive Strength from Unconfined Compression Test
Unless Noted Otherwise

Strata Boundaries May Not Be Exact

▽ Free Water First Encountered

▽ Water Level After 10 minutes
(Prior to Wash Boring)

SOIL TESTING ENGINEERS, INC.

SOIL BORING LOG

Project Delta Disposal P
Houma, Louisiana

Client T. Baker Smith & Sons, Inc.
Houma, Louisiana

Boring No. B-2

Sheet 2 **of** 2

File No. 80-173

Date 11/04/80

Tech. Chenevert

FIELD DATA				LABORATORY DATA					
Graphic Soil Log	Depth (feet)	Sampling	Standard Penetration Test (blows/foot) or Penetrometer (P) (tons/sq.ft)	Compressive Strength (tons/sq.ft.)	Moisture Content (%)	Dry Density (lbs./cu.ft.)	Liquid Limit (%)	Plasticity Index (%)	
									Soft gray silty clay, w/sand traces
	45		0.3 (P)		32		35	9	
	50		0.7 (P)						
									Boring terminated @ 50'

SYMBOL

- Standard Penetration Test
  - 140 lb. hammer-30" fall
- Undisturbed Sample
  - 3 in. dia. Shelby Tube
- No Recovery

Compressive Strength from Unconfined Compression Test
Unless Noted Otherwise
Strata Boundaries May Not Be Exact

SOIL TESTING ENGINEERS, INC.

MONITORING WELL LOG

Boring No. W-1

Project: Delta Disposal Pit
Houma, Louisiana

Client: T. Baker Smith & Sons, Inc.
Houma, Louisiana

File No. 80-173
Date 11/03/80
By Chenevert

FIELD DATA

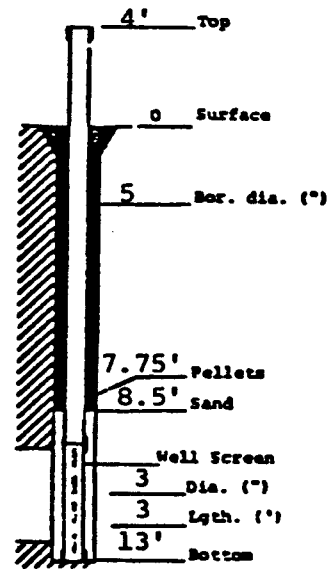
Boring Advance Method: Wash 0' to 12'

Drill Rig: 200
Driller: James Kelly

DEPTH (feet)	Standard Penetration Test (blows/foot) or Penetrometer (P) - Torvane (T) (tons/sq. ft.)	
5		SEE BORING B-1
10		
		Boring terminated @ 12'

Monitoring Well Data

Well No. 1



Standard Penetration Test (140 lb hammer - 30 in fall)

Undisturbed Sample 3 in dia Shelby Tube

No Recovery

Strata boundaries inferred and may not be exact

SOIL TESTING ENGINEERS, INC

MONITORING WELL LOG

Boring No. W-2

Project: Delta Disposal Pit
Houma, Louisiana

Client: T. Baker Smith & Sons, Inc.
Houma, Louisiana

File No. 80-173
Date 11/04/80
By Chenevert

FIELD DATA

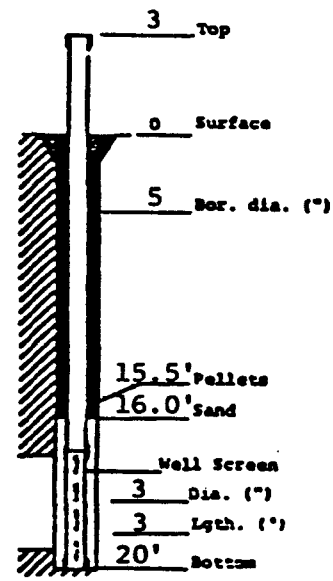
Boring Advance Method: Wash 0' to 20'

Drill Rig: 200
Driller: James Kelly

WATER LEVELS	DEPTH (feet)	SAMPLE NO.	Standard Penetration Test (blows/foot) or Penetrometer (P) - Torvane (T) (tons/sq ft)	
	5			SEE BORING B-2
	10			
	15			
	20			Boring terminated @ 20'

Monitoring Well Data

Well No. 2



Standard Penetration Test
140 lb hammer - 30 in fall

Undisturbed Sample
3 in dia Shelby Tube

No Recovery

Strata boundaries inferred and may not be exact

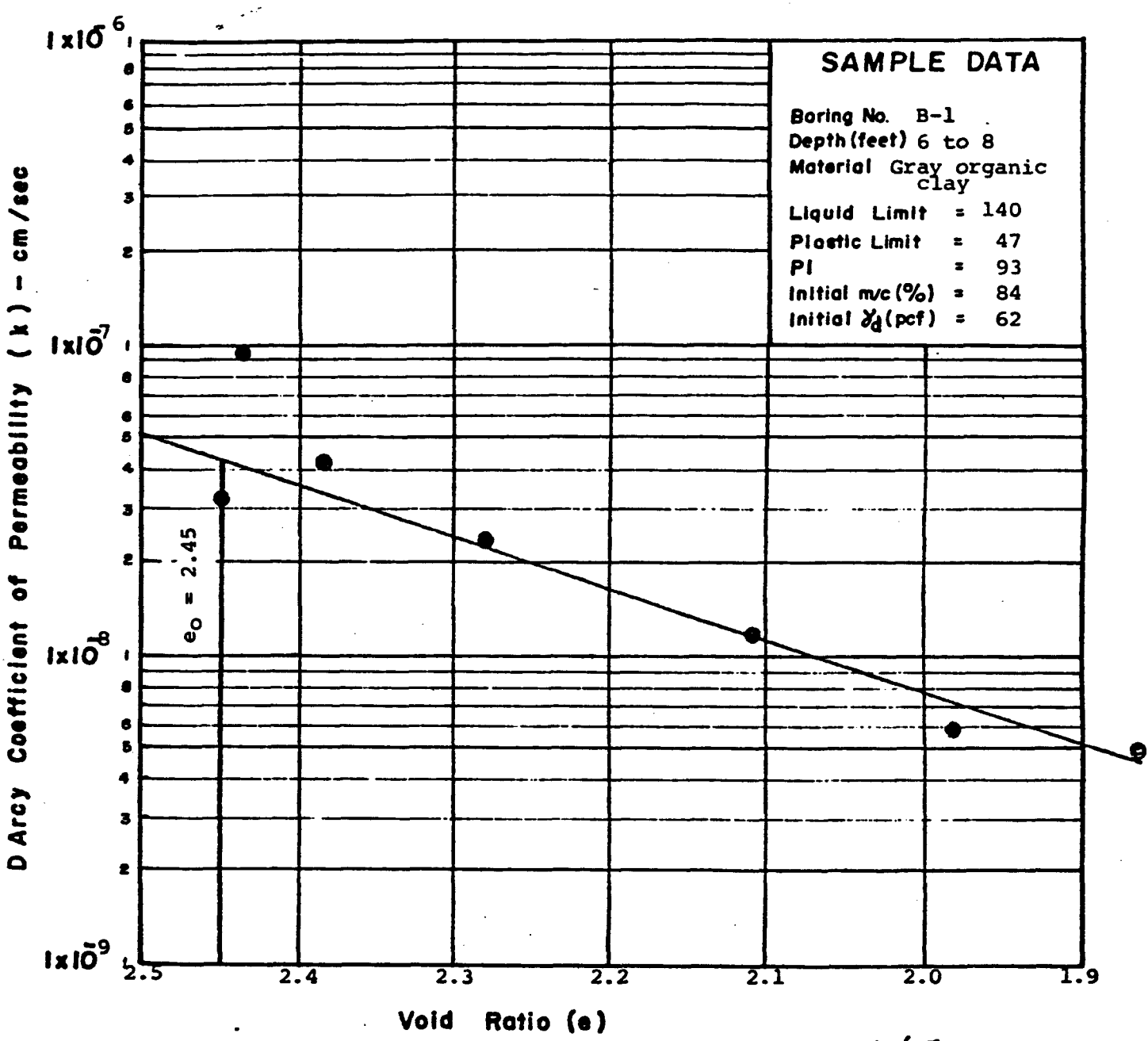
SOIL TESTING ENGINEERS, INC

TABLE I

CHEMICAL ANALYSIS

Boring No.	Depth (feet)	pH
1	2.0 to 4	7.3
1	6.0 to 8	7.9
1	10.0 to 12	5.9
1	16.0 to 18	7.3
1	28.0 to 30	8.2
1	38.0 to 40	8.1
2	0 to 2	6.8
2	4.0 to 6	7.7
2	8.0 to 10	7.5
2	12.0 to 14	6.3
2	18.0 to 20	8.0
2	33.0 to 35	8.0
2	43.0 to 45	8.0

SOIL TESTING ENGINEERS, INC.



$$k = C_v \gamma_w \frac{\Delta e / \Delta \sigma}{1 + e_o}$$

C_v = Coeff. of Consolidation
Δe = Change in Void Ratio
$\Delta \sigma$ = Change in Pressure
γ_w = Unit Weight of Water

● Raw Data Point

—— Best Fit Linear Regression in Stable Range

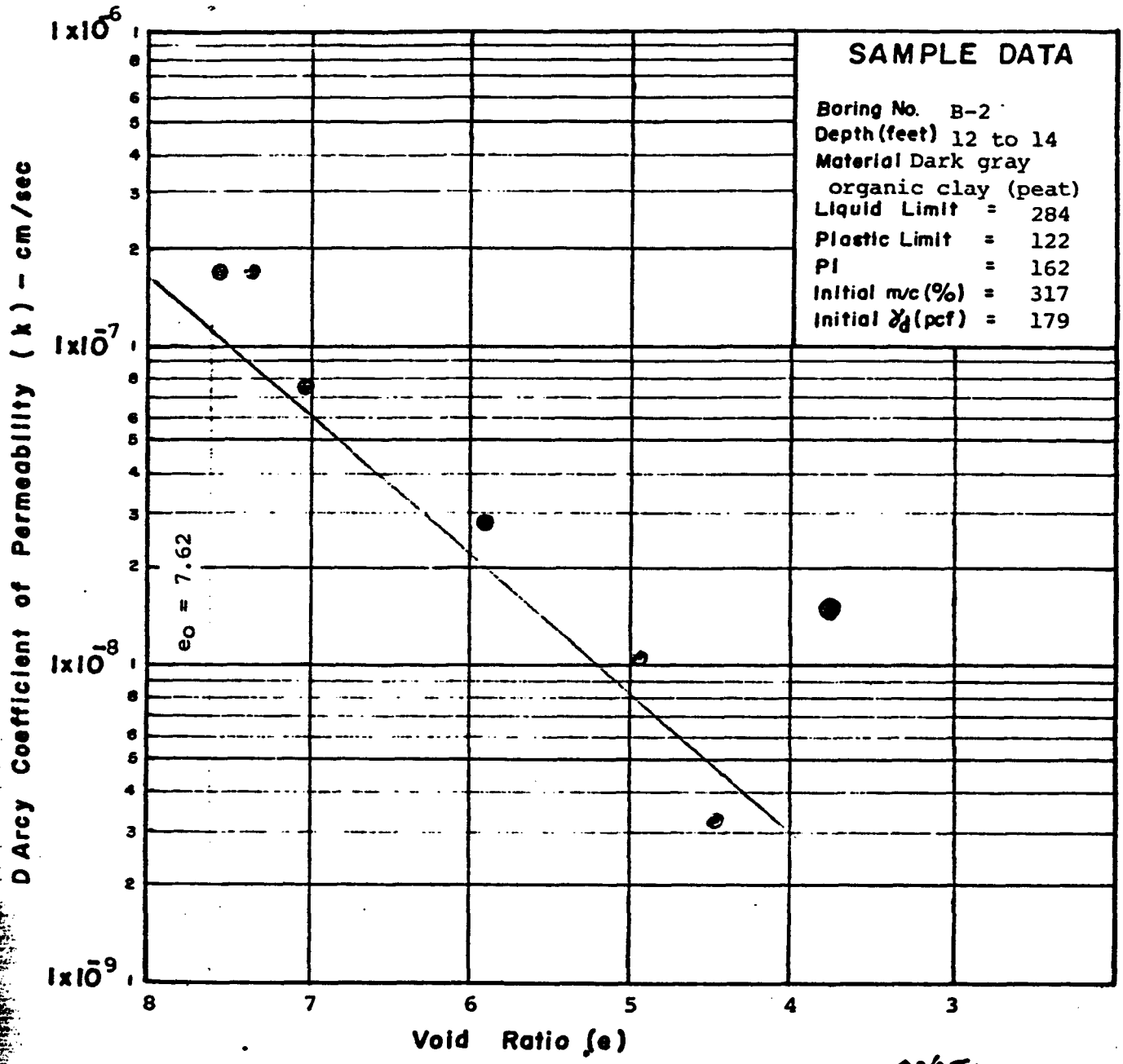
$k = 4.3 \times 10^{-8}$ cm/sec at e_o = 2.45

PERMEABILITY DETERMINED BY CONSOLIDATION TEST

Delta Shipyard Disposal Pit
Houma, Louisiana

80-173
Figure A-IB

SOIL TESTING ENGINEERS, INC.



$$k = C_v \gamma_w \frac{\Delta e / \Delta \sigma}{1 + e_o}$$

● Raw Data Point

—— Best Fit Linear Regression in Stable Range

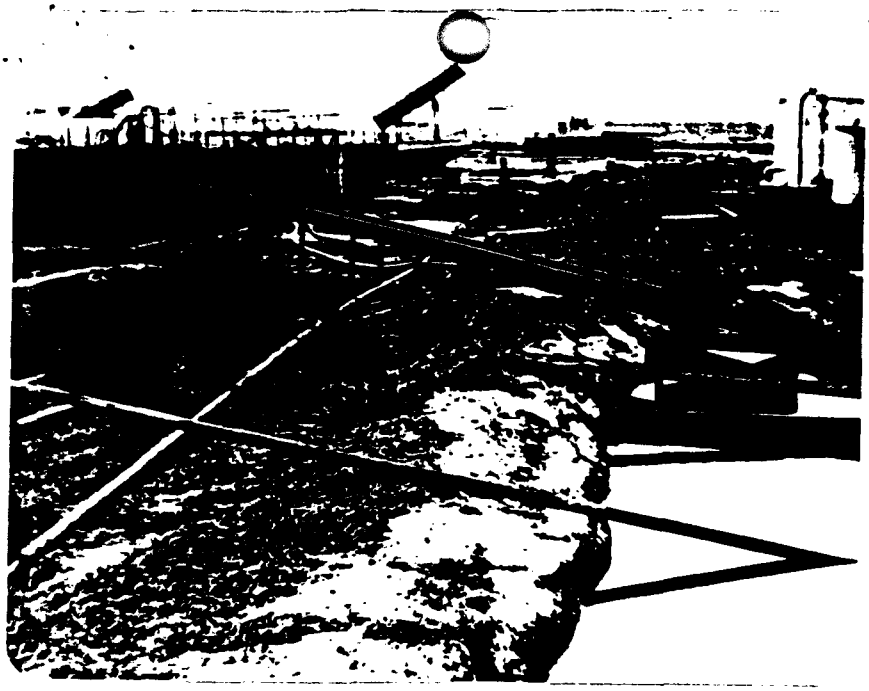
C_v = Coeff. of Consolidation
Δe = Change in Void Ratio
$\Delta \sigma$ = Change in Pressure
γ_w = Unit Weight of Water

$k = 1.2 \times 10^{-7}$ cm/sec at $e_o = 7.62$

PERMEABILITY DETERMINED BY CONSOLIDATION TEST

Delta Shipyard Disposal Pit
Houma, Louisiana

80-173
Figure A-IIB



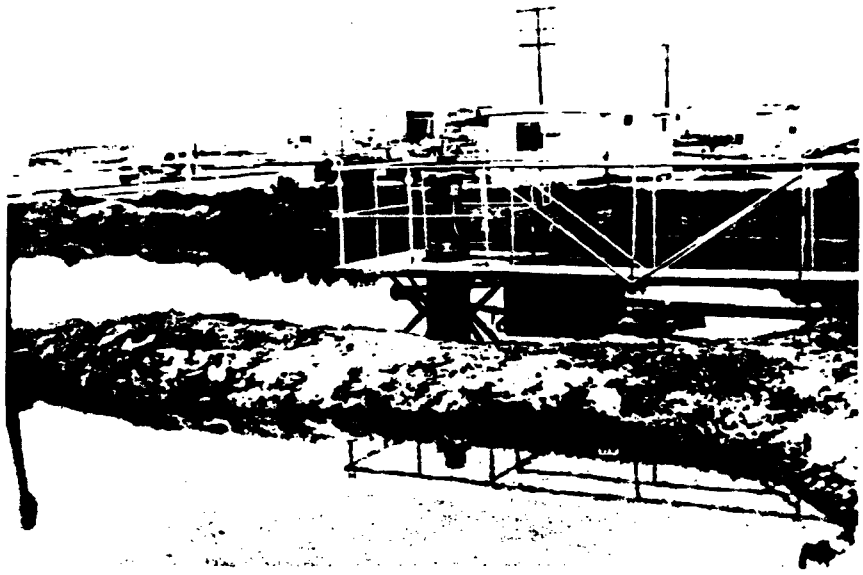
Photographer / Witness PHOTO #1

G. Duncan / D. Vaughn

Date / Time / Direction

3-11-81 / 11:00 / SE

Comments: surface impoundment in foreground; upper left background shows separator tank and overflow trough



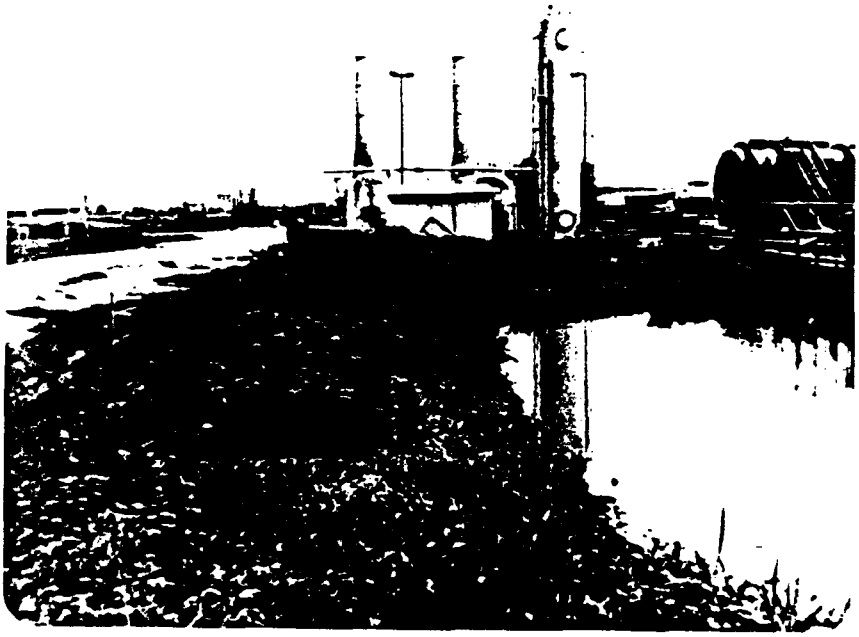
Photographer / Witness PHOTO #2

G. Duncan / D. Vaughn

Date / Time / Direction

3-11-81 / 11:05 / NW

Comments: suction line from waste water impoundment to boilers.



Photographer / Witness PHOTO #3

G. Duncan / D. Vaughn

Date / Time / Direction

3-11-81 / 11:07 / SW East

Comments: looking towards storm cleaner boilers and northern part of waste impoundments.

REFERENCE 4

WINK ENGINEERING
A DIVISION OF WINK INCORPORATED

MECHANICAL
CIVIL
ELECTRICAL
PROCESS
INSTRUMENT

7520 HAYNE BLVD. ■ NEW ORLEANS, LA. 70126-1899 ■ TELEPHONE: 504/246-7924

SEPTEMBER 20, 1985

MR. BILL DEVILLE
ADMINISTRATOR
LOUISIANA STATE DEPARTMENT OF ENVIRONMENTAL QUALITY
INACTIVE & ABANDONED WASTE SITES DIVISION
P.O. BOX 44307
BATON ROUGE, LA 70804

LETTER NO.: WM59-7
RE: DELTA SHIPYARD'S
WASTE SITES AT
HOUMA & DUSON, LA
JOB: 59-051484

DEAR MR. DEVILLE:

PLEASE FIND ATTACHED A COPY OF THE PACKAGE REPORTING AN INDEPENDENT LABORATORY ANALYSIS AND OUR OPINION AS TO CLASSIFICATION FOR THE ABOVE REFERENCED WASTE SITES. I HAVE BEEN INFORMED THAT YOUR OFFICE WILL REVIEW THE PACKAGE AND STIPULATE THE REQUIREMENTS FOR PROPER DISPOSITION AND CLASSIFICATION.

PLEASE ADVISE AS TO YOUR DECISION AT THE EARLIEST POSSIBLE DATE.

VERY TRULY YOURS,

Conrad Dussel

CONRAD A. DUSSEL, P.E.
PROJECT ENGINEER

CAD:MLV
CC: H. SEIFE (MILBANK, ET AL)
J. WINK
R. FEEMSTER
ATTACHMENT

RECEIVED
SEP 20 1985
LA. DEPT. OF
ENVIRONMENTAL QUALITY
IAS DIVISION

P E 4

WINK ENGINEERING
A DIVISION OF WINK INCORPORATED

MECHANICAL
CIVIL
ELECTRICAL
PROCESS
INSTRUMENT

7520 HAYNE BLVD ■ NEW ORLEANS, LA 70126-1899 ■ TELEPHONE 504/246-7924

JULY 5, 1985

MR. GLENN A. MILLER
ADMINISTRATOR
LOUISIANA DEPARTMENT OF
ENVIRONMENTAL QUALITY
P.O. BOX 44066
BATON ROUGE, LA 70804

LETTER NO.: WM59-5
RE: DELTA SHIPYARD'S WASTE SITES AT HOUMA & DUSON, LOUISIANA
WINK JOB NO.: 59-051485

DEAR MR. MILLER:

THIS LETTER AND ITS ATTACHMENTS ARE PREPARED PURSUANT TO MY TELEPHONE CONVERSATIONS ON JUNE 5, 1985, WITH MESSRS. DUDLEY DEVILLE AND TOM PATTERSON OF YOUR OFFICE. WINK, INC., AN INDEPENDENT CONSULTING ENGINEERING FIRM, HAS BEEN RETAINED TO DETERMINE IF THE ABOVE REFERENCED SITES ARE HAZARDOUS.

~~THERE ARE CURRENTLY SIX (6) SURFACE IMPOUNDMENTS AT DELTA'S HOUMA YARD. THREE (3) ARE COVERED AND OVERGROWN WITH VEGETATION, WHILE THE REMAINING THREE (3) ARE EXPOSED AND FILLED WITH SLUDGE.~~ AT THE DUSON YARD THERE IS A SUBMERGED, UNCOVERED STEEL TANK FILLED WITH A LIQUID SUBSTANCE. ACCORDING TO OUR RESEARCH, ALL SITES WERE ONCE USED TO DISPOSE OF OIL FIELD DRILLING MATERIAL. THIS PRACTICE CEASED ABOUT 10 YEARS AGO; HOWEVER, IT APPEARS FROM OUR ANALYSIS DUMPING HAS OCCURRED INTERMITTENTLY SINCE THEN. SEVERAL SURFACE SPILLS WERE OBSERVED ON THESE PROPERTIES AND A CHEMICAL ANALYSIS WAS SUBSEQUENTLY MADE.

AT ONE TIME THE SURFACE IMPOUNDMENTS AT HOUMA WERE REGISTERED WITH THE DEPARTMENT OF ENVIRONMENTAL QUALITY AS HAZARDOUS WASTE SITES, BUT WERE RECOMMENDED BY YOUR ENFORCEMENT AGENCY IN JANUARY, 1984, TO BE REMOVED FROM THE HAZARDOUS WASTE SYSTEM. CURRENTLY, THESE IMPOUNDMENTS ARE IN THE INACTIVE CLASSIFICATION AS CONFIRMED BY TELEPHONE ON JUNE 5, 1985. TO DETERMINE THE SLUDGE AND LIQUID CHEMICAL COMPOSITION AND THEREFORE THE POTENTIALLY HAZARDOUS NATURE OF THESE SITES, NUMEROUS SAMPLES WERE COLLECTED AT RANDOM LOCATIONS AS INDICATED IN ATTACHMENTS 1, 2, 3, 4, & 5. IMPOUNDMENTS 1, 2, 3 IN HOUMA ARE COVERED WITH A THIN CRUST OF FILL WHILE NOS. 5, 6, 7 ARE EXPOSED. HOUMA AREA NO. 4 AND DUSON AREA NOS. 2 & 3 ARE ESSENTIALLY LOW SPOTS WHERE ACCUMULATIONS OF SLUDGE HAVE SETTLED. DUSON AREA NO. 1 CONSISTS OF A SUBMERGED STEEL TANK OF UNKNOWN DEPTH CONTAINING A LIQUID SUBSTANCE. SOIL SAMPLES WERE TAKEN AT VARIOUS DEPTHS APPROXIMATELY 8" FROM THE SUBMERGED TANK TO CHECK FOR LEAKAGE.

ALL INDIVIDUAL SAMPLES FROM EACH IMPOUNDMENT/AREA WERE THOROUGHLY MIXED TO FORM A COMPOSITE SAMPLE FOR EACH LOCATION. LABORATORY ANALYSES WERE PERFORMED BY WEST-PAINE OF BATON ROUGE, AND THE RESULTS ARE CONTAINED IN ATTACHMENT NO. 6.

THE FOLLOWING TESTS WERE PERFORMED ON EACH SAMPLE: VOA (VOLATILE ORGANIC AROMATICS), CYANIDE, PHENOL (TOTAL), FLASH POINT (BELOW 140^{0}F), PH, EP TOXICITY, AND OIL & GREASE. BASED ON THE ATTACHED ANALYSES, THE ~~EP TOXICITY CONSTITUENTS DO~~ NOT EXCEED THOSE LIMITS DESCRIBED IN CHAPTER 24, TABLE 5. NEITHER DO THE SUMMATION OF CONSTITUENTS LISTED IN PARAGRAPHS 24.1 (D) AND (E) AND CHAPTER 17 EXCEED 1000 PPM. IT IS OUR OPINION THAT THESE SITES ARE NOT TO BE CONSIDERED HAZARDOUS AND WILL NOT NOW OR IN THE FUTURE POSE A THREAT TO HUMAN HEALTH OR THE ENVIRONMENT.

IF YOUR OFFICE IS IN AGREEMENT THAT THESE FACILITIES ARE NOT HAZARDOUS, PLEASE FURNISH THE NECESSARY DOCUMENTS TO AUTHORIZE DECLASSIFICATION OR CONFIRM THAT YOU HAVE CLOSED OUT YOUR FILE.

VERY TRULY YOURS,

Conrad Dussel

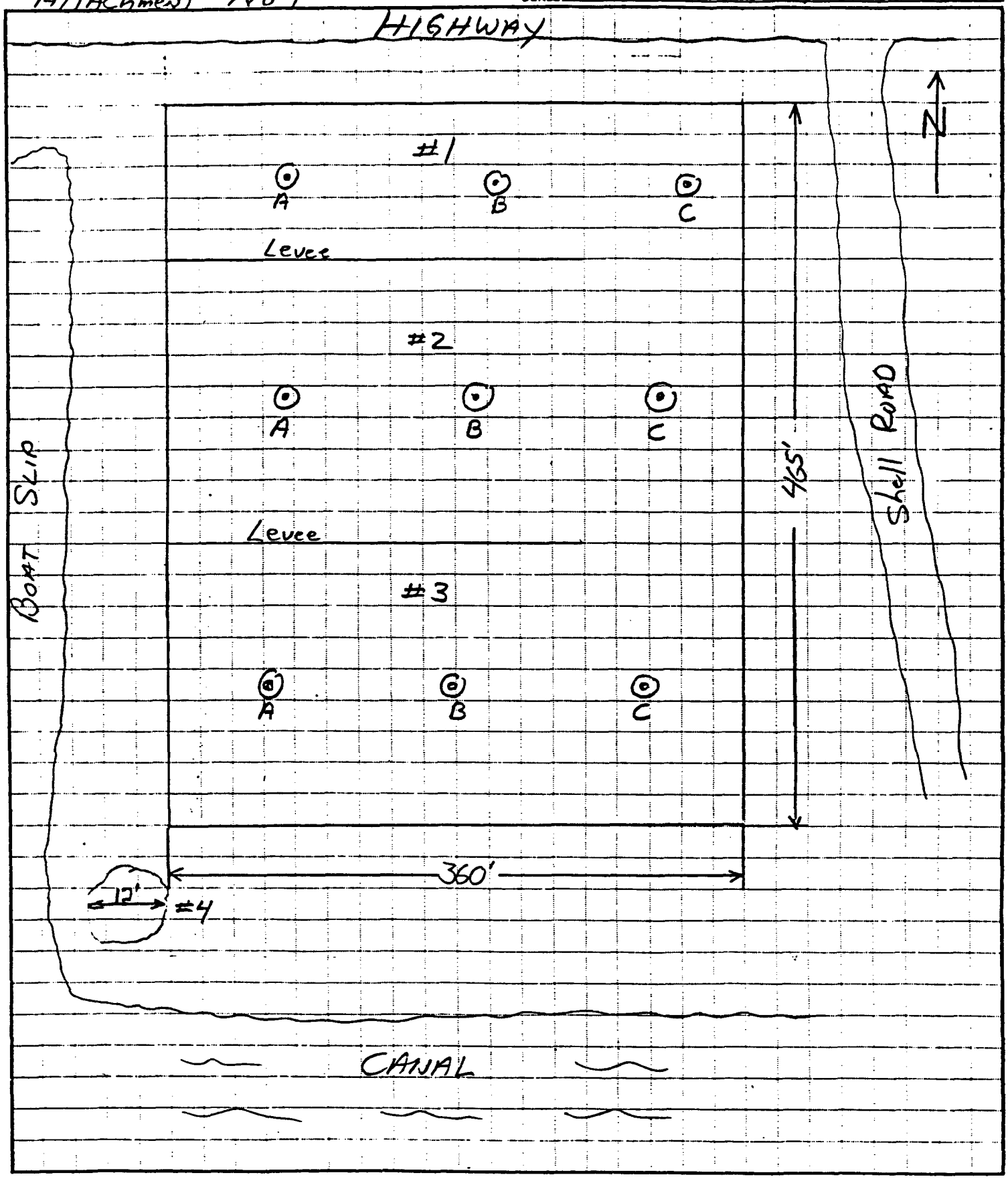
CONRAD A. DUSSEL, P.E.
PROJECT ENGINEER

CAD:MLV
ATTACHMENTS
CC: DUDLEY DEVILLE (DEQ)
TOM PATTERSON (DEQ)
HOWARD SEIFE (MILBANK, ET.AL.)

WINK ENGINEERING
A Division of Wink, Inc.
7520 Hayne Blvd.
New Orleans, Louisiana 70126-1899
(504) 246-7924

JOB: Delta Shipyard - Houma, LA
SHEET NO. 1 OF 1
CALCULATED BY: CAO DATE: 6/18/85
CHECKED BY: DATE:
SCALE: 3 Covered Pits / 1 Open Spill

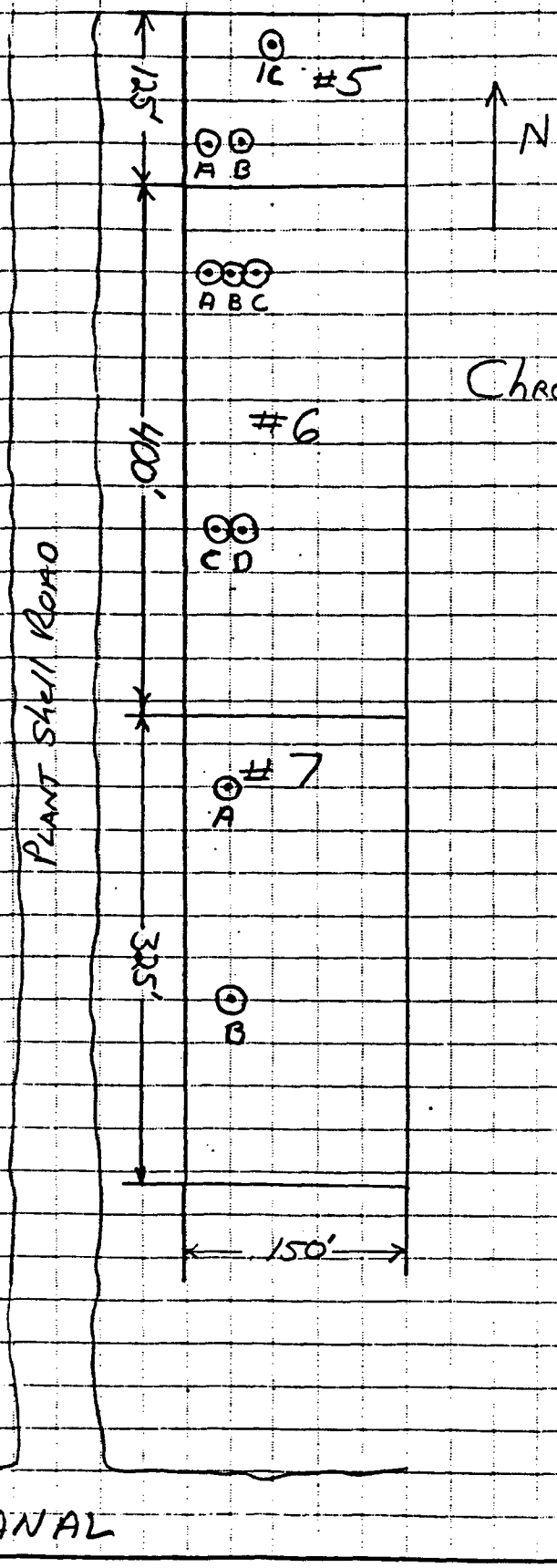
ATTACHMENT No 1



WINK ENGINEERING
A Division of Wink, Inc.
7520 Hayne Blvd.
New Orleans, Louisiana 70126-1899
(504) 246-7924

JOB DELTA - SHIPYARD - HOUMA, LA
SHEET NO. 1 OF 1
CALCULATED BY CIAN DATE 6/18/85
CHECKED BY _____ DATE _____
SCALE 3 EXPOSED SURF. IMPOUNDMENTS

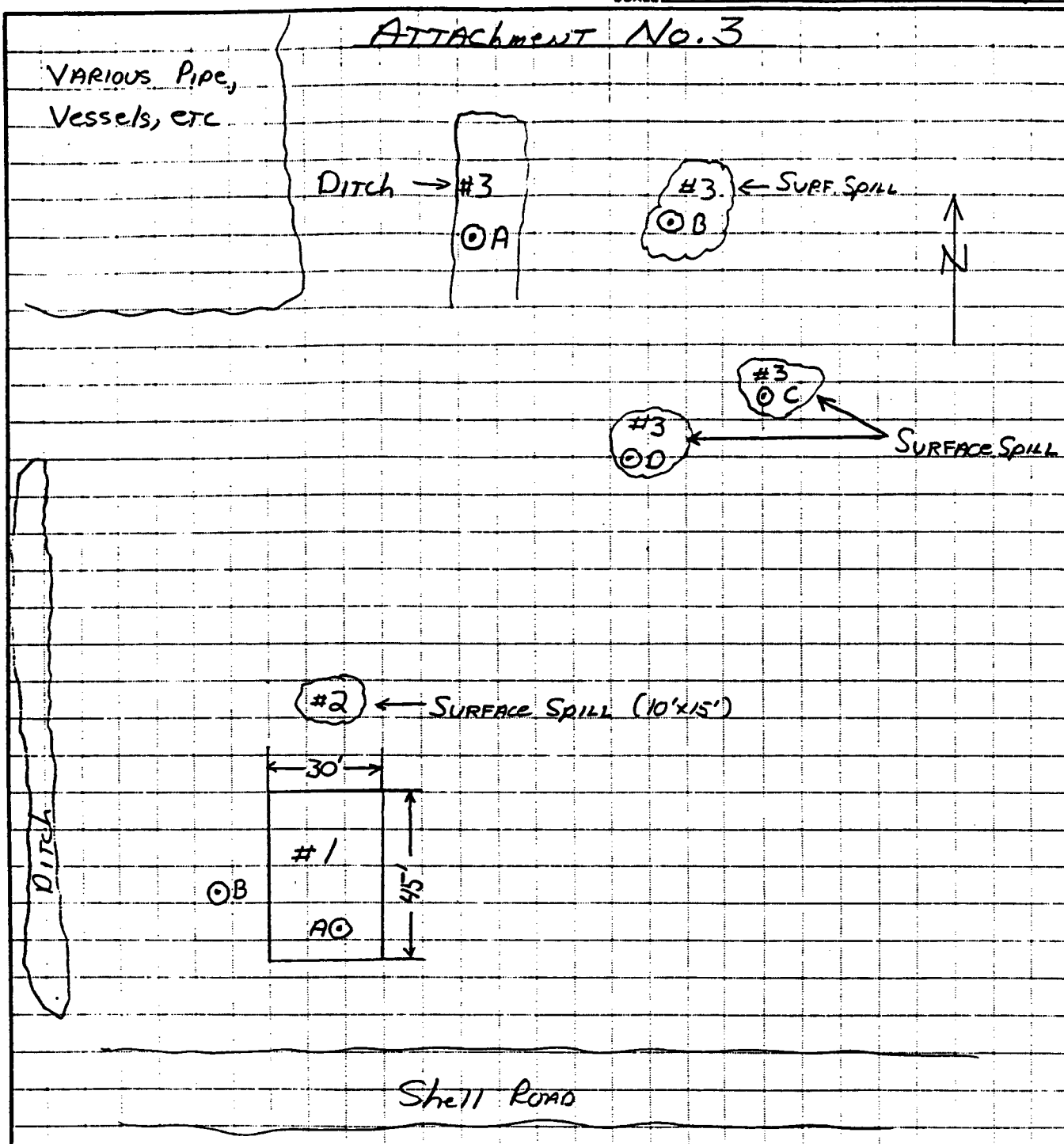
ATTACHMENT No. 2



WINK ENGINEERING
A Division of Wink, Inc.
7520 Hayne Blvd.
New Orleans, Louisiana 70126-1899
(504) 246-7924

JOB DELTA - SHIPYARD - DUSON, LA
SHEET NO. 1 OF 1
CALCULATED BY CAO DATE 6/18/85
CHECKED BY DATE
SCALE 1 SUBMERGED TANK + MISC. SPILLS

ATTACHMENT No. 3



DUSON

ATTACHMENT NO. 4
DELTA SHIPYARD SLUDGE SAMPLING PROTOCOL
HOUMA, LA
MAY 20, JUNE 5 & JUNE 6, 1985

SAMPLE NO.	DEPTH	SAMPLE NO.	DEPTH
1A	1'-6"	5A	2'-0"
1A	2'-6"	5A	3'-0"
1A	4'-6"	5A	4'-0"
1A	5'-6"	5A	5'-6"
1B	1'-0"	5B	0'-6"
1B	3'-0"	5B	1'-6"
1B	5'-6"	5B	3'-6"
1C	SURFACE	5B	5'-0"
1C	2'-0"	5C	SURFACE
1C	3'-0"	5C	1'-0"
1C	4'-6"	5C	2'-0"
1C	5'-6"	5C	5'-6"
2A	1'-0"	6A	0'-6"
2A	3'-6"	6A	2'-0"
2A	5'-6"	6A	4'-0"
2B	0'-6"	6B	1'-0"
2B	2'-6"	6B	2'-6"
2B	4'-0"	6B	3'-6"
2C	1'-0"	6B	5'-6"
2C	3'-0"	6C	1'-0"
2C	5'-6"	6C	2'-0"
3A	0'-6"	6C	3'-0"
3A	1'-6"	6C	4'-0"
3A	3'-6"	6C	5'-0"
3A	4'-6"	6D	SURFACE
3B	1'-0"	6D	1'-6"
3B	3'-0"	6D	2'-6"
3C	0'-6"	6D	3'-0"
3C	2'-0"	7A	SURFACE
3C	4'-0"	7A	2'-0"
4	SURFACE SAMPLES	7A	3'-0"
		7B	0'-6"
		7B	2'-6"
		7B	4'-0"

ATTACHMENT NO. 5
DELTA SHIPYARD SLUDGE SAMPLING PROTOCOL
DUSON, LA
JUNE 5, 1985

SAMPLE NO.	DEPTH
1A	SURFACE (LIQUID)
1B	0'-6" (WITHIN 8" OF PI
1B	1'-0"
1B	3'-6"
1B	5'-0"
2	0'-6"
2	1'-0"
2	3'-0"
3A	SURFACE
3B	SURFACE
3C	SURFACE
3D	SURFACE

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

ATTACHMENT NO. 6

SAMPLE ANALYSES

for

WINK ENGINEERING
7520 Hayne Blvd.
New Orleans, Louisiana 70126-1899

ATTENTION: Mr. Conrad A. Dussel

June 11, 1985

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Samples collected by Wink Engineering as documented by the enclosed chain-of-custody form, were received at West-Paine Laboratories, Incorporated on June 5, 1985 and June 7, 1985. The samples were analyzed according to the Environmental Protection Agency protocol:

A. Test Methods for Evaluating Solid Waste, SW-846, July 1982:

Parameter	Method
Cyanide	9010
Ignitability	1010
EP Toxicity Extraction Procedure	1310
Arsenic	7060
Barium	7080
Cadmium	7130
Chromium	7190
Lead	7420
Mercury	7470
Selenium	7740
Silver	7760
Volatile Organic Fraction	8240
pH	9040

B. Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980:

Parameter	Method
Oil & Grease	503C

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WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

C. Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1979:

Parameter	Method
Phenol	510A, 510B

The results are on the following pages.

Victor J. Blanchard, III
Manager

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: DUSON #1 Composite

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	0.53	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	8.5	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	36,100	10.0/8.4	06-10/1600/RH

Duson

WEST-PAINE Laboratories INC.
7979 QSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: DUSON #2 Composite

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	0.43	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	9.2	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	53,000	10.0/8.4	06-10/1600/RH

DUSON

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WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: DUSON #3 Composite

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	0.15	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	9.0	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	163,000	10.0/8.4	06-10/1600/RH

DUSON

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: [redacted]

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	<0.15	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	7.7	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	4,650	10.0/8.4	06-10/1600/RH

Houma

WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

Sample Identification: HOUMA #2 Composite

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	<0.15	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	8.2	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	2,980	10.0/8.4	06-10/1600/RH

WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

Sample Identification: HOUMA #3 Composite

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	<0.15	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	7.4	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	150	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	3,100	10.0/8.4	06-10/1600/RH

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85-2082

WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: [redacted]

Date Received: June 5, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	0.69	0.020/0.021	06-07/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	7.8	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	311,000	10.0/8.4	06-11/0900/RH

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85-2082

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: HOUMA #5 Composite

Date Received: June 7, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	3.0	0.020/0.020	06-10/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	9.1	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	104,000	10.0/8.4	06-11/0900/RH

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WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

Sample Identification: HOUMA #6 Composite

Date Received: June 7, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	2.5	0.020/0.020	06-10/0800/BE
Cyanide (mg/kg CN)	<0.5	0.100/0.110	06-07/0930/MS
pH (Units) as 4% w/v	9.3	7.0/7.0	06-10/1200/RC
Flashpoint (^{o}F)	>200	Not Applicable	Not Applicable
Oil & Grease (mg/kg)	183,000	10.0/8.4	06-11/0900/RH

CORRECTED REPORT

WEST-PAINE Laboratories INC.
7979 GSRI AVE • BATON ROUGE LA 70820

WINK ENGINEERING
New Orleans, Louisiana
May 29, 1985

Sample Identification: #7 HOUMA COMPOSITE

Date Received: May 21, 1985

Parameter	Results	Quality Assurance Actual/Found	Date/Time Analyst
Phenol (mg/kg Phenol)	2.3	0.020/0.020	05-24/1630/BE
Cyanide (mg/kg CN)	<0.2	0.10/0.11	05-26/1100/RC
pH (Units) as 4% w/v	9.0	7.0/7.0	05-24/1300/RC
Flashpoint (^{o}F)	>200	------	Not Applicable
Oil & Grease (mg/kg)	331,000	10.0/9.2	05-23/2000/FT

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85-1925

WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: DUSON #1, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	0.3	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.008	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	<0.04	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 104.44 gm

DUSON

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85-2082

WEST-PAINE Laboratories INC.
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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: DUSON #2, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	0.2	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.016	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	<0.04	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 103.64 gm

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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: DUSON #3, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	0.3	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.016	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	0.12	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 103.77 gm

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WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: [redacted]

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	<0.1	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.012	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	<0.04	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 100.84 gm

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WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: HOUMA #2, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	0.02	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	0.2	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.016	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	<0.04	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 103.07 gm

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WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: HOUMA #3, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	0.1	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	<0.01	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	<0.005	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.01	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	<0.04	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 102.30 gm

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana

June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: HOUMA #4, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	<0.01	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	0.1	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.008	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	<0.1	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	0.91	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 103.50 gm

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: HOUMA #5, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	0.04	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	2.6	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.016	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	0.48	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	1.5	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 107.50 gm

WEST-PAINE Laboratories INC.
7979 GSRI AVE. • BATON ROUGE, LA 70820

WINK ENGINEERING
New Orleans, Louisiana
June 11, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: HOUMA #6, Composite

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	0.07	5.0	0.050/0.049	06-10/RM
Barium (mg/L Ba)	1.7	100	2.50/2.54	06-10/RM
Cadmium (mg/L Cd)	0.016	1.0	0.250/0.248	06-10/RM
Chromium (mg/L Cr)	0.56	5.0	0.50/0.51	06-10/RM
Lead (mg/L Pb)	1.2	5.0	2.50/2.46	06-10/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0109	06-10/RM
Selenium (mg/L Se)	<0.01	1.0	0.050/0.051	06-09/RM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	06-10/RM

Sample Weight: 102.80 gm

WEST·PAINE Laboratories INC.
7979 GSR AVE • BATON ROUGE LA 70820

WINK ENGINEERING
New Orleans, Louisiana
May 29, 1985

The total weight of solid material filtered from the sample as received is listed below. The Extraction Procedure (EP Toxicity Test) was employed as specified in the Federal Register, Monday, May 19, 1980, Appendix II, pages 33127 - 33128. The results below for sample extract, in mg/L, represent the concentration in the final leachate. For purpose of comparison, the maximum allowable concentration of each component is listed.

Sample Identification: #7 HOUMA COMPOSITE

Parameter	Results	Maximum Allowable in Extract	Quality Assurance Actual/Found	Date/ Analyst
Arsenic (mg/L As)	0.09	5.0	0.50/0.48	05-23/VM
Barium (mg/L Ba)	0.7	100	2.50/2.36	05-24/RM
Cadmium (mg/L Cd)	<0.005	1.0	0.250/0.250	05-23/VM
Chromium (mg/L Cr)	0.02	5.0	0.50/0.50	05-24/RM
Lead (mg/L Pb)	0.12	5.0	2.50/2.50	05-24/RM
Mercury (mg/L Hg)	<0.0002	0.2	0.0100/0.0105	05-23/VM
Selenium (mg/L Se)	0.03	1.0	0.050/0.048	05-23/VM
Silver (mg/L Ag)	<0.01	5.0	0.50/0.50	05-23/VM

Sample Weight: 102.06

WEST-PAINE Laboratories INC.
7979 USRI AVE. • BATON ROUGE, LA 70806

Wink Engineering

New Orleans, Louisiana

060585-51-53

All results in milligrams per kilogr

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	Duson #1	Duson #2	Duson #3
Benzene	<0.02	<0.02	<0.02
Bromoform	<0.02	<0.02	<0.02
Carbon tetrachloride	<0.02	<0.02	<0.02
Chlorobenzene	<0.02	0.27	<0.02
Chlorodibromomethane	<0.02	<0.02	<0.02
Chloroethane	<0.02	<0.02	<0.02
2-Chloroethylvinyl ether	<0.02	<0.02	<0.02
Chloroform	<0.02	<0.02	<0.02
1,2-Dichlorobenzene	<0.02	<0.02	<0.02
1,4-Dichlorobenzene	<0.02	<0.02	<0.02
1,3-Dichlorobenzene	<0.02	<0.02	<0.02
Dichlorobromomethane	<0.02	<0.02	<0.02
1,1-Dichloroethane	<0.02	<0.02	<0.02
1,2-Dichloroethane	<0.02	<0.02	<0.02
1,1-Dichloroethene	<0.02	<0.02	<0.02
trans-1,2-Dichloroethene	<0.02	<0.02	<0.02
1,2-Dichloropropane	<0.02	<0.02	<0.02
cis-1,3-Dichloropropene	<0.02	<0.02	<0.02
trans-1,3-Dichloropropene	<0.02	<0.02	<0.02
Ethylbenzene	0.06	0.65	<0.02
Methylbromide	<0.02	<0.02	<0.02
Methylchloride	<0.02	<0.02	<0.02
Methylene chloride	<0.02	<0.02	<0.02
1,1,2,2-Tetrachloroethane	<0.02	<0.02	<0.02
Tetrachloroethene	<0.02	<0.02	<0.02
Toluene	0.07	0.70	<0.02
1,1,1-Trichloroethane	<0.02	<0.02	<0.02
1,1,2-Trichloroethane	<0.02	<0.02	<0.02
Trichloroethene	<0.02	<0.02	<0.02
Trichlorofluormethane	<0.02	<0.02	<0.02
Vinyl chloride	<0.02	<0.02	<0.02
Total Xylene (semiquantitative)	0.46	6.7	<0.02
Date of Analyses	06-07-85	06-07-85	06-07-85

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Wink Engineering

New Orleans, Louisiana

060585-54-57

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilogra

ppm

	[redacted] #1	Houma #2	Houma #3	Houma #4
Benzene	<0.02	<0.02	<0.02	<0.02
Bromoform	<0.02	<0.02	<0.02	<0.02
Carbon tetrachloride	<0.02	<0.02	<0.02	<0.02
Chlorobenzene	<0.02	<0.02	<0.02	<0.02
Chlorodibromomethane	<0.02	<0.02	<0.02	<0.02
Chloroethane	<0.02	<0.02	<0.02	<0.02
2-Chloroethylvinyl ether	<0.02	<0.02	<0.02	<0.02
Chloroform	<0.02	<0.02	<0.02	<0.02
1,2-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
1,4-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
1,3-Dichlorobenzene	<0.02	<0.02	<0.02	<0.02
Dichlorobromomethane	<0.02	<0.02	<0.02	<0.02
1,1-Dichloroethane	<0.02	<0.02	<0.02	<0.02
1,2-Dichloroethane	<0.02	<0.02	<0.02	<0.02
1,1-Dichloroethene	<0.02	<0.02	<0.02	<0.02
trans-1,2-Dichloroethene	<0.02	<0.02	<0.02	<0.02
1,2-Dichloropropane	<0.02	<0.02	<0.02	<0.02
cis-1,3-Dichloropropene	<0.02	<0.02	<0.02	<0.02
trans-1,3-Dichloropropene	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	<0.02	<0.02	<0.02
Methylbromide	<0.02	<0.02	<0.02	<0.02
Methylchloride	<0.02	<0.02	<0.02	<0.02
Methylene chloride	<0.02	<0.02	<0.02	<0.02
1,1,2,2-Tetrachloroethane	<0.02	<0.02	<0.02	<0.02
Tetrachloroethene	<0.02	<0.02	<0.02	<0.02
Toluene	0.02	<0.02	<0.02	<0.02
1,1,1-Trichloroethane	<0.02	<0.02	<0.02	<0.02
1,1,2-Trichloroethane	<0.02	<0.02	<0.02	<0.02
Trichloroethene	<0.02	<0.02	<0.02	<0.02
Trichlorofluormethane	<0.02	<0.02	<0.02	<0.02
Vinyl chloride	<0.02	<0.02	<0.02	<0.02
Total Xylene (semiquantitative)	<0.02	<0.02	<0.02	<0.02
Date of Analyses	06-07-85	06-07-85	06-07-85	06-07-85

WEST-PAINE Laboratories INC.
7979 OSHI AVE • BATON ROUGE, LA 70808

nk Engineering

New Orleans, Louisiana

060785-45-46

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

All results in milligrams per kilog

ppm

	Houma #5	Houma #6
Benzene	<0.04	<0.04
Bromoform	<0.04	<0.04
Carbon tetrachloride	<0.04	<0.04
Chlorobenzene	~~0.20~~	~~0.05~~
Chlorodibromomethane	<0.04	<0.04
Chloroethane	<0.04	<0.04
2-Chloroethylvinyl ether	<0.04	<0.04
Chloroform	<0.04	<0.04
1,2-Dichlorobenzene	<0.04	<0.04
1,4-Dichlorobenzene	<0.04	<0.04
1,3-Dichlorobenzene	<0.04	<0.04
Dichlorobromomethane	<0.04	<0.04
1,1-Dichloroethane	<0.04	<0.04
1,2-Dichloroethane	<0.04	<0.04
1,1-Dichloroethene	<0.04	<0.04
trans-1,2-Dichloroethene	<0.04	<0.04
1,2-Dichloropropane	<0.04	<0.04
cis-1,3-Dichloropropene	<0.04	<0.04
trans-1,3-Dichloropropene	<0.04	<0.04
thylbenzene	~~0.99~~	~~0.57~~
Methylbromide	<0.04	<0.04
Methylchloride	<0.04	<0.04
Methylene chloride	<0.04	<0.04
1,1,2,2-Tetrachloroethane	<0.04	<0.04
Tetrachloroethene	<0.04	<0.04
Toluene	~~1.45~~	~~0.49~~
1,1,1-Trichloroethane	<0.04	<0.04
1,1,2-Trichloroethane	<0.04	<0.04
Trichloroethene	<0.04	<0.04
Trichlorofluormethane	<0.04	<0.04
Vinyl chloride	<0.04	<0.04
Total Xylene (semiquantitative)	~~10.6~~	~~0.2~~
Date of Analyses	06-07-85	06-07-85

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Wi[illegible] Engineering
New Orleans, Louisiana
052185-45-46

All results in milligrams per kilogra

PRIORITY POLLUTANTS
VOLATILES FRACTIONS

	Houma #7 Composite
Benzene	<0.02
Bromoform	<0.02
Carbon tetrachloride	<0.02
Chlorobenzene	<0.02
Chlorodibromomethane	<0.02
Chloroethane	<0.02
2-Chloroethylvinyl ether	<0.02
Chloroform	<0.02
1,2-Dichlorobenzene	<0.02
1,4-Dichlorobenzene	<0.02
1,3-Dichlorobenzene	<0.02
Dichlorobromomethane	<0.02
1,1-Dichloroethane	<0.02
1,2-Dichloroethane	<0.02
1,1-Dichloroethene	<0.02
trans-1,2-Dichloroethene	<0.02
1,2-Dichloropropane	<0.02
cis-1,3-Dichloropropene	<0.02
trans-1,3-Dichloropropene	<0.02
Ethylbenzene	<0.02
Methylbromide	<0.02
Methylchloride	<0.02
Methylene chloride	<0.02
1,1,2,2-Tetrachloroethane	<0.02
Tetrachloroethene	<0.02
Toluene	<0.02
1,1,1-Trichloroethane	<0.02
1,1,2-Trichloroethane	<0.02
Trichloroethene	<0.02
Trichlorofluormethane	<0.02
Vinyl chloride	<0.02
Total Xylene (semiquantitative)	<0.02
Date of Analyses	05-27-85

REFERENCE 5

DELTA SHIPYARD

COVERAGE

STATE	COUNTY	STATE NAME	COUNTY NAME
22	57	Louisiana	Lafourche Par
22	109	Louisiana	Terrebonne Par

CENTER POINT AT STATE : 22 Louisiana
COUNTY : 109 Terrebonne Par

REGION OF THE COUNTRY

Zipcode found: 70361 at a distance of 3.5 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
LA	HOUMA	22109	29.5967	90.7167

CENSUS DATA

DELTA SHIPYARD
LATITUDE 29:34: 2 LONGITUDE 90:42:18 1990 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	15	3578	12872	16284	7739	40488
RING TOTALS	0	15	3578	12872	16284	7739	40488

STAR STATION

WBAN NUMBER	STATION NAME	LATITUDE	LONGITUDE	PERIOD OF RECORD	DISTANCE (km)
12916	NEW ORLEANS/MOISANT LA	29.9833	90.2500	1960-1964	63.7
12958	NEW ORLEANS/CALLENDER LA	29.8167	90.0167	1967-1971	72.0
13970	BATON ROUGE/RYAN LA	30.5333	91.1500	1975-1979	115.5
13976	LAFAYETTE LA	30.2000	91.9833	1954-1958	141.8
93919	MCCOMB/PIKE CO MS	31.2500	90.4667	1949-1954	188.3
13820	BILOXI/KEESLER MS	30.4167	88.9167	1960-1964	196.2
03937	LAKE CHARLES LA	30.1167	93.2167	1966-1970	249.6

U.S. SOIL DATA

STATE : LOUISANA

LATITUDE : 29:34: 2 LONGITUDE : 90:42:18
THE STATION IS INSIDE H.U. 8090302

GROUND WATER ZONE	:	10			
RUNOFF SOIL TYPE	:	3			
EROSION	:	1.7430E-04			CM/MONTH
DEPTH TO GROUND WATER BETWEEN	:	3.0480E+02	AND	1.5240E+03	
FIELD CAPACITY FOR TOP SOIL	:	8.0000E-02			
EFFECTIVE POROSITY BETWEEN	:	2.0000E-02	AND	3.0000E-01	
SEEPAGE TO GROUNDWATER BETWEEN	:	4.6330E+03	AND	1.3900E+04	CM/MONTH
DISTANCE TO DRINKING WELL	:	2.6000E+04			CM

U.S. CITY

STATE	PLACE NAME	FIPSCODE	LATITUDE	LONGITUDE
LA	HOUMA	22109	29.5967	90.7167

APPENDIX A

SITE ACCESS AGREEMENT

26 May 1994

URGENT LEGAL MATTER - PROMPT REPLY NECESSARY

CERTIFIED MAIL/RETURN RECEIPT REQUESTED - P 110 204 340

EPA I.D. NO.: LAD058475419

ATTN: Lynn Dean
8404 Colonel Drive
Shelmett, Louisiana 70043

RE: EPA Site Inspection
Site Access Request
Delta Shipyard, Houma, Louisiana

Dear Mr. Dean:

The purpose of this letter is to request you to voluntarily permit the U.S. Environmental Protection Agency (EPA), and its officers, employees or representatives, authorized by EPA, including but not limited to Roy F. Weston, Inc. (WESTON®), (Contract No. 68-W9-0015), access to the above referenced property located at 201 Industrial Boulevard in Houma, Louisiana so that EPA can enforce the provisions of the Comprehensive Environmental Responsibility Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. § 9601 et seq., copy pertinent documents or records, inspect the site, and obtain samples of any suspected hazardous substance or pollutant or contaminant found on site. A description of the property or a map identifying the site for which access is required is attached.

Specifically, WESTON has been requested by the EPA, Region 6 to conduct a Site Inspection Prioritization of the Delta Shipyard Site to further assess the degree of risk to the public health, welfare, and environment related to hazardous substances, pollutants or contaminants that may be present at the site. Based on preliminary file information, EPA finds it necessary to perform this Site Inspection Prioritization at your site pursuant to 40 CFR 300.400 Subpart E.

Section 104(e) of CERCLA, 42 U.S.C. Section 9604(e), explicitly grants EPA the authority to enter a property at reasonable times to inspect and obtain samples from any location of any suspected hazardous substance or pollutant or contaminant. Further, the cited section authorizes EPA to require any person who has or may have information relating to any of the following to furnish information or documents relating to:

1. The identification, nature and quantity of materials which have been or are generated, treated, stored, or disposed of at vessel or facility, or transported to a vessel or facility;
2. The nature or extent of a release of a hazardous substance, or pollutant, or contaminant at or from a vessel or facility;
3. Information relating to the ability of a person to pay for or perform a cleanup.

It is EPA policy to seek voluntary cooperation from the public when possible. Consequently, EPA is making this request for access to the property and records mentioned above. EPA hopes that you will voluntarily comply by signing, dating and returning the enclosed Consent for Access to Property, to the address indicated below within seven days of your receipt of this letter. Please mail it to:

Stacey Bennett
Superfund Site Assessment
Hazardous Waste Section (6E-SH)
USEPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

If EPA does not receive the enclosed consent for access to the property, signed and dated by you, EPA will treat your failure to respond as a denial of access. Please note that EPA will not agree to conditions which will restrict or impede the manner or extent of an inspection or response action, impose indemnity or compensatory obligations on EPA, or operate as a release of liability. Should you impose conditions of this nature in the consent for access to the property, EPA will treat this as a denial of consent.

Failure to grant EPA access may result in the issuance of an order directing compliance with EPA's request for access. Failure to comply with such an order may result in a civil action in United States District Court to enjoin compliance with the order. EPA may also seek the assessment of a civil penalty not to exceed $25,000 per day of noncompliance with the order. You may assert a business confidentiality claim covering part of the information you submit in response to this request. Any such claim must be made by placing on (or attaching to) the information, at the time it is submitted to EPA, a cover sheet or a stamped or typed legend or other suitable form of notice employing language such as "trade secret," "proprietary," or "company confidential." Confidential portions of otherwise nonconfidential documents should be clearly identified and may be submitted separately to facilitate identification and handling by EPA. If you make such claim, the information by that claim will be disclosed by EPA only to the extent, and by the means of the procedures, set forth in Subpart B of 40 CFR Part 2. If no

such claim accompanies the information when it is received by EPA, it may be made available to the public without further notice to you. The requirements of 40 CFR Part 2 regarding business confidentiality claims were published in the Federal Register on September 1, 1976, and amended on September 8, 1978, and December 18, 1985.

As part of the information gathering process, the collection of samples from your site may become necessary. This collection process may generate investigation derived wastes (IDWs) such as equipment, rinsate water, or disposable personal protective clothing. WESTON will manage these IDWs in the most responsible manner consistent with EPA policy regarding these wastes, which is to leave site conditions essentially unchanged, such as to return soil cuttings to the location from which they were taken or properly to dispose of the IDWs.

Field inspection activities are tentatively planned for mid-June 1994 through August 1994. You will be given at least two (2) weeks notice prior to the site visit. Peter Rung will be contacting you to verify the exact dates of this visit. During the visit you will be provided with a receipt describing any samples obtained and, if you so request, you will be given a portion of each sample. There will be no charge for the samples EPA provides you. If you would like a portion of each sample, please put a check mark in the space provided in the enclosed consent for access to property. If you do not wish to be provided with a portion of each sample, please put a check mark in the alternative space. If you do not mark any space, EPA will treat your failure to respond as your statement that you do not wish to be provided with a portion of each sample.

You can obtain a copy of the resulting inspection report and analytical data by writing to Ed Sierra, Chief, Superfund Site Assessment Section (6H-MA), EPA Region 6, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202-2733.

In future inquiries, please indicate your site's EPA I.D. Number and name as listed, to ensure prompt processing. If you have any questions concerning this matter, please contact me at (214) 655-8374.

Sincerely,

Stacey Bennett
Superfund Site Assessment
EPA Region 6

cc: Tim Knight
LDEQ - Inactive and Abandoned Sites Division
P. O. Box 82282
Baton Rouge, LA 70884-2282

bcc: E. Sierra (6H-MA)
B. Greenfield (6X)
V. McFarland (6H-MC)
M. Peycke (6C-W)

arcs:46032722:dean.519(cfl)

In future inquiries, please indicate your site's EPA I.D. Number and name as listed, to ensure prompt processing. If you have any questions concerning this matter, please contact me at (214) 655-8374.

Sincerely,

Stacey Bennett
Superfund Site Assessment
EPA Region 6

cc: Tim Knight
LDEQ - Inactive and Abandoned Sites Division
P. O. Box 82282
Baton Rouge, LA 70884-2282

CONSENT FOR ACCESS TO PROPERTY

Name: Lynn Dean

EPA I.D. No.: LAD058475419
Site Name: Delta Shipyard, Houma, Louisiana

Description of Property: The Delta Shipyard is located at 201 Industrial Boulevard in Houma, Louisiana (see attached site location map).

I hereby consent to officers, employees, and representatives authorized by the United States Environmental Protection Agency (EPA) entering and having continued access to my property for the following purposes:

1. Reviewing and copying documents related to the site;
2. The taking of such soil, water and air samples as may be determined to be necessary;
3. The sampling of any solids or liquids stored or disposed of on property;
4. The drilling of holes and the installation of monitoring wells for subsurface investigation of subsurface contamination.

I realize that these actions are undertaken pursuant to EPA's response and enforcement responsibilities under the Comprehensive Environmental Responsibility, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. § 9601 et seq., as well as 40 CFR Part 300.400 Subpart E.

I am the property owner, or a responsible agent of the property owner, and I warrant that I have the authority to enter into this access agreement.

Place a check mark in the appropriate space. Please note that if no selection is made EPA will assume that you do not wish to be provided with a portion of the sample.

(✓) Please provide me with a portion of each sample taken at the property described above. I understand that there will be no charge for the sample portions provided by the EPA. I also understand that I must furnish suitable containers, be responsible for the laboratory analytical analysis, and sign for the transfer of custody from the EPA designated sampler.

( ) I do not wish to receive a portion of samples taken at the property described above.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

6/15/94
DATE

[signature], MANAGER
SIGNATURE, Title

APPENDIX B

HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN (HASP) FORM

Prepared By: Peter M. Rung
W. O. #: 04603-027-022-2140

Date 5/26/9

I. General Information

A. Project Identification

1. Division: South Central Region - Houston
2. Department/Office: 000536/000910
3. Site Name: Delta Shipyard
4. Client: US EPA - ARCS
5. Work Location Address: 202 Industrial Boulevard, Houma, LA

B. Site History

1. Describe briefly: Site was ~~an~~ a cleaning and repairing facility for old oil barges and fishing vessels

C. Scope of Work

1. Describe briefly: Site Reconnaissance Visit

Site Visit only, Site HASP not necessary, list personnel here and sign below:

_____, _____, _____, _____

D. Hazard Assessment and Regulatory Status

Indicate Yes (Y) or No (N) to:

1. Types of hazards anticipated.

(Y) Physio-chemical

Toxic Chemical - Levels

~~(Y) (N)~~ TLV-TWA (N) >TLV-STEL
(N) >IDLH (Y) Bio-Hazards

health:hasp.gen(pmr)

(N) Radiation
(N) Construction type
(N) Nuclear Industry type
(Y) Physical
(Y) Industrial type

2. Site Regulatory Status:

CERCLA/SARA

(Y) U.S. EPA CERCLA/SARA
(N) State
(N) NPL Site

RCRA

(N) U.S. EPA
(N) State

OSHA

(Y) 1910
(N) 1926
(N) State

NRC

(N) 10 CFR 20

Other Federal Agency)

(N) DOE
(N) USATHAMA
(N) Air Force

Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard HASP will be used and append the appropriate pages of this Form along with the Standard Plan.

3. Standard Plan to be used:

(N) Stack Test
(N) Asbestos
(N) Life Systems
(N) Construction
(N) USATHAMA
(N) Air Emissions
(N) Industrial Hygiene
(Y) Hazardous Material
(N) NRC/DOE
(N) Air Force

E. Review and Approval Documentation

Amendment 1

1. Reviewed by:

a. P.M. Carol LaBruche for RBB Date: 6/14/94
b. P.D. _____ Date: _____
c. DSO/RSO Dan Quackenbush Date: 6/5/94
d. SHSC Peter Rung Date: 6/14/94

2. Approved by: MK O for GMC Date: 6/15/94

(✓) a. Corporate Health and Safety Director (CHSD)
( ) b. DSO/RSO (Only with specific delegation by CHSD)

Project Start Date: 1/1/94; End Date: 10/1/94. This Site HASP must be Reissued/Reapproved for any activities conducted after: Date: ~~11/23/94~~ 2/2/95

Amendment Date(s): 1. ~~7/27/94~~ 8/2/94 for added task 2 DKD for GMC 8/2/94 2. _____ 3. _____ 4. _____

F. Key Personnel

1. WESTON Representative

Organization/Branch	Name/Title	Address	Telephone
Peter Rung	Assistant Geologist I	Houston, Texas	(713)621-1620
Diane Williams	Assistant Geologist I	Houston, Texas	(713)621-1620

2. Roles and Responsibilities

Field team responsible for recording site specific observations and reviewing site-related documentation.

3. **WESTON Subcontractors**

Organization/Branch	Name/Title	Address	Telephone
Not applicable			

4. **Roles and Responsibilities**

Not applicable

G. **Site Specific Health and Safety Personnel**

(Letter 7/1/94)

1. The SHSC for activities to be conducted at this Site is Peter Rung The Site Health and Safety Coordinator (SHSC) has total responsibility for ensuing that the provisions of this Site HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as SHSC's are experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120.

2. Qualifications:

   40-hour Health and Safety, CPR, First Aid, SHSC training

3. Designated alternatives include: the field personel listed on page ~~36~~ 31 that meet training requirements for SHSC who are selected by the Project Task Leader and approved by the Regional Safety Officer to be designated alternative SHSCs. An Asterisk appears after their name of the personnel listed on page ~~36~~ 31 who are eligible for this role.

II. Health and Safety Evaluation

A. Hazard Assessment

1. Background Review: Complete ( ) Partial (X). The hazard assessment for the site is partially complete because the contaminant source areas onsite and contaminant migration have not been fully characterized. The purpose of this project is to assess site hazards through reconnaissance and sampling. The HASP will be amended to include hazards noted during site reconnaissance if necessary.

2. Activities Covered Under this Plan are listed below.

Task/Subtask	Task Description	Schedule
1. Site Recon	Site Reconnaissance Walk Through	7/12
2. Sampling	Sediment Sampling	8/20-8/30

3. Types of Hazards:

a. Physio-Chemical Hazards

(Y) Flammable (N) Explosive (N) Corrosive
(Y) Reactive (N) O_2 Rich (N) O_2 Deficient [1]*

Chemically Toxic:

(Y) Inhal. (Y) Ingest. (Y) Cont.
(Y) Absorb. (Y) Carcin. (N) Mutagen
(N) Terat. (Y) OSHA 1910.1000 Substance
(~~N~~)Y OSHA Specific Hazard. Sub. Standard, Describe: BENZENE

b. Biological Hazards:

(N) Etiol. Agent (Y) Other - Plant, insect, animal [2]*

c. Radiation Ionizing Hazards: None Suspected

(N) Internal Exposure (N) External Exposure [3]*

Non-ionizing Radiation: None Suspected

(N) UV (N) IR (N) RF
(N) MicroW (N) LASER

d. Physical Hazards: (Y) [4][1]

e. Construction Activities: (N) [5][1]

---

[1] The number in the [ ] refers to one of the following hazard evaluation forms. Complete hazard evaluation forms for each appropriate Hazard Class.

B. Source/Location of Contaminants and Hazardous Substances:

1. Directly Related to Tasks

(Y) Air	(Y) Soil
(Y) Other Surface	(Y) S. Water
(Y) G. Water	(Y) Sediments
(Y) Waste Source Materials	

Note that the purpose of the site assessment is to identify source locations, and contamination is suspected in all pathways.

2. Indirectly Related to Work - Nearby Process(es) which could affect team members: None are known, but they are possible. This will be determined during site reconnaissance efforts. The HASP will be amended at the bottom of this page by the SHSC in consultation with the RSO after site recon if necessary. Nearby process areas that are not part of the site under investigation will not be approached.

Describe:

(N) In accordance with the Scope of Work, a client briefing will not be arranged before site reconnaissance is performed. Subsequently, a briefing may be held with EPA to identify imminent threats associated with the site, if any.

C. Chemical Hazards

1. Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to this project: NaOH, HCl and HNO_3 may be used as sample preservatives. A single line is drawn through non-applicable materials. MSDS Sheets attached include:

- Benzene (Suspected site contaminant)
- Toluene (Suspected site contaminant)
- Xylene (Suspected site contaminant)
- Ethylbenzene (Suspected site contaminant)
- _____ (Suspected site contaminant)
- _____ (Suspected site contaminant)
- _____ (Suspected site contaminant)

2. Chemical Contaminants of Concern (Y). If present, provide following data.

Hazardous Substance/ Task	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ % Response
Benzene	(*F) State = Liquid (in soil) pH=__ FP=12°F LEL=1.3% UEL=7.9% Auto.Ig=__ BP= 176°F MP=__ Incompatible with: strong oxidizers; many fluorides and perchlorates, nitric acid Sp.Gr=0.88 Vap.D=__ Vap.P=75mm H_2O Sol.=0.07%	NIOSH/OSHA=1 ppm ST=5 ppm IDLH=3000 ppm ~~[Cμ]~~ PK [CA]	Inh, Abs, Ing, Con/ irrt eyes, nose resp sys; gidd; head, nau, stg. gait, Ftg, anor, lass, derm.	Organic Vapor Analyzer (OVA) Response=150% (% as methane) IP=9.24 eV
Toluene	(*F) State = Liquid (in soil) pH=__ FP=40°F LEL=1.2% UEL=7.1% Auto.Ig=__ BP=232°F MP=-139°F Incompatible with: strong oxidizers Sp.Gr=0.87 Vap.D=__ Vap.P=65mm (20mm) H_2O Sol.=0.05% (61°F)	NIOSH/OSHA= 100 ppm ST=150 ppm IDLH=2000 ppm	INH, ABS, Ing, Con/ftg, weak; conf, euph, dizz, head, dilated pupils, lac; ner, musc. ftg, insom.	Organic Vapor Analyzer (OVA) Response=110% (% as methane) IP=8.82 eV
Xylenes	(*F) State = Liquid (in soil) pH=__ FP=63°F LEL=1.1% UEL=7.0% Auto.Ig=__ BP=292°F MP=__ Incompatible with: Sp.Gr=0.88 Vap.D=__ Vap.P=7mm H_2O Sol.=Insoluble	NIOSH/OSHA= 100 ppm ST=150 ppm IDLH=1000 ppm	INH, ABS, Ing, Con/dizz, excitement, drow, inco, irrit eyes, nose, throat, anor, nau, vomit	Organic Vapor Analyzer (OVA) Response= 111% (o) 116% (m) 116% (p) (% as methane) IP=8.56
Ethylbenzene	(*F) State pH=__ FP=55°F LEL=1.0% UEL=6.7% Auto.Ig=__ BP=227°F MP=__ Incompatible with: Sp.Gr=1.46 Vap.D=__ Vap.P=400mm H_2O Sol.=0.9%	NIOSH/OSHA- 100 ppm ST=125 ppm IDLH=2000 ppm		Organic Vapor Analyzer (OVA) IP=8.76 eV Response= 100% (% as methane)

* E = Explosive, F = Flammable, C = Corrosive, R = Reactive, W = Water reactive, O = Oxide, Ra = Radioactive. State = Normal physical state at site/proj. temp.

** Use lowest of two, if no TLV/PEL, use Toxicity data in following order: Lowest Toxic Co humans (LTC-HMN), Lowest Lethal Conc. in humans (LLC-HMN), Lowest Toxic Dose in humans (LT Lowest Lethal Dose in humans (LLD-HMN), LC_{50} or LD_{50} in humans, the Lowest Toxic Concentration Lowest Toxic Dose in animals, the lowest LC_{50} or LD_{50} in animals.

*** I - Inhalation, G = Ingestion, S = Skin Absorption, C = Contact, D = Direct Penetration

\+ IP = Ionization Potential

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D. Biological Hazards:

Hazard	(Y/N)	Task No.(s)*	Location/ Source (K/S)**	Route of Exposure (I,G,C,D)+	Team Member(s) Allergic?	Immuni-zation Req'd?
Poisonous Plants	(Y)	All	Suspected	Contact	No	No
Insects*	(Y)	All	Suspected	Direct Penet.	No	No
Snakes	(Y)	All	Suspected	Direct Penet.	No	No
Animals	(Y)	All	Suspected	Direct Penet.	No	No
Sewage	(N)	None reported or suspected at the site.				
Etiologic Agents	(N)	None reported or suspected at the site.				

* Note that a tick check will be completed for all of the field team members at the end of each day. The spread of lyme disease through contact with ticks is of concern.

E. Radiation Hazards of Concern: No Radiation Hazards known or suspected.

TYPE

1. Ionizing - N/A

	Location/ Source	Type Emitter	Task No.(s)	Exposure Limits	Protection Protocol Reference
RadioNuclide					

2. Non-ionizing N/A

	Location/ Source	Type Emitter	Task No.(s)	Exposure Limits	Protection Protocol Reference
Ultra violet					
Infra Red					
Microwave					
Radio-Freq.					
LASER					

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F. Physical Hazards of Concern

	Hazard (Y/N)	TASK NO(S).	Protection OP(s) (See Note Below)
1. Noise	(N)	N/A	
2. Heat - ambient air	(Y)+	All	FLD02, FLD05
- Hot Process - Steam	(N)	N/A	FLD03
- Hot Process - LT[3]	(N)	N/A	FLD04
- Hot Process - Incin.	(N)	N/A	FLD04
3. Cold	(Y)+	All	FLD02, FLD06
4. Rain	(Y)	All	FLD02, FLD07
5. Snow	(Y)+	All	FLD02
6. Electric Storms	(Y)	All	FLD02
7. Confined Space Entry	(N)	N/A	FLD08
8. "Hot Work"	(N)	N/A	FLD09
9. Heavy Manual Lifting/Moving	(Y)	All	FLD10
10. Rough Terrain	(Y)		FLD11
11. Housekeeping	(N)	N/A	FLD12
12. Structural Integrity	(N)	N/A	FLD13
13. Naughtiness	(Y)	All	
14. Remoteness	(Y)	All	FLD15
15. Compressed Gases	(Y)	All	FLD16
16. Diving	(N)	N/A	FLD17
17. Using Boats	( )		FLD18
18. Working Over Water	(N)		FLD19
19. Traffic	(N)		FLD20
20. Explosives	(N)		FLD21
21. Heavy Equipment Operation	(N)	N/A	FLD22A
22. Lifting Equipment Operation	(N)	N/A	FLD23
- Cranes,	(N)	N/A	
- Manlifts			
23. Working at Elevation	(N)	N/A	FLD25
24. Using Ladders	(N)	N/A	FLD26
25. Using Scaffolding	(N)	N/A	FLD27
26. Excavating/Trenching	(N)	N/A	FLD28
27. Materials Handling	(N)		FLD29
28. Haz. Mat. Use/Storage	(Y)	All	FLD30
- haz. liq./gases	(Y)	2	
- oxidizers	(Y)	2	
- corrosives			
29. Fire Prevent/Response plan required	(N)	N/A	FLD31
30. Fire Extinguishers required	(Y)	All	FLD32
31. Demolition	(N)	N/A	FLD33
32. Utilities - Underground	(N)	N/A	FLD34
- Overhead	(N)	N/A	
33. Electrical - General	(N)	N/A	FLD35A
- High Voltage	(N)	N/A	
34. Welding/cutting/burning	(N)	N/A	FLD36
35. Hand tools	(Y)	All	FLD38
36. Power Hand Tools	(N)	N/A	FLD38
37. High Pressure Water	(N)	N/A	FLD37

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	Hazard (Y/N)	TASK NO(S).	Protection OP(s) (See Note Below)
38. Other _____	( )		
39. Other _____	( )		
40. Other _____	( )		

NOTES:

+ Seasonal
* The Protection OPs are included in the WESTON SHSC Manual, which will be available onsite (kept in the van). This HASP will be attached to the manual so that the OPs are readily accessible with the HASP.

Task by Task Risk Analysis

The preceding tables identify the hazards known or suspected to be present in accomplishing the tasks involved in this project. Section II A.2. of this HASP describes the background of this site/project and identifies the tasks involved. Each project task and the likelihood of exposure to the hazards identified and the protective protocols to be used are briefly described below. Tasks crossed out are not applicable for this investigation.

(1) Site Reconnaissance

Members of the Project Team will perform a site walk through survey of the site. No intrusive activities will take place. Initial level of protection will be Level D because no air pathway hazards are known or suspected in the breathing zone. The Sampling Team will monitor the area using ~~a Geiger-Mueller Radiation Meter (waist level)~~ and an FID-OVA (breathing zone) to determine if upgrading to a higher level protection is needed. If elevated monitoring instrument readings are observed, the team will withdraw to the support zone immediately and upgrade appropriately to complete the work (see Page 13). An initial air monitoring effort will be made at sample locations to determine if upgrades in the level of protection are needed. See Page 13 for action levels for upgrade. Unless a miniRAM and appropriate action levels are specified below, work will stop if there is visible dust in the air. The reconnaissance team will return to the Support zone, upgrade to Level C with GMC-H APR cartridges, and continue work in Level C until the dust is no longer visually apparent.

Estimate of Risk of Exposure to Hazards:

The Risk of exposure is estimated to be low.

Additional Air Monitoring/Equipment Required for this Task:

N/A

(2c) Sediment Sampling

The Project Team will collect sediment samples from onsite and, potentially offsite, streams and drainage ditches. Team members will collect the samples from the edge of the ditch close to the bank using hand augers. Initially, Level D (modified) protection will be worn if justified by initial air monitoring at the sample locations. An FID-OVA will be used to monitor organic acids and vapors before and during sampling in the breathing zone to determine if upgrading (Page 17) to a higher Level of Protection is required. See Page 17c for action levels for upgrade. Unless a miniRAM and action levels are specified below, work will stop when dust becomes visible in the air. Work will proceed in Level C until dust is no longer visible.

Estimate of Risk of Exposure to Hazards:

LOW - THE POTENTIAL FOR CONTACT WITH SEDIMENT WILL BE MINIMIZED BY PPE

Additional Air Monitoring/Equipment:

OVA WILL BE USED TO SWEEP THE SAMPLE LOCATIONS AND IN THE BREATHING ZONE

~~MINIRAM FOR ACTION LEVELS SEE PG 17b~~ JW

Additional Sampling Equipment/Procedures:

BOOTIES, GLOVES (INNER & OUTER), OVA, DISPOSABLE PLASTIC OR STAINLESS STEEL SCOOPS, HAND AUGER, TYVEK OR SARANEX.

Additional Site Specific Information:

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Additional Site Specific Information:

A site reconnaissance indicates that WESTON has never conducted a site visit. Subsequently, the risk for exposure is evaluated based on site specific information provided in project files, and is generally considered to be minimal. However, WESTON will monitor breathing zones while conducting initial site activities, such as a site walk-through, and establish safe breathing areas at the site.

If action levels are encountered during site activities which indicate that an upgrade in PPE is required, the following procedures will be followed:

- If a certified SHSC for the required upgraded level of protection is onsite, then WESTON representatives will upgrade to the determined level and continue with site activities.

- If a certified SHSC for the required upgraded level of protection is not onsite, then WESTON representatives will immediately leave the area requiring upgrade and evacuate to an area that is established as being a safe breathing zone.

III. Personnel Protection Plan

A. Engineering Controls

1. Describe Engineering Controls used as part of Personnel Protection Plan:

Task(s):

1 - Soils may be moistened to suppress dust generation if conditions are dry and this is thought to be necessary by the SHSC.

B. Administrative Controls

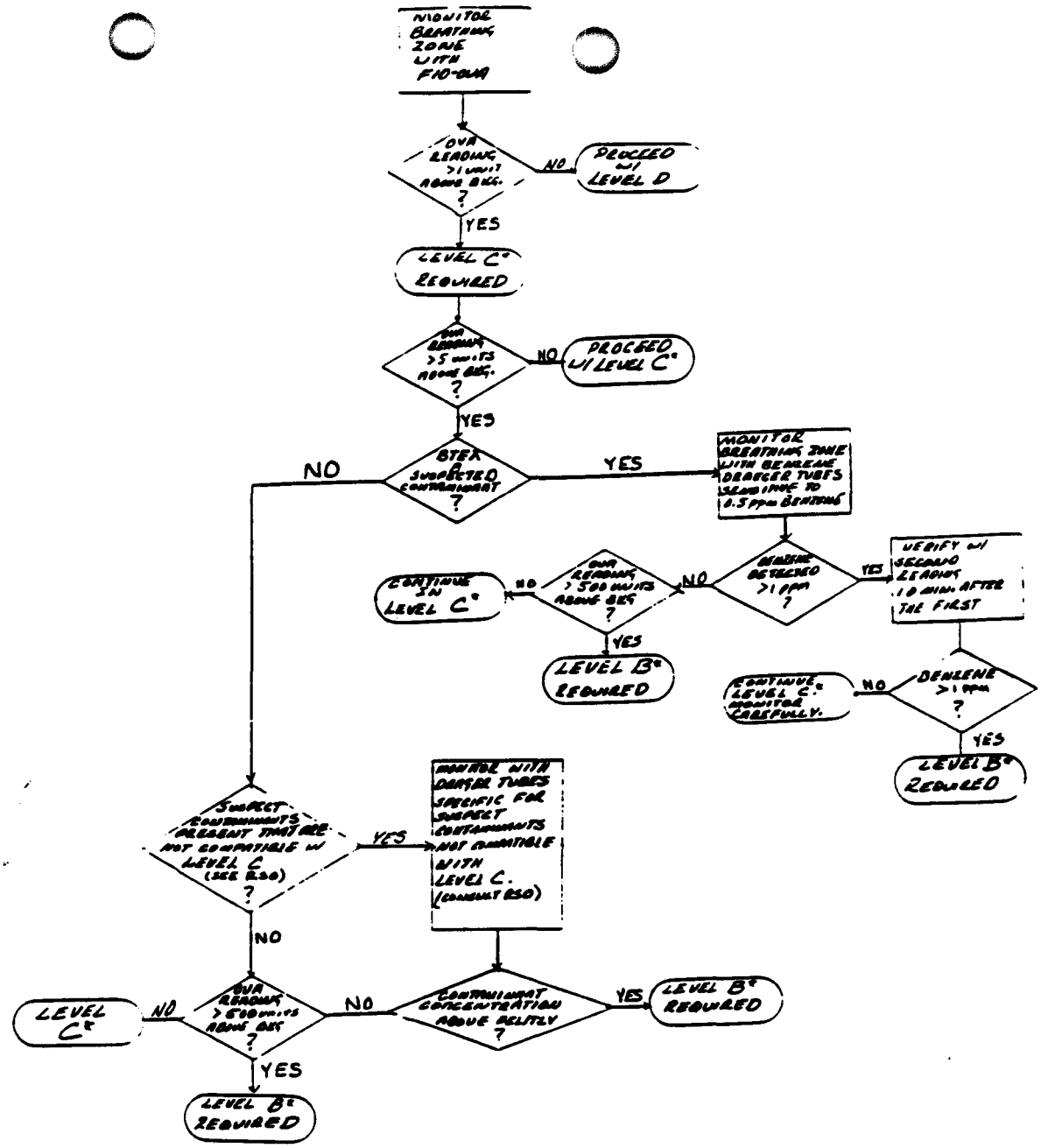
An initial safety meeting will held at the site before work starts subsequently, safety meetings will be held each morning and as needed. This will be done to keep all team members current on their knowledge of safety concerns at the site.

C. Personnel Protective Equipment*

1. Action Levels for Changing Levels of Protection

The -OVA Action Levels for up or down grade for each task are defined in the decision tree attached as the next page.

For action levels for the radiation meter, refer to page 21.
For action levels for the miniRAM (if applicable), refer to page 21.

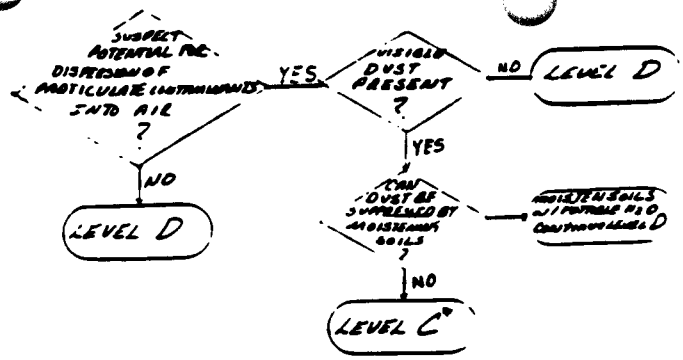


ACTION LEVELS FOR ARCS PA, SI, AND ESI FIELD WORK AT <u>INCOMPLETELY</u> CHARACTERIZED SITES

ORGANIC VAPOR ACTION LEVELS

THESE ACTION LEVELS REPRESENT A CONSERVATIVE APPROACH FOR SITES IN WHICH ORGANIC VAPOR HAZARDS HAVE BEEN INCOMPLETELY DEFINED.

***REQUIRES THAT AN SHSC CERTIFIED IN THE APPROPRIATE LEVEL OF PROTECTION BE PRESENT**



SITE NAME :

SUSPECTED CONTAMINANT PEL/TLV

ACTION LEVELS FOR ARCS PA, SI, AND ESI FIELD WORK AT <u>INCOMPLETELY</u> CHARACTERIZED SITES

PARTICULATE ACTION LEVELS

THIS ACTION LEVEL MAY ONLY BE USED IF:

1) **CONCENTRATION OF KNOWN CONTAMINANTS IN SOIL IS UNDETERMINED, AND**
2) **1/2(PEL/TLV) OF SUSPECTED CONTAMINANTS IN THE SOIL IS GREATER THAN THE 1/2(NUISANCE DUST LIMIT) VALUE OF 2.5 MG/KG.**

***REQUIRES THAT AN SHSC CERTIFIED IN THE APPROPRIATE LEVEL OF PROTECTION BE PRESENT**

Additional action levels include the following:

N/A

Refer to Benzene Protocol which is attached to the HASP as the next page.

1.6 Benzene Guideline - FLD41

Health and Safety Plan Operating Procedures

Field Operating Procedures - FLD41 - Benzene Guideline

This Operating Practice must be implemented as a strategy for air monitoring and upgrading Level of Protection (LOP) during activities where Benzene may be listed as a constituent of the contamination suspected. Activities of concern include, but are not limited to, gasoline spill response, and excavation or drilling activities where gasoline or petroleum constituents are encountered. During these activities air monitoring of the breathing zone should be conducted in the following manner:

1. Monitor contaminant concentrations with Direct Reading Instruments sensitive to aromatic compounds as specified in the Health And Safety Plan (HASP).

2. Level D protection is considered acceptable if Instrument readings remain below 1 unit above background.

3. Level C protection is required if Instrument readings are between 1 to 5 units above background.

4. An Instrument reading of 5 units above background shall be further characterized by taking a breathing zone air sample using a colorimetric detector tube (e.g. Drager, MSA). The colorimetric detector tube must be sensitive to 0.5 ppm Benzene.

5. Level C protection is considered acceptable if the colorimetric detector tube indicates less than 1.0 ppm Benzene. Periodic measurements should be taken with the colorimetric detector tube.

6. A colorimetric detector tube indication of 1.0 ppm Benzene or greater will be verified by a second measurement, using a colorimetric tube, at the end of a ten (10) minute interval.

7. Level B protection is required if both colorimetric detector tube measurements taken ten (10) minutes apart indicate 1.0 ppm Benzene or greater.

8. Irrespective of colorimetric detector tube indications Level B protection will be initiated at Direct Reading Instrument readings of 500 units above background.

2. Description of Levels

Task(s)	1 (Recon) Level D	2a (Sampling) Level D Modified	2b, c, d, e (Sampling) Level D Modified
Head Eye & Face	(X) Hardhat ~~(IF NEEDED)~~ (X) Safety Glasses or goggles	(X) Hardhat ~~(IF NEEDED)~~ (X) Safety Glasses or goggles	(X) Hardhat ~~(IF NEEDED)~~ (X) Safety Glasses or goggles
Hearing Arms & Legs Only	None None	None None	None None
Whole Body	(X) Coveralls	(X) Tyvek	(X) Saranex
Hand - gloves - gloves	(X) Latex	(X) Latex (X) Nitrile	(X) Latex (X) Nitrile
Foot - boots - boots	(X) Steel Toe Boots (X) Boot covers	(X) Steel Toe Boots (X) Boot covers	(X) Steel Toe Boots (X) Boot covers

Task(s)	2a (Sampling) Level C	2b, c, d, e (Sampling) Level C
Head	(X) Hardhat ~~(IF NEEDED)~~	(X) Hardhat ~~(IF NEEDED)~~
Eye & Face		
Hearing		
Arms & Legs Only		
Whole body apron	(X) Tyvek	(X) Saranex
Hand - gloves	(X) Latex	(X) Latex
- gloves	(X) Nitrile	(X) Nitrile
- gloves		
Foot - boots	(X) Steel-toe Boots	(X) Steel-toe Boots
- boots	(X) Boot covers	(X) Boot covers
- boots		
Full Face	(X) MSA Ultra-twin	(X) MSA Ultra-twin
Cart./Canister	(X) GMC-H	(X) GMC-H
Type C		
SAR - Airline/		
SCBA		
Comb. Airline/SCBA		
Cascade Syst		
Compressor		
Fall Protection		
Floatation		
Foot - boots		

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Amendments to Equipment/PPE Requirements:

IV. Site or Project Hazard Monitoring Program

A. Direct Reading Air Monitoring Instruments

1. Instrument Selection & Initial Check Road

	No.	Task No.(s)	Instrument checked upon receipt	Initials
OGI-	()			
O_2	()			
OGI/O_2-	()			
CGI/O2/tox-PPM,H2S,H2S/CO	()			
RAD-GM (12)	(1)	Task 1		
-NaI	()			
-ZnS	()			
Other _____	()			
PID -HNU 10.2	()			
-HNU 11.7	()			
-HNU 9.5,	()			
-PHOTOVAC, TMA, OTHER	()			
FID -FOX-128	(1)	Task 1, 2		
-FOX 128GC	()			
-Health, Aid, Other _____	()			
RAM, Mini-RAM, Other _____	()			
MONITOX-HCN	()			
H_2S	()			
COCL,	()			
SO_2	()			
Other _____	()			
Bio-Aerosol Monitor	()			
Detector Tubes	(X)	Task 1, 2		
Pump MSA, Drager, Sensidyne	(1)			
Tubes(No.)/type				
Tubes(No.)/type	(X)	Benzene (0.5/a)		
	( )			

Reporting Format

X 1. Field logbook. ____ 2. Field data sheets. ____ 3. Air monitoring log
____ 4. Trip report. ____ 5. Other.

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B. Direct Reading Air Monitoring Instruments Calibration Record

(To be Completed in the Field Logbook)

Instrument Mfg. Model, Eqp.ID.No.	Date	Time	Calib Material	Calib. Method Mfg.'s	Other	Initial Setting & Reading	Final Setting & Reading	Calibs. Initials

C. Site Air Monitoring Program

Air Monitoring Instrument: FID - FOXBORO OVA

Air Monitoring Frequency — Tasks

___X___ 1. Periodically — Task 1, 2

___X___ 2. Continuous

_____ 3. Other:

Monitoring Locations

___X___ 1. Upwind/downwind of site activities — Task 1, 2 (periodically)

___X___ 2. Near residents, etc. — Task 1

_____ 3. Key site activity locations:

___X___ decon area — Task 1, 2 (periodically)

___X___ staging area — Task 1, 2 (periodically)

_____ excavation area

_____ field lab area

___X___ storage tanks — Task 1, 2 (periodically)

___X___ lagoons — Task 1, 2 (periodically)

___X___ drums — Task 1, 2 (periodically)

_____ 4. Fixed stations

_____ 5. Other: Monitor in breathing zone during reconnaissance and site evaluation. Use of detector tubes may be required in conjunction with the use of the OVA.

Air Monitoring Instrument:

Air Monitoring Frequency — Tasks

___ ___ 1. Periodically — Task 1

_____ 2. Continuous

_____ 3. Other:

Monitoring Locations

_____ 1. Upwind/downwind of site activities

_____ 2. Near residents, etc.

_____ 3. Key site activity locations: Monitoring will be done at location of reconnaissance team

_____ decon area

_____ staging area

_____ excavation area

_____ field lab area

_____ storage tanks

_____ lagoon

_____ drums

_____ 4. Fixed stations

___ ___ 5. Other: If specified for project, monitor in breathing zone during reconnaissance and site evaluation.

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D. Action Levels

___ 1. Explosive atmosphere: Task

Action Level	Action
<10% LEL	Continue investigation
10%-25% LEL	Continue on-site monitoring with extreme caution as higher levels are encountered.
>25% LEL	Explosion hazard. **Withdraw from area immediately.**

___ 2. Oxygen: Task

Action Level	Action
<19.5%	Monitor wearing SCBA. NOTE: Combustible gas readings may not be valid in atmospheres with <19.5% oxygen.
19.5%-25%	Continue investigation with caution, as Oxygen levels >21% require extreme caution. Other than normal level may be due to presence of other substances.
>25%	Fire hazard potential. Stop work and **consult a fire safety specialist.**

X 3. ~~Radiation:~~ Task 1 (None Suspected)

Action Level	Action:
3 x BKG - ~~<2 mr/hr~~ 1 mR/hr	Radiation above background levels (normally 0.01-0.02 mR/hr)* signifies possible source(s) of radiation present.
1 mrem/hr ~~>2 mr/hr~~	Continue investigation with caution. Perform thorough monitoring. **Consult with a health physicist.** Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of a health physicist.

X 4. Organic gases and vapors: See Page 13 and Benzene Protocol attached.

___ 5. Inorganic gases and vapors:

Action Level	Action:
Depends on chemical	Consult standard reference manuals for air concentration/toxicity data. Action level depends on PEL/REL/TLV. If required miniRAM action levels are shown at bottom of page.

The Action Levels, if not defined by regulation, are some percent (usually 50%) of the applicable PEL/REL/TLV. That number must also be adjusted to account for instrument response factors (See page 7).

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I. Work Location Instrument Readings (To be Completed in Field Logbook)

Location: _____

% LEL ___, ___, ___, ___; % O_2 ____, ____, ____, ____; PID ppm ____, ____, ____, ____
FID ppm ____, ____, ____; Aerosol Monitor mg/M^3 ____, ____, ____
GM: Shield Probe/Thin Window - mR/hr ____, ____, ____; cpm ____, ____, ____
NaI _____, _____, _____, _____ uR/hr; ZnS _____, _____, _____, ____ cpm;
(Monitox) ppm: ( )____, ____, ____, ____; ( ) ____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
(Detector Tube) (s): ( ) ____, ____, ____, ____; ( )____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
Sound Levels ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA
Illumination _____; _____ Other _____ Other _____ Other _____ Other

Location: _____

% LEL ___, ___, ___, ___; % O_2 ____, ____, ____, ____; PID ppm ____, ____, ____, ____
FID ppm ____, ____, ____; Aerosol Monitor mg/M^3 ____, ____, ____
GM: Shield Probe/Thin Window - mR/hr ____, ____, ____; cpm ____, ____, ____
NaI _____, _____, _____, _____ uR/hr; ZnS _____, _____, _____, ____ cpm;
(Monitox) ppm: ( )____, ____, ____, ____; ( ) ____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
(Detector Tube) (s): ( ) ____, ____, ____, ____; ( )____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
Sound Levels ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA
Illumination _____; _____ Other _____ Other _____ Other _____ Other

Location: _____

% LEL ___, ___, ___, ___; % O_2 ____, ____, ____, ____; PID ppm ____, ____, ____, ____
FID ppm ____, ____, ____; Aerosol Monitor mg/M^3 ____, ____, ____
GM: Shield Probe/Thin Window - mR/hr ____, ____, ____; cpm ____, ____, ____
NaI _____, _____, _____, _____ uR/hr; ZnS _____, _____, _____, ____ cpm;
(Monitox) ppm: ( )____, ____, ____, ____; ( ) ____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
(Detector Tube) (s): ( ) ____, ____, ____, ____; ( )____, ____, ____, ____;
( ) ____, ____, ____, ____, ____; ( ) ____, ____, ____, ____, ____
Sound Levels ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA
Illumination _____; _____ Other _____ Other _____ Other _____ Other

V. Decontamination Plan

A. Personnel Decontamination

Section III C lists the tasks and specific levels of protection required for each. Consistent with the levels of protection required, step by step procedures for personnel decontamination for each Level of Protection are attached.

B. Levels of Protection Required for Decontamination Personnel

The levels of protection required assisting with decontamination will be Level D Modifications to Level D for this work are that Nitrile and Latex gloves will be worn by decontaminations personnel working in Level D.

C. Non Sampling Equipment Decontamination

Non sampling equipment, such as monitoring instruments, will not be exposed to sources of contamination. They will be cleaned with a damp towel or by other appropriate means. There will be no heavy machinery associated with the project other than a van and a car. Vehicles will not be driven into areas of known or suspected contamination.

D. Sampling Equipment Decontamination

Sampling equipment will be decontaminated in accordance with the following procedure:

Non disposable equipment will be washed in a tub with potable water and scrub brushes, washed with a solution of non-phosphate detergent and potable water, rinsed three times with deionized water, and allowed to air dry between sample locations. It may be decontaminated with hexane and ethanol onsite before it is returned to WESTON Regional Equipment Stores.

E. Disposition of Decontamination Wastes

Decontamination wastes will be disposed of as follows:

- Personnel protective equipment (PPE) including tyvek, saranex, boot covers, gloves and other disposables will be ~~washed in potable water to remove gross contamination and then rinsed with potable water for decontamination purposes. Subsequently, the PPE will be removed and rendered unusable by shredding it with a knife. The unusable PPE will be~~ double bagged in two plastic trash bags and disposed of in a trash dumpster, or alternatively it will be drummed and stored onsite for later disposal by EPA or WESTON. If stored onsite, the decontamination wastes will be stored onsite in an area designated by the site representative or owner.

VI. Contingencies

A. Emergency Contacts and Phone Numbers

Agency	Contact	Phone Number
Local Medical Emergency Facility		(504) 873-2200
WESTON Medical Emergency Contact	EMR	(800) 229-3674 George Crau
WESTON Health and Safety	Darryl Drenon	(713) 621-1620 & (610) 701-
Fire Department (Local)		911 and —
Police Department (Local)		911 and —
Site Coordinator	Robert Beck	(713) 621-1620
Site Telephone	None	Abandoned Site
Nearest Telephone	Field Team Leader	Hotel (to be determined)
Car Phone	Field Team Leader	To be determined

B. Local Medical Emergency Facility(s)

1. Primary Facility

Name of Hospital: Chabert Medical Center Phone No. (504) 873-2200
Address: 1978 Industrial Blvd
Name of Contact: _____
Type of Services:
( ) Physical Trauma only ( ) Chemical Exposure only
(✓) Physical Trauma & Chemical Exposure (✓) Available 24 Hours

Route to Hospital: (Attach Map)

Travel Time From Site (minutes): ~2 minutes
Distance to Hospital (miles): 1 miles
Name/No. of 24 Hour Ambulance Service: Name: Acadia Ambulance
Phone No.: 911

2. Secondary or Specialty Services Provider

Name of Hospital: NONE Phone No._____
Address: _____
Name of Contact: _____
Type of Services:
( ) Physical Trauma only ( ) Chemical Exposure only
( ) Physical Trauma & Chemical Exposure ( ) Available 24 Hours

Route to Hospital: (Attach Map)

Travel Time From Site (minutes): _____ minutes
Distance to Hospital (miles): _____ miles
Name/No. of 24 Hour Ambulance Service: Name:_____
Phone No.:_____

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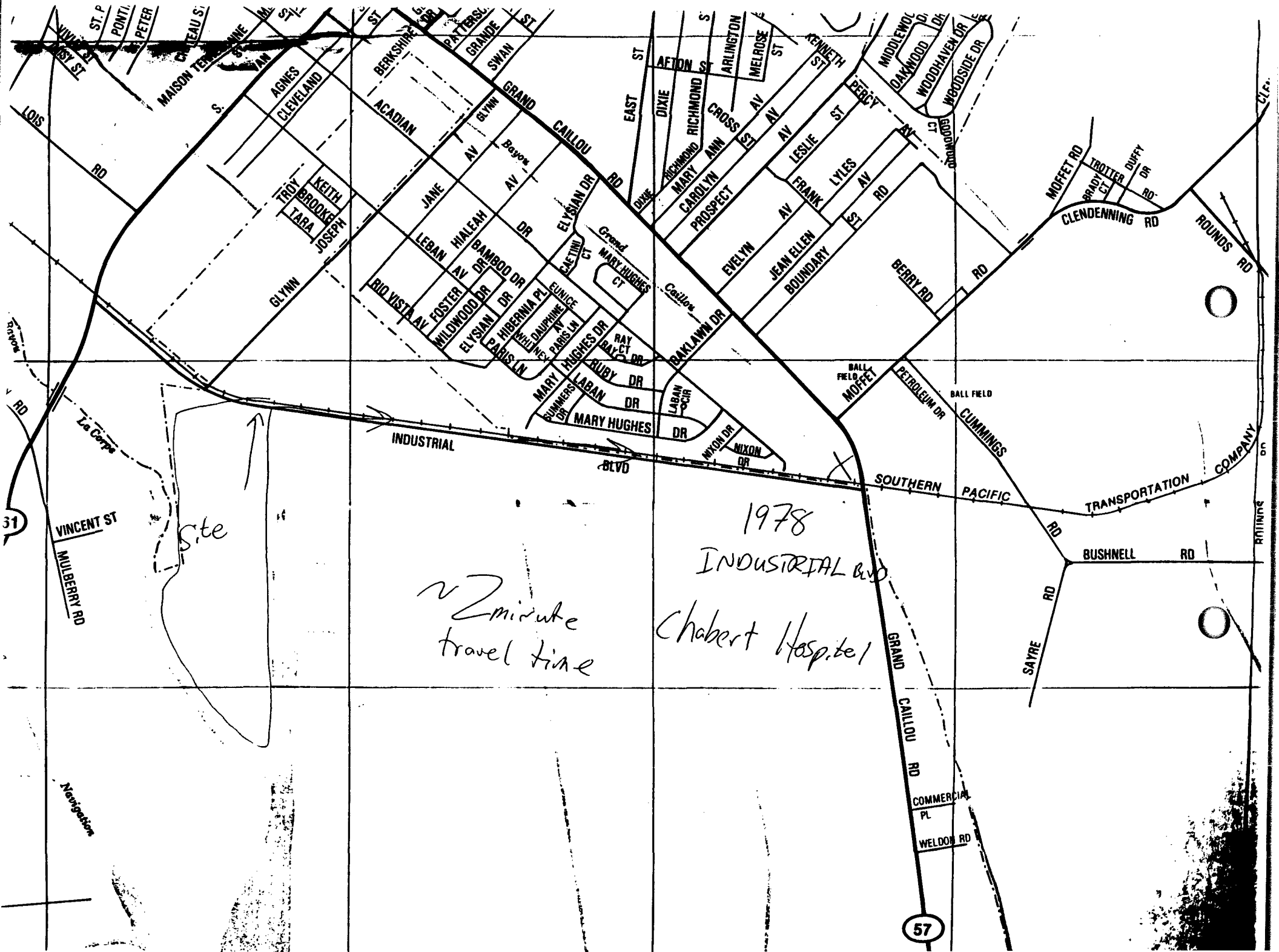

Site
~2 minute travel time
1978
INDUSTRIAL BLVD
Chabert Hospital
INDUSTRIAL BLVD
SOUTHERN PACIFIC TRANSPORTATION COMPANY
GRAND CAILLOU RD
CLENDENNING RD
CUMMINGS RD
BUSHNELL RD
SAYRE RD
MOFFET RD
BERRY RD
BAKLAWN DR
MARY HUGHES DR
LABAN DR
RUBY DR
RAY CT
RAY DR
ELYSIAN DR
CAETINI CT
MARY HUGHES CT
EUNICE
DAUPHINE AV
HIBERNIA PL
WHITNEY
PARIS LN
FOSTER
WILDWOOD DR
RIO VISTA AV
LEBAN AV
HIALEAH DR
BAMBOO DR
JANE AV
ACADIAN
GLYNN
AGNES
CLEVELAND
TROY
KEITH
BROOKE
TARA
JOSEPH
LOIS RD
VINCENT ST
MULBERRY RD
La Corps
Navigation
Bayou
Grand Caillou
BALL FIELD
PETROLEUM DR
COMMERCIAL PL
WELDON RD
NIXON DR
LABAN CIR
SUMMERS DR
EVELYN AV
JEAN ELLEN
BOUNDARY ST
FRANK
LYLES AV
LESLIE ST
PROSPECT
CAROLYN
MARY ANN
RICHMOND
DIXIE
EAST ST
AFTON ST
ARLINGTON
MELROSE ST
KENNETH ST
PERCY AV
CROSS AV
MIDDLEWOOD DR
OAKWOOD DR
WOODHAVEN DR
WOODSIDE DR
GOODWOOD CT
MOFFET RD
TROTTER RD
BRADY CT
DUFFY DR
ROUNDS RD
SOUTHERN
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C. Response Plans

1. Medical - General Response Plan:

(1) Conduct a primary survey of the scene
(2) Administer First Aid
(3) Take to hospital if necessary
(4) Document the incident and call the RSO and appropriate WESTON manager

a. First Aid Kit - Type: 25 man
Location: WESTON or rental Van

b. Eyewash required (Y) Y/N
Location(s): First Aid Kit in Van

c. Safety Shower
Location(s): N/A

2. Special First Aid Procedures: None Required
Hydrofluride on site (N) Y/N

a. Attach HF procedure and ensure solution is on site. Not Applicable

Cyanides on site (N) Y/N

b. Confirm that Local Med. Emerg. Facility has antidote kit. Not Applicable
c. Maintain infection control kit at all times (will be kept in van)

3. Plan for Response to Fire/Explosion:

(1) Evacuate site
(2) Call Fire Department (see Page 21)
(3) Call WESTON Site Manager and RSO

4. Fire Extinguisher:
Type: ABC
Location: VAN

5. Plan for Response to Spill/Release:

(1) Evacuate site
(2) Call Fire Department
(3) Call WESTON Site Manager and RSO
(4) If spill is under the RQ an absorbent material will be applied, then drummed.

6. Spill Response Gear: Not Applicable. No spill response will be performed.

7. Plan for Response to Security Problems

(1) Evacuate site if necessary
(2) Call Police (see Page 21)
(3) Call WESTON Site Manager

VII. Site Personnel and Certification Status

A. WESTON

Name	Title	Task(s)	Medical Current a.	Fit Test Current Qual b.	Fit Test Current Quant b.	Training Current c.	Certification Level or Description
Bruce Anderson*	PTL	All	(Y)	(Y)	( )	(Y)	D-S/B-T
Jeff Criner*	PTL	All	(Y)	(Y)	( )	(Y)	B-S
Steve Mitchell*	PTL	All	(Y)	(Y)	( )	(Y)	D-S/B-T
Jeff Wormser*	PTL	All	(Y)	(Y)	( )	(Y)	D-S/B-T
John Warren*	Sampler	All	(Y)	(Y)	( )	(Y)	D-S/B-T
Dennis Hayes	Sampler	All	(Y)	(Y)	( )	(Y)	B-T
Bob Ullmer*	Sampler	All	(Y)	(Y)	( )	(Y)	B-S
Phillip Allen*	Sampler	All	(Y)	(Y)	( )	(Y)	D-S/B-T
Andy Kallus	Sampler	All	(Y)	(Y)	( )	(Y)	B-T
Peter Rung*			(Y)	(Y)	( )	(Y)	~~B-S/B~~ D-S/B-T
Diane Williams*			(Y)	(Y)	( )	(Y)	D-S/B-T
			( )	( )	( )	( )	
			( )	( )	( )	( )	

Site Health and Safety Coordinator (SHSC)

Peter Rung	SHSC		(Y)	(Y)	( )	(Y)	D-S/B-T

(a) Training - All personnel, including visitors, entering the exclusion or contamination reduction zones must have certification of completion of training in accordance with OSHA 29 CFR 1910 29, CFR 1910 29, CFR 1226/1910 or 29 CFR 1910.120.

(b) Respirator Fit Testing - All persons, including visitors, entering any area requiring the use of potential use of any negative pressure respirator must have had as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI within the last 12 months. If site conditions require the use of a full face negative pressure, air purifying respirator for protection from Asbestos or lead, employees must have had a Quantitative fit test, administered according to OSHA 29 CFR 1910.1002 or 1025 within the last 6 months.

(c) Medical Monitoring requirements - All personnel, including visitors, entering the exclusion or contamination reduction zones must be certified as medically fit to work, and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910 or 29 CFR 1910.120.

The Site Health and Safety Coordinator is responsible for verifying all certifications and fit tests.

*The asterisk indicates that the person has the appropriate training to be assigned as SHSC for the project for the level of protection listed in the right hand column of the table above.

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VIII. Health and Safety Plan Approval/Sign Off Form

A. Site Name: EPA Region VI/ARCS Site Inspection Prioritization Delta
Work Order No.: 04603-027-022-2140
Site Location/Address:

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Site Safety Coordinator: Peter Runs

Signature: Peter Runs Date: 7/13/94

Name	Signature	Date
DIANE G. WILLIAMS	Diane G. Williams	7/13/94

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VIX. Training and Briefing Topics

A. The following items will be covered at the site specific training meeting, daily or periodically.

Site Specific Training Meeting	Daily	Periodically	
X			Site characterization and analysis, Sec. 3.0; 29 CFR 1910.120 i.
X	X		Physical hazards, Table 3.2.
X	X		Chemical hazards, Table 3.1.
X			Animal bites, stings and poisonous plants.
			Etiologic (Infectious) Agents.
X			Site control, Sec. 8.0; 29 CFR 1910.120 d.
			Engineering controls and work practices, Sec. 8.5; 29 CFR 1910.120 g. Heavy Machinery.
			Forklift
			Backhoe
			Equipment
			Tools
			Ladder 29 CFR 1910.27 d.
			Overhead and Underground Utilities
			Scaffolds
			Structural Integrity
			Unguarded Openings-wall, Floor, Ceilings (?).
			Pressurized Air Cylinders
X	X		Personnel Protective Equipment, Sec. 5.0; 29 CFR 1910.120 g; 20 CFR 1910.134
X			Respiratory Protection Sec. 5.8; 29 CFR 1910.120g; Z88.2-1980.
			Level A
			Level B
X		X	Level C
X	X		Level D
X	X	X	Monitoring, Sec. 7.0; 29 CFR 1910.120 h.
X		X	Decontamination, Sec. 9.0; 29 CFR 1910.120 k.

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Site Specific Training Meeting	Daily	Periodically	
			Emergency Response, Sec. 10.0; 29 CFR 1910.120 l.
			Elements of an Emergency Response, Sec. 100; 29 CFR 1910.120 l.
X	X		Procedures for Handling Site Emergency Incidents; Sec. 10.0; 29 CFR 1910.120 l.
			Off Site Emergency Response, 29 CFR 1910.120 l.
			Handling Drums and Containers, 29 CFR 1910.120 j.
			Opening Drums and Containers
			Electrical Material Handling Equipment.
			Radioactive Waste.
			Shock Sensitive Waste.
			Laboratory Waste Packs.
			Sampling Drums and Containers.
X		X	Shipping and Transport, 49 CFR 172.101.
			Tank and Vault Procedures.
			Illumination, 29 CFR 1910.120 m.
			Sanitation, 29 CFR 1910.120 n.

Attachment 1. Level D/Modified Level D Decontamination
[Check indicated Functions or add steps as necessary]

Step	Function	Description of Process Solution and Container
(1)	Segregated equipment drop	Plastic Sheet
(2)	Boot cover & glove wash	Non-phosphate in a tub
(3)	Boot cover & glove rinse	Non-phosphate in a tub or spray bottle
(4)	Tape removal Outer glove & boot	Double Bag for Disposal
(5)	Boot cover removal	Double Bag for Disposal
(6)	Outer glove removal	Double Bag for Disposal
	----------Hot-Line----------	
( )	Suit/safety boot wash	None
( )	Suit/boot/glove rise	
( )	Safety boot removal	Plastic Bag for Cleaning if necessary
(7)	Suit Removal	Bag for Cleaning
~~(8)~~	~~Inner glove wash~~	~~Non-phosphate detergent solution in a bucket~~
~~(9)~~	~~Inner glove rinse~~	~~Deionized water in a bucket~~
(10)	Inner glove removal	Double Bag for Disposal
( )	Inner clothing removal	
	----------CRZ Safe Zone Boundary----------	
( )	Field Wash	Replace gloves, boot cover
(11)	Redress	Replace suit if necessary

DISPOSAL PLAN:

END OF DAY: All waste PPE will be shredded to render it unusable, and it will be double bagged in plastic trash bags. Waste PPE may be stored in a drum onsite on a daily basis, or it may disposed of daily as indicated for End of Project disposal below.

END OF PROJECT: Double bagged waste PPE will be disposed of in an appropriate trash dumpster. Alternatively it will be left onsite in a drum for subsequent disposal by EPA or WESTON.

Attachment 2. Level C/Decontamination
[Check indicated Functions or add steps as necessary]

Step	Function	Description of Process, Solution and Container
(1)	Segregated equipment drop	Plastic (Visqueen) sheet on ground
(2)	Boot cover & glove wash	Non-phosphate Detergent Solution in a tub
(3)	Boot cover & glove rinse	Potable water in a tub
(4)	Tape removal Outer glove & boot	Double bag for disposal
(5)	Boot cover removal	Double bag for disposal
(6)	Outer glove removal	Double bag for disposal
	——Hot-Line——	
(7)	*Suit/safety boot wash	Non-phosphate detergent solution
(8)	*Suit/boot/glove rise	Potable water in a tub
(9)	Safety boot removal	Plastic bag for cleaning
(10)	Suit Removal	Bag for disposal in a tub
(11)	Inner glove wash	Non-phosphate detergent solution in a tub
(12)	Inner glove rinse	Potable water in a tub
(13)	Face piece removal	Plastic Cloth
(14)	Inner glove removal	Double bag for disposal
( )	Inner clothing removal	
	——CRZ/SafeZone Boundary——	
( )	Field Wash	
( )	Redress	

DISPOSAL PLAN:

END OF DAY: See plan for Level D.

END OF PROJECT: See plan for Level D.

*Only if Saranex. Tyvek suits will not be washed.

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B. Key Personnel/Identification of Health and Safety Personnel

1.0 Key Personnel

The following personnel and organizations are key to the activities at this site.

EPA Representatives

Organization/Branch	Name/Title	Address	Telephone
EPA/Hazardous Waste	Stacey Bennett Work Assignment Mgr.	1445 Ross Ave. Dallas, TX 75202	214/655-6941
EPA Superfund Site Assessments	Ed Sierra Section Chief	1445 Ross Ave. Dallas, TX 75202	214/655-6740

Roles and Responsibilities: Primary Client Contacts for Technical Work

Other EPA Contractors & Subcontractors (None This Project)

Organization/Branch	Name/Title	Address	Telephone

Roles and Responsibilities: _____

Other Regulatory Agency Representatives None

Organization/Branch	Name/Title	Address	Telephone

Roles and Responsibilities: _____

BENZENE

BNZ

Common Synonyms	Watery liquid	Colorless	Gasoline-like odor
Benzol Benzole	Floats on water. Flammable, irritating vapor is produced. Freezing point is 42°F.		

- Avoid contact with liquid and vapor. Keep people away.
- Wear goggles and self-contained breathing apparatus.
- Shut off ignition sources and call fire department.
- Stop discharge if possible.
- Stay upwind and use water spray to knock down vapor.
- Isolate and remove discharged material.
- Notify local health and pollution control agencies.

Fire	FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.
Exposure	CALL FOR MEDICAL AID **VAPOR** Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. **LIQUID** Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.
Water Pollution	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-high flammability

Restrict access

2. LABEL

2.1 Category: Flammable liquid

2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic Hydrocarbon

3.2 Formula: C_6H_6

3.3 IMO/UN Designation: 3.2/1114

3.4 DOT ID No.: 1114

3.5 CAS Registry No.: 71-43-2

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (at shipped): Liquid

4.2 Color: Colorless

4.3 Odor: Aromatic; rather pleasant aromatic odor; characteristic odor

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Hydrocarbon vapor canister, supplied air or a hose mask; hydrocarbon-resistant rubber or plastic gloves; chemical goggles or face splash shield; hydrocarbon-resistant apron such as neoprene.

5.2 Symptoms Following Exposure: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death.

5.3 Treatment of Exposure: 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.

5.4 Threshold Limit Value: 10 ppm

5.5 Short Term Inhalation Limits: 75 ppm for 30 min.

5.6 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 mg/kg

5.7 Late Toxicity: Leukemia

5.8 Vapor (Gas) Irritant Characteristics: If present in high concentrations, vapors may cause irritation of eyes or respiratory system. The effect is temporary.

5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.

5.10 Odor Threshold: 4.68 ppm

5.11 IDLH Value: 2,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 12°F C.C.

6.2 Flammable Limits in Air: 1.3%-7.9%

6.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide

6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective

6.5 Special Hazards of Combustion Products: Not pertinent

6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back

6.7 Ignition Temperature: 1087°F

6.8 Electrical Hazard: Class I, Group D

6.9 Burning Rate: 6.0 mm/min.

6.10 Adiabatic Flame Temperature: Data not available

6.11 Stoichiometric Air to Fuel Ratio: Data not available

6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction

7.2 Reactivity with Common Materials: No reaction

7.3 Stability During Transport: Stable

7.4 Neutralizing Agents for Acids and Caustics: Not pertinent

7.5 Polymerization: Not pertinent

7.6 Inhibitor of Polymerization: Not pertinent

7.7 Water Reactivity (Reactant to Products): Data not available

7.8 Reactivity Group: 32

8. WATER POLLUTION

8.1 Aquatic Toxicity:
5 ppm/6 hr/minnow/lethal/distilled water
20 ppm/24 hr/sunfish/TL_m/tap water

8.2 Waterfowl Toxicity: Data not available

8.3 Biological Oxygen Demand (BOD): 1.2 lb/lb, 10 days

8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity:

Industrial pure	99+%
Thiophene-free	99+%
Nitration	99+%
Industrial 90%	95+%
Reagent	99+%

9.2 Storage Temperature: Open

9.3 Inert Atmosphere: No requirement

9.4 Venting: Pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

A-T-U-V-W

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid

11.2 NAS Hazard Rating for Bulk Water Transportation:

Category	Rating
Fire	3
Health	
Vapor Irritant	1
Liquid or Solid Irritant	1
Poisons	3
Water Pollution	
Human Toxicity	3
Aquatic Toxicity	1
Aesthetic Effect	3
Reactivity	
Other Chemicals	2
Water	1
Self Reaction	0

11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Liquid

12.2 Molecular Weight: 78.11

12.3 Boiling Point at 1 atm: 176°F = 80.1°C = 353.3°K

12.4 Freezing Point: 42.0°F = 5.5°C = 278.7°K

12.5 Critical Temperature: 552.0°F = 289.0°C = 562.1°K

12.6 Critical Pressure: 710 psia = 48.3 atm = 4.89 MN/m²

12.7 Specific Gravity: 0.879 at 20°C (liquid)

12.8 Liquid Surface Tension: 28.8 dynes/cm = 0.0288 N/m at 20°C

12.9 Liquid Water Interfacial Tension: 35.0 dynes/cm = 0.035 N/m at 20°C

12.10 Vapor (Gas) Specific Gravity: 2.7

12.11 Ratio of Specific Heats of Vapor (Gas): 1.081

12.12 Latent Heat of Vaporization: 169 Btu/lb = 94.1 cal/g = 3.94 X 10⁵ J/kg

12.13 Heat of Combustion: −17,480 Btu/lb = −9699 cal/g = −406.0 X 10⁵ J/kg

12.14 Heat of Decomposition: Not pertinent

12.15 Heat of Solution: Not pertinent

12.16 Heat of Polymerization: Not pertinent

12.26 Heat of Fusion: 30.46 cal/g

12.26 Limiting Value: Data not available

12.27 Reid Vapor Pressure: 3.22 psia

NOTES

TOLUENE

TOL

Common Synonyms	Watery liquid	Colorless	Pleasant odor
Toluol Methylbenzene Methylbenzol	Floats on water. Flammable, irritating vapor is produced.		

Stop discharge if possible. Keep people away.
Shut off ignition sources and call fire department.
Stay upwind and use water spray to "knock down" vapor.
Avoid contact with liquid and vapor.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire

FLAMMABLE.
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.

Wear goggles and self-contained breathing apparatus.
Extinguish with dry chemical, foam, or carbon dioxide.
Water may be ineffective on fire.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID.

VAPOR
Irritating to eyes, nose and throat.
If inhaled, will cause nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness.

Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing difficult, give oxygen.

LIQUID
Irritating to skin and eyes.
If swallowed, will cause nausea, vomiting or loss of consciousness.

Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.
DO NOT INDUCE VOMITING.

Water Pollution

Dangerous to aquatic life in high concentrations.
Fouling to shoreline.
May be dangerous if it enters water intakes.

Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)
Issue warning-high flammability
Evacuate area

2. LABEL

2.1 Category: Flammable liquid
2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic Hydrocarbon
3.2 Formula: $C_6H_5CH_3$
3.3 IMO/UN Designation: 3.2/1294
3.4 DOT ID No.: 1294
3.5 CAS Registry No.: 108-88-3

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Liquid
4.2 Color: Colorless
4.3 Odor: Pungent; aromatic, benzene-like; distinct, pleasant

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Air-supplied mask; goggles or face shield; plastic gloves.
5.2 Symptoms Following Exposure: 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, gaping, dizziness, depressed respiration.
5.3 Treatment of Exposure: 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.
5.4 Threshold Limit Value: 100 ppm
5.5 Short Term Inhalation Limits: 600 ppm for 30 min.
5.6 Toxicity by Ingestion: Grade 2; LD_{50} = 0.5 to 5 g/kg
5.7 Late Toxicity: Kidney and liver damage may follow ingestion.
5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
5.10 Odor Threshold: 0.17 ppm
5.11 IDLH Value: 2,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 40°F C.C.; 55°F O.C.
6.2 Flammable Limits in Air: 1.27%-7%
6.3 Fire Extinguishing Agents: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires.
6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back.
6.7 Ignition Temperature: 997°F
6.8 Electrical Hazard: Class I, Group D
6.9 Burning Rate: 5.7 mm/min.
6.10 Adiabatic Flame Temperature: Data not available

(Continued)

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: 32

8. WATER POLLUTION

8.1 Aquatic Toxicity: 1180 mg/l/96 hr/sunfish/TL$_m$/fresh water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): 0%, 5 days; 30% (theor), 5 days
8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research, reagent, nitration-all 99.5 + %; industrial: contains 94 + %, with 5% xylene and small amounts of benzene and nonaromatic hydrocarbons; 90/120: less pure than industrial.
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open (flame arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)
A-T-U

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid
11.2 NAS Hazard Rating for Bulk Water

Transportation: Category	Rating
Fire	3
Health	
Vapor Irritant	1
Liquid or Solid Irritant	1
Poisons	2
Water Pollution	
Human Toxicity	1
Aquatic Toxicity	3
Aesthetic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0

11.3 NFPA Hazard Classifications

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Liquid
12.2 Molecular Weight: 92.14
12.3 Boiling Point at 1 atm: 231.1°F = 110.6°C = 383.8°K
12.4 Freezing Point: −139°F = −95.0°C = 178.2°K
12.5 Critical Temperature: 605.4°F = 318.6°C = 591.8°K
12.6 Critical Pressure: 599.1 psia = 40.85 atm = 4.136 MN/m²
12.7 Specific Gravity: 0.867 at 20°C (liquid)
12.8 Liquid Surface Tension: 28.0 dynes/cm = 0.0280 N/m at 20°C
12.9 Liquid Water Interfacial Tension: 36.1 dynes/cm = 0.0361 N/m at 20°C
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): 1.089
12.12 Latent Heat of Vaporization: 155 Btu/lb = 86.1 cal/g = 3.61 X 10⁵ J/kg
12.13 Heat of Combustion: −17,430 Btu/lb = −9690 cal/g = −405.5 X 10⁵ J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.17 Heat of Fusion: 17.17 cal/g
12.18 Limiting Value: Data not available
12.19 Reid Vapor Pressure: 1.1 psia

6. FIRE HAZARDS (Continued)

6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

ETHYLBENZENE

ETB

Common Synonyms	Liquid	Colorless	Sweet, gasoline-like odor
Phenylethane EB	Floats on water. Flammable, irritating vapor is produced.		

[illegible] wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves)
Shut off ignition sources and call fire department
Stop discharge if possible
Stay upwind and use water spray to knock down vapor
Isolate and remove discharged material
Notify local health and pollution control agencies

Fire

FLAMMABLE.
Flashback along vapor trail may occur.
Vapor may cause flash fire or explosion in an enclosed area.
[illegible] wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves)
Extinguish with dry chemical, foam, or carbon dioxide
Water may be ineffective on fire
Cool exposed containers with water.

Exposure

[illegible] MEDICAL AID

VAPOR
Irritating to eyes, nose and throat.
If inhaled, will cause dizziness or difficult breathing.
If breathing has stopped, give artificial respiration
If breathing is difficult, give oxygen

LIQUID
Will burn skin and eyes.
Remove if contaminated clothing and shoes.
Flush affected areas with plenty of water
IF IN EYES hold eyelids open and flush with plenty of water
IF SWALLOWED and victim is CONSCIOUS, have victim drink water [illegible]
DO NOT INDUCE VOMITING

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
Floating to shoreline.
May be dangerous if it enters water intakes.

Notify local health and wildlife officials
Notify operators of nearby water intakes

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)
Mechanical containment
Should be removed
Chemical and physical treatment

2. LABEL

2.1 Category: Flammable liquid
2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic hydrocarbon
3.2 Formula: $C_6H_5CH_2CH_3$
3.3 IMO/UN Designation: 3.3/1175
3.4 DOT ID No.: 1175
3.5 CAS Registry No.: 100-41-4

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Liquid
4.2 Color: Colorless
4.3 Odor: Aromatic

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Self-contained breathing apparatus; safety goggles.
5.2 Symptoms Following Exposure: Inhalation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters.
5.3 Treatment of Exposure: INHALATION: if it affects odor, 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.
5.4 Threshold Limit Value: 100 ppm
5.5 Short Term Inhalation Limits: 200 ppm for 30 min.
5.6 Toxicity by Ingestion: Grade 2; LD_{50} = 0.5 to 5 g/kg (rat)
5.7 Late Toxicity: Data not available
5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary.
5.9 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure.
5.10 Odor Threshold: 140 ppm
5.11 IDLH Value: 2,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 60°F O.C., 55°F C.C.
6.2 Flammable Limits in Air: 1.0%-6.7%
6.3 Fire Extinguishing Agents: Foam (most effective), water fog, carbon dioxide or dry chemical.
6.4 Fire Extinguishing Agents Not to be Used: Not pertinent
6.5 Special Hazards of Combustion Products: Irritating vapors are generated when heated.
6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back.
6.7 Ignition Temperature: 687°F
6.8 Electrical Hazard: Not pertinent
6.9 Burning Rate: 5.8 mm/min.
6.10 Autoignition Flame Temperature: Data Not Available

(Continued)

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data Not Available
7.8 Reactivity Group: 32

8. WATER POLLUTION

8.1 Aquatic Toxicity: 20 ppm/96 hr/bluegill/TL_m/fresh water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): 2.6% (Rand), 5 days
8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research grade: 99.99%; pure grade: 99.5%; technical grade: 99.0%
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open (flame arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

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11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid
11.2 NAS Hazard Rating for Bulk Water Transportation:

Category	Rating
Fire	3
Health	
Vapor Irritant	2
Liquid or Solid Irritant	2
Poisons	2
Water Pollution	
Human Toxicity	1
Aquatic Toxicity	3
Aquatic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0

11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Liquid
12.2 Molecular Weight: 106.17
12.3 Boiling Point at 1 atm: 277.2°F = 136.2°C = 409.4°K
12.4 Freezing Point: −139°F = −95°C = 178°K
12.5 Critical Temperature: 651.6°F = 343.2°C = 617.1°K
12.6 Critical Pressure: 523 psia = 35.6 atm = 3.61 MN/m²
12.7 Specific Gravity: 0.867 at 20°C (liquid)
12.8 Liquid Surface Tension: 29.2 dynes/cm = 0.0292 N/m at 20°C
12.9 Liquid Water Interfacial Tension: 35.40 dynes/cm = 0.03540 N/m at 20°C
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): 1.071
12.12 Latent Heat of Vaporization: 144 Btu/lb = 80.1 cal/g = 3.35 X 10⁵ J/kg
12.13 Heat of Combustion: −17,780 Btu/lb = −9877 cal/g = −413.5 X 10⁵ J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.20 Heat of Fusion: Data Not Available
12.26 Limiting Value: Data Not Available
12.27 Reid Vapor Pressure: 0.4 psia

6. FIRE HAZARDS (Continued)

6.11 Stoichiometric Air to Fuel Ratio: Data Not Available
6.12 Flame Temperature: Data Not Available

m-XYLENE

XLM

Common Synonyms

1, 3-Dimethylbenzene
Xyl.

Watery liquid — Colorless — Sweet odor

Floats on water. Flammable, irritating vapor is produced.

Stop discharge if possible. Keep people away.
Call fire department.
Avoid contact with liquid and vapor.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire

FLAMMABLE
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.
Wear self-contained breathing apparatus.
Extinguish with foam, dry chemical, or carbon dioxide.
Water may be ineffective on fire.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID

VAPOR
Irritating to eyes, nose, and throat.
If inhaled, will cause headache, difficult breathing, or loss of consciousness.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Irritating to skin and eyes.
If swallowed, will cause nausea, vomiting, or loss of consciousness.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold lids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.
DO NOT INDUCE VOMITING.

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
Floating to shoreline.
May be dangerous if it enters water intakes.

Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)
Issue warning-high flammability
Evacuate area
Should be removed
Chemical and physical treatment

2. LABEL

2.1 Category: Flammable liquid
2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic Hydrocarbon
3.2 Formula: m-$C_6H_4(CH_3)_2$
3.3 IMO/UN Designation: 3.2/1307
3.4 DOT ID No.: 1307
3.5 CAS Registry No.: 108-38-3

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Liquid
4.2 Color: Colorless
4.3 Odor: Like kerosene; characteristic aromatic

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots.
5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma; can be fatal. Kidney and liver damage can occur.
5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; 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.
5.4 Threshold Limit Value: 100 ppm
5.5 Short Term Inhalation Limits: 300 ppm for 30 min.
5.6 Toxicity by Ingestion: Grade 2; LD_{50} = 50 to 500 g/kg
5.7 Late Toxicity: Kidney and liver damage.
5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
5.10 Odor Threshold: 0.05 ppm
5.11 IDLH Value: 10,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 84°F C.C.
6.2 Flammable Limits in Air: 1.1%-6.4%
6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide
6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective.
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.
6.7 Ignition Temperature: 867°F
6.8 Electrical Hazard: Class I, Group D
6.9 Burning Rate: 5.8 mm/min.
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Water Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: 32

8. WATER POLLUTION

8.1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL_m/fresh water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 0% (theor.), 5 days
8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research: 99.99%; Pure: 99.9%; Technical: 99.2%
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open (flame arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)
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11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid
11.2 NAS Hazard Rating for Bulk Water Transportation:

Category	Rating
Fire	3
Health	
Vapor Irritant	1
Liquid or Solid Irritant	1
Poisons	2
Water Pollution	
Human Toxicity	1
Aquatic Toxicity	3
Aesthetic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0

11.3 NFPA Hazard Classifications:

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Liquid
12.2 Molecular Weight: 106.16
12.3 Boiling Point at 1 atm: 289.4°F = 131.9°C = 405.1°K
12.4 Freezing Point: −54.2°F = −47.9°C = 225.3°K
12.5 Critical Temperature: 650.5°F = 343.6°C = 617.0°K
12.6 Critical Pressure: 513.5 atm = 34.80 psia = 3.540 MN/m²
12.7 Specific Gravity: 0.864 at 20°C (liquid)
12.8 Liquid Surface Tension: 28.8 dynes/cm = 0.0288 N/m at 20°C
12.9 Liquid Water Interfacial Tension: 38.4 dynes/cm = 0.0384 N/m at 20°C
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): 1.071
12.12 Latent Heat of Vaporization: 147 Btu/lb = 81.8 cal/g = 3.42 X 10⁵ J/kg
12.13 Heat of Combustion: −17,554 Btu/lb = −9752.4 cal/g = −408.31 X 10⁵ J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.25 Heat of Fusion: 28.01 cal/g
12.26 Limiting Value: Data not available
12.27 Reid Vapor Pressure: 0.34 psia

NOTES

o-XYLENE

XLO

[illegible] Synonyms Co[illegible] 1, 2-Dimethylben[illegible] Xylol	Watery liquid Colorless Sweet odor Floats [illegible] water. Flammable [illegible] creating vapor is produced.

Stop discharge if possible. Keep people away.
Call fire department.
Avoid contact with liquid and vapor.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire	FLAMMABLE Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.
Exposure	CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.
Water Pollution	Dangerous to aquatic life in high concentrations. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-high flammability
Evacuate area
Should be removed
Chemical and physical treatment

2. LABEL

2.1 Category: Flammable liquid
2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic Hydrocarbon
3.2 Formula: o-$C_6H_4(CH_3)_2$
3.3 IMO/UN Designation: 3.2/1307
3.4 DOT ID No.: 1307
3.5 CAS Registry No.: 95-47-6

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (at shipping): Liquid
4.2 Gases: Colorless
4.3 Odor: Benzene-like; characteristic aromatic

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots.
5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma. Can be fatal. Kidney and liver damage can occur.
5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; 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.
5.4 Threshold Limit Value: 100 ppm
5.5 Short Term Inhalation Limits: 300 ppm for 30 min.
5.6 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 mg/kg
5.7 Late Toxicity: Kidney and liver damage.
5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
5.10 Odor Threshold: 0.05 ppm
5.11 IDLH Value: 10,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 63°F C.C.; 75°F O.C.
6.2 Flammable Limits in Air: 1.1%-7.0%
6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide
6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective.
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.
6.7 Ignition Temperature: 867°F
6.8 Electrical Hazard: Class I, Group D
6.9 Burning Rate: 5.8 mm/min.
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: 32

8. WATER POLLUTION

8.1 Aquatic Toxicity: >100 mg/l/96 hr/D. magna/TL_m/fresh water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): 0 lb/lb. 5 days; 2.5% (theor.), 5 days
8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research: 99.99%; Pure: 99.7%; Commercial: 95+%
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No reaction
9.4 Venting: Open (flame arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

A-T-U

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid
11.2 NAS Hazard Rating for Bulk Water Transportation:

Category	Rating
Fire	3
Health	
Vapor Irritant	1
Liquid or Solid Irritant	1
Poisons	2
Water Pollution	
Human Toxicity	1
Aquatic Toxicity	3
Aesthetic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0

11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 16°C and 1 atm: Liquid
12.2 Molecular Weight: 106.16
12.3 Boiling Point at 1 atm: 291.9°F = 144.4°C = 417.9°K
12.4 Freezing Point: −13.3°F = −25.2°C = 248.0°K
12.5 Critical Temperature: 674.8°F = 357.1°C = 630.3°K
12.6 Critical Pressure: 541.5 atm = 36.04 psia = 3.732 MN/m²
12.7 Specific Gravity: 0.880 at 20°C (liquid)
12.8 Liquid Surface Tension: 30.53 dynes/cm = 0.03053 N/m at 15.5°C
12.9 Liquid Water Interfacial Tension: 35.00 dynes/cm = 0.03500 N/m at 20°C
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): 1.088
12.12 Latent Heat of Vaporization: 149 Btu/lb = 82.9 cal/g = 3.47 X 10⁴ J/kg
12.13 Heat of Combustion: −17,580 Btu/lb = −9764.7 cal/g = −408.41 X 10⁴ J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.35 Heat of Fusion: 20.64 cal/g
12.36 Limiting Volume: Data not available
12.37 Reid Vapor Pressure: 0.25 psia

NOTES

p-XYLENE

XLP

Common Synonyms
1, 4-Dimethylbenzene
Xylol

Watery liquid | Colorless | Sweet odor

Floats on water. Flammable, irritating vapor is produced.
Freezing point is 56°F.

Stop discharge if possible. Keep people away
Call fire department
Avoid contact with liquid and vapor
Isolate and remove discharged material
Notify local health and pollution control agencies

Fire

FLAMMABLE
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.

Wear self-contained breathing apparatus.
Extinguish with foam, dry chemical, or carbon dioxide
Water may be ineffective on fire
Cool exposed containers with water

Exposure

CALL FOR MEDICAL AID

VAPOR
Irritating to eyes, nose and throat.
If inhaled, will cause dizziness, difficult breathing, or loss of consciousness.

Move to fresh air
If breathing has stopped, give artificial respiration
If breathing is difficult, give oxygen

LIQUID
Irritating to skin and eyes.
If swallowed, will cause nausea, vomiting, loss of consciousness.

Remove contaminated clothing and shoes
Flush affected areas with plenty of water
IF IN EYES, hold lids open and flush with plenty of water
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.
DO NOT INDUCE VOMITING.

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
Fouling to shoreline.
May be dangerous if in entire water intake.

Notify local health and wildlife officials
Notify operators of nearby water intakes

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-high flammability
Evacuate area
Should be removed
Chemical and physical treatment

2. LABEL

2.1 Category: Flammable liquid
2.2 Class: 3

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Aromatic Hydrocarbon
3.2 Formula: p-$C_6H_4(CH_3)_2$
3.3 IMO/UN Designation: 3.2/1307
3.4 DOT ID No.: 1307
3.5 CAS Registry No.: 106-42-3

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Liquid
4.2 Color: Colorless
4.3 Odor: Like benzene; characteristic aromatic

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots.
5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma. Can be fatal. Kidney and liver damage can occur.
5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; 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.
5.4 Threshold Limit Value: 100 ppm
5.5 Short Term Inhalation Limits: 300 ppm for 30 min.
5.6 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 mg/kg
5.7 Late Toxicity: Kidney and liver damage.
5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
5.10 Odor Threshold: 0.05 ppm
5.11 IDLH Value: 10,000 ppm

6. FIRE HAZARDS

6.1 Flash Point: 81°F C.C.
6.2 Flammable Limits in Air: 1.1%-6.6%
6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide
6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective.
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.
6.7 Ignition Temperature: 870°F
6.8 Electrical Hazard: Class I, Group D
6.9 Burning Rate: 5.8 mm/min.
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Water Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: 22

8. WATER POLLUTION

8.1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL_m/fresh water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): 0 lb/lb in 5 days
8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research: 99.99%; Pure: 99.8%; Technical: 99.0%
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open (flame arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

A-T-U

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable liquid
11.2 NAS Hazard Rating for Bulk Water

Transportation: Category	Rating
Fire	3
Health	
Vapor Irritant	1
Liquid or Solid Irritant	1
Poisons	2
Water Pollution	
Human Toxicity	1
Aquatic Toxicity	3
Aesthetic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0

11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Liquid
12.2 Molecular Weight: 106.16
12.3 Boiling Point at 1 atm: 280.5°F = 138.5°C = 411.5°K
12.4 Freezing Point: 55.9°F = 13.3°C = 286.5°K
12.5 Critical Temperature: 649.4°F = 343.0°C = 616.2°K
12.6 Critical Pressure: 508.4 atm = 34.65 psia = 3.510 MN/m²
12.7 Specific Gravity: 0.861 at 20°C (liquid)
12.8 Liquid Surface Tension: 28.3 dynes/cm = 0.0283 N/m at 20°C
12.9 Liquid Water Interfacial Tension: 37.0 dynes/cm = 0.0370 N/m at 20°C
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): 1.071
12.12 Latent Heat of Vaporization: 150 Btu/lb = 81 cal/g = 3.4 X 10⁵ J/kg
12.13 Heat of Combustion: −17,580 Btu/lb = −9764.7 cal/g = −408.41 X 10⁵ J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.17 Heat of Fusion: 37.89 cal/g
12.18 Limiting Value: Data not available
12.19 Reid Vapor Pressure: 0.34 psia

NOTES

ATTACHMENT 2

Reconnaissance Checklist

SITE RECONNAISSANCE CHECKLIST
GENERAL SITE INFORMATION WORKSHEET

I. SITE INSPECTION INFORMATION

1. ____ Date and time of the inspection: ___/___/___ at ___:___ a.m/p.m

2. ____ WESTON personnel performing the inspection:
   a._____
   b._____
   c._____

3. ____ Names of site owner or representatives present
   a._____
   b._____
   c._____

4. ____ Names of regulatory officials present:
   a._____
   b._____
   c._____

5. ____ Weather conditions during inspection:
   a. Temperature: _____ degrees F
   b. Cloud Cover: _____ percent
   c. Rain/snow: _____ amount

II. GENERAL SITE INFORMATION

1. ____ Official site name / CERCLIS ID: _____ (TXD_____)
2. ____ Accurate street address: _____
3. ____ City and State: _____

4. ____ List current owner(s) name(s) and address(es):

5. ____ List past site owners and addressess, if possible:

5. ____ Indicate ownership type ("C" for current, "P" for past)

a. ____ Private	e. ____ Federal
b. ____ Municipal	f. ____ DOD
c. ____ County	g. ____ DOE
d. ____ State	h. ____ Indian
e. ____ Unknown	i. ____ Other (describe): _____

B. ____ Verify site location on a topo map, indicating the reason for any discrepancies below.

SITE RECONNAISSANCE CHECKLIST
SITE FEATURES WORKSHEET

III. SITE FEATURES

1. ____ Draw a sketch map of the site to show the location of important site features

2. ____ Describe site access features:
   a. Locations where the site can be accessed: _____
   b. Major roads leading to site: _____
   c. On-site roads / paths and their condition: _____
   d. Location/condition of barricades impeding site access: _____

3. ____ List current/historic site occupants and landuse:
   a._____
   b._____
   c._____
   d._____

4. ____ Indicate the nature of the site occupant(s) (put corresponding letter from above beside type belo

a. ____ Lumber or wood products	l. ____ Retail
b. ____ Inorganic chemicals	m. ____ Recycling
c. ____ Plastics or rubber products	n. ____ Junk/salvage yard
d. ____ Paints or varnishes	o. ____ Municipal landfill
e. ____ Industrial organic chemicals	p. ____ DOD
f. ____ Agricultural chemicals	q. ____ DOE
g. ____ Misc. chemical products	r. ____ DOI
h. ____ Fabricated structural metal products	s. ____ Other federal facility:_____
i. ____ Electronic equipment	t. ____ RCRA TSD site:_____
j. ____ Other manufacturing:_____	u. ____ RCRA generator:_____
k. ____ Mining and other exploration: _____	v. ____ Other RCRA:_____
	x. ____ Other:_____

5. ____ Status: a. ____ Active b.____ Inactive or left site

6. ____ Describe buildings or other structures (occupant, size, location, use)
   a._____
   b._____
   c._____
   d._____
   e._____

7. ____ Locate and describe the following:
   a.____ Municipal water supply hook ups, if any _____
   b.____ Storm drain Inlets or discharge points _____
   c.____ Sanitary sewers _____
   d.____ Parking lots and other impervious surfaces _____
   e.____ Water wells _____
   f.____ Oil and gas wells: _____
   g.____ Mining activities onsite: _____
   h.____ Rail spur locations (usage): _____
   i.____ Pipelines (owner/contents): _____
   j.____ Other easements: _____

IV. NATURAL SITE FEATURES

1. ____ Describe regional and site topography _____
2. ____ Determine the site surface gradient / slope _____
3. ____ Describe site and adjacent property vegetation _____
4. ____ Describe site surface soils (texture, color, structure)

5. ____ Describe site and local surface geological features (lithology, structures, grain size)

6. ____ Locate and map nearby surface water bodies surface:
   a. Determine the dimensions and profile of each surface water body

   b. Describe flow rate and direction of flow, if any

   c. Indicate the type surface water usage (fisheries, water intakes)

7. ____ Locate and map any springs, seeps, ponded areas or wetlands

8. ____ Locate and map any drainage swales or ditches onsite

9. ____ Determine the direction and destination of site runoff _____

10. ____ List other potentially sensitive environments
    a._____
    b._____
    c._____

V. OTHER NOTABLE SITE FEATURES

1. ____ Describe any other notable site features below:

SITE RECONNAISSANCE CHE LIST
..E OPERATIONAL HISTOR CHECKLIST

VI. SITE OPERATIONAL HISTORY

1. ____ Describe the exact types and quantities of wastes stored and generated (what/when):
   a._____
   b._____
   c._____
   d._____
   e._____
   f._____

2. ____ Determine the locations of historic waste disposal practices onsite (check as source area below

3. ____ Map and describe historic buildings, storage areas or process areas no longer obvious onsite:

4. ____ Determine the current/historical number of occupants or workers onsite daily _____

5. ____ Describe in detail the current/historical processes used onsite:

6. ____ List site environmental related permits (RCRA, TACB, TWC, TRRC, TDH, etc.)
   a._____
   b._____
   c._____
   d._____

7. ____ Get copies of any manifests or other records available

8. Describe other relevant facts concerning site operations:

SITE RECONNAISSANCE CHECKLIST
POTENTIAL WASTE SOURCES IDENTIFICATION WORKSHEET

A. Check the potential waste sources below which are found onsite:

1. ____ Dry wells or injection wells
2. ____ Ponds, lagoons or other surface impoundment
3. ____ Landfills
4. ____ Land treatment or land farming areas
5. ____ Areas of contaminated soil
6. ____ Storage tanks or other nondrum containers
7. ____ Drums or drum-like containers
8. ____ Incineration areas or burn pits
9. ____ Piles (Chemical, scrap metals, tailings, etc.)
10. ____ Ventilation systems
11. ____ Hydraulic lifts
12. ____ Pits or sumps
13. ____ Transformers
14. ____ Contaminated sediments or surface water with unidentified source
15. ____ Contaminated groundwater with unidentified source
16. ____ Other source type (describe:_____)
17. ____ No sources identified

SITE RECONNAISSANCE CHECKLIST
SITE SOURCE DESCRIPTION WORKSHEET

(Complete one sheet for each source area)

1. ____ Assign waste source a name for identification: _____
2. ____ Status of source area (closed, inactive, active) _____
3. ____ Locate the source area on a map and describe location: _____
4. ____ Measure the dimensions of the source area: _____
5. ____ Determine the length of time that the source area contained waste: _____
6. ____ Describe the method of source containment and degree of maintenance: _____
7. ____ Describe the method of secondary containment and maintenance:
8. ____ Indicate the current and historical contents of source area:
   - a. ____ Metals
   - b. ____ Inorganics
   - c. ____ Organics
   - d. ____ Radioactive waste
   - e. ____ Pesticides/herbicides
   - f. ____ Oily waste
   - g. ____ Mining waste
   - h. ____ Explosives
   - i. ____ Paints/pigments/dyes
   - j. ____ Solvents
   - k. ____ Laboratory/hospital waste
   - l. ____ Construction/demolition waste
   - m. ____ Acids/bases
   - n. ____ Municipal/residential type waste
   - l. ____ Other (describe) _____
9. ____ Describe the physical state of the waste (check one)
   - a. ____ Solid
   - b. ____ Powder
   - c. ____ Liquid
   - d. ____ Sludge
   - e. ____ Gas
10. ____ Determine the location of waste generation:
    - a. ____ onsite
    - b. ____ offsite (generator): _____
11. ____ Indicate who authorized waste deposition:
    - a. ____ Present owner
    - b. ____ Former owner
    - c. ____ Unauthorized
    - d. ____ Unknown
12. ____ Assess the accessibility of the source area to the public:
    - a. ____ Accessable
    - b. ____ Nonaccessable (why): _____
13. ____ Current and historical high level of containment
14. ____ Method of secondary containment and degree of maintenance
15. ____ Indicate if there is visual evidence of a release
    - a. ____ Discharges or waste streams (Indicate receiving body): _____
    - b. ____ Leachate outbreak
    - c. ____ Spill or leak
    - d. ____ Other type of release (describe): _____
16. ____ Indicate if there is visual evidence of contamination around source
    - a. ____ Stained/contaminated soil (area): _____
    - b. ____ No evidence of
17. ____ Describe cover over the source area
    - a. ____ Engineered cap
    - b. ____ Buried (w/soil, asphalt, etc.)
    - c. ____ Other (Roof, tarp, etc.)
18. ____ Functioning collection or venting system (describe in detail)
19. ____ Evidence of biogas release (odors, vapors, FID response)
20. ____ Describe Vegetation around source area:
    - a. Type and degree of vegetation: _____
    - b. Condition of vegetation (stressed/unaffected): _____

VIII. OFFSITE SURVEY

1. ____ Describe and lo[illegible] c. [illegible] map adjacent and nearby s[illegible] of interest:
   a. _____
   b. _____
   c. _____

2. ____ Map location of public facilities (schools, day care facilities, parks, etc.)
   a. _____
   b. _____
   c. _____

3. ____ Determine the location and number of residences within a 1/2 mile radius of the site

4. ____ Determine the population of workers, schoolchildren, etc in areas near the site

5. ____ List alternative source sites within a four mile radius:
   a. Automobile service stations
      1. _____
      2. _____
   b. Dry cleaners
      1. _____
      2. _____
   c. Manufacturing/industrial sites
      1. _____
      2. _____
   d. Rail loading areas
      1. _____
   e. Landfills
      1. _____
   f. Other sites
      1. _____

6. ____ Locate and describe surface water bodies as follows:
   a. Distance to probable point of entry of a waste from the site _____
   b. Flow rate and direction of flow _____
   c. Storm drains discharging into the surface water body _____
   d. Potential targets along the surface water _____
   e. Branching in surface water flow path and effect on target _____
   f. Tidal influence effect on flow _____
   g. Tributaries with alternative source sites _____
   h. Drinking water intakes _____
   i. Fishing or other recreational use recreation _____

7. ____ Locate and describe water wells in the distance limit, as possible:
   a. Location of well and distance from site _____
   b. Well owner and population potentially served _____
   c. Well usage and completion information _____

APPENDIX C

SAMPLING PROCEDURES

ORIGINAL

EPA/540/P-91/006
OSWER Directive 9360.4-02
January 1991

COMPENDIUM OF ERT SOIL SAMPLING AND SURFACE GEOPHYSICS PROCEDURES

Sampling Equipment Decontamination

Soil Sampling

Soil Gas Sampling

General Surface Geophysics

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

Printed on Recycled Paper

1.0 SAMPLING EQUIPMENT DECONTAMINATION: SOP #2006

1.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes methods used for preventing or reducing cross-contamination, and provides general guidelines for sampling equipment decontamination procedures at a hazardous waste site. Preventing or minimizing cross-contamination in sampled media and in samples is important for preventing the introduction of error into sampling results and for protecting the health and safety of site personnel.

Removing or neutralizing contaminants that have accumulated on sampling equipment ensures protection of personnel from permeating substances, reduces or eliminates transfer of contaminants to clean areas, prevents the mixing of incompatible substances, and minimizes the likelihood of sample cross-contamination.

1.2 METHOD SUMMARY

Contaminants can be physically removed from equipment, or deactivated by sterilization or disinfection. Gross contamination of equipment requires physical decontamination, including abrasive and non-abrasive methods. These include the use of brushes, air and wet blasting, and high-pressure water cleaning, followed by a wash/rinse process using appropriate cleaning solutions. Use of a solvent rinse is required when organic contamination is present.

1.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

1.4 INTERFERENCES AND POTENTIAL PROBLEMS

- The use of distilled/deionized water commonly available from commercial vendors may be acceptable for decontamination of sampling equipment provided that it has been verified by laboratory analysis to be analyte free.

- An untreated potable water supply is not an acceptable substitute for tap water. Tap water may be used from any municipal water treatment system for mixing of decontamination solutions.

- Acids and solvents utilized in the decontamination sequence pose the health and safety risks of inhalation or skin contact, and raise shipping concerns of permeation or degradation.

- The site work plan must address disposal of the spent decontamination solutions.

- Several procedures can be established to minimize contact with waste and the potential for contamination. For example:

  - Stress work practices that minimize contact with hazardous substances.

  - Use remote sampling, handling, and container-opening techniques when appropriate.

  - Cover monitoring and sampling equipment with protective material to minimize contamination.

  - Use disposable outer garments and disposable sampling equipment when appropriate.

1.5 EQUIPMENT/APPARATUS

- appropriate personal protective clothing
- non-phosphate detergent
- selected solvents
- long-handled brushes
- drop cloths/plastic sheeting
- trash container
- paper towels
- galvanized tubs or buckets
- tap water

- distilled/deionized water
- metal/plastic containers for storage and disposal of contaminated wash solutions
- pressurized sprayers for tap and deionized/distilled water
- sprayers for solvents
- trash bags
- aluminum foil
- safety glasses or splash shield
- emergency eyewash bottle

1.6 REAGENTS

There are no reagents used in this procedure aside from the actual decontamination solutions and solvents. In general, the following solvents are utilized for decontamination purposes:

- 10% nitric acid[1]
- acetone (pesticide grade)[2]
- hexane (pesticide grade)[2]
- methanol

[1] Only if sample is to be analyzed for trace metals.
[2] Only if sample is to be analyzed for organics.

1.7 PROCEDURES

As part of the health and safety plan, develop and set up a decontamination plan before any personnel or equipment enter the areas of potential exposure. The equipment decontamination plan should include:

- the number, location, and layout of decontamination stations
- which decontamination apparatus is needed
- the appropriate decontamination methods
- methods for disposal of contaminated clothing, apparatus, and solutions

1.7.1 Decontamination Methods

All personnel, samples, and equipment leaving the contaminated area of a site must be decontaminated. Various decontamination methods will either physically remove contaminants, inactivate contaminants by disinfection or sterilization, or do both.

In many cases, gross contamination can be removed by physical means. The physical decontamination techniques appropriate for equipment decontamination can be grouped into two categories: abrasive methods and non-abrasive methods.

Abrasive Cleaning Methods

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The following abrasive methods are available:

- Mechanical: Mechanical cleaning methods use brushes of metal or nylon. The amount and type of contaminants removed will vary with the hardness of bristles, length of brushing time, and degree of brush contact.

- Air Blasting: Air blasting is used for cleaning large equipment, such as bulldozers, drilling rigs or auger bits. The equipment used in air blast cleaning employs compressed air to force abrasive material through a nozzle at high velocities. The distance between the nozzle and the surface cleaned, as well as the pressure of air, the time of application, and the angle at which the abrasive strikes the surface, determines cleaning efficiency. Air blasting has several disadvantages: it is unable to control the amount of material removed, it can aerate contaminants, and it generates large amounts of waste.

- Wet Blasting: Wet blast cleaning, also used to clean large equipment, involves use of a suspended fine abrasive delivered by compressed air to the contaminated area. The amount of materials removed can be carefully controlled by using very fine abrasives. This method generates a large amount of waste.

Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off of a surface with pressure. In general, less of the equipment surface is removed using non-abrasive methods. The following non-abrasive methods are available:

- High-Pressure Water: This method consists of a high-pressure pump, an operator-controlled directional nozzle, and a high pressure hose. Operating pressure usually ranges from 340 to 680 atmospheres (atm) which relates to flow rates of 20 to 140 liters per minute.

- Ultra-High-Pressure Water: This system produces a pressurized water jet (from 1,000 to 4,000 atm). The ultra-high-pressure spray removes tightly-adhered surface film. The water velocity ranges from 500 m/sec (1,000 atm) to 900 m/sec (4,000 atm). Additives can enhance the method. This method is not applicable for hand-held sampling equipment.

Disinfection/Rinse Methods

- Disinfection: Disinfectants are a practical means of inactivating infectious agents.

- Sterilization: Standard sterilization methods involve heating the equipment. Sterilization is impractical for large equipment.

- Rinsing: Rinsing removes contaminants through dilution, physical attraction, and solubilization.

1.7.2 Field Sampling Equipment Cleaning Procedures

Solvent rinses are not necessarily required when organics are not a contaminant of concern and may be eliminated from the sequence specified below. Similarly, an acid rinse is not required if analysis does not include inorganics.

1. Where applicable, follow physical removal procedures specified in section 1.7.1.

2. Wash equipment with a non-phosphate detergent solution.

3. Rinse with tap water.

4. Rinse with distilled/deionized water.

5. Rinse with 10% nitric acid if the sample will be analyzed for trace organics.

6. Rinse with distilled/deionized water.

7. Use a solvent rinse (pesticide grade) if the sample will be analyzed for organics.

8. Air dry the equipment completely.

9. Rinse again with distilled/deionized water.

Selection of the solvent for use in the decontamination process is based on the contaminants present at the site. Use of a solvent is required when organic contamination is present on-site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. An acid rinse step is required if metals are present on-site. If a particular contaminant fraction is not present at the site, the nine-step decontamination procedure listed above may be modified for site specificity. The decontamination solvent used should not be among the contaminants of concern at the site.

Table 1 lists solvent rinses which may be required for elimination of particular chemicals. After each solvent rinse, the equipment should be air dried and rinsed with distilled/deionized water.

Sampling equipment that requires the use of plastic tubing should be disassembled and the tubing replaced with clean tubing, before commencement of sampling and between sampling locations.

1.8 CALCULATIONS

This section is not applicable to this SOP.

1.9 QUALITY ASSURANCE/ QUALITY CONTROL

One type of quality control sample specific to the field decontamination process is the rinsate blank. The rinsate blank provides information on the effectiveness of the decontamination process employed in the field. When used in conjunction with field blanks and trip blanks, a rinsate blank can detect contamination during sample handling, storage and sample transportation to the laboratory.

Table 1: Recommended Solvent Rinse for Soluble Contaminants

SOLVENT	SOLUBLE CONTAMINANTS
Water	• Low-chain hydrocarbons • Inorganic compounds • Salts • Some organic acids and other polar compounds
Dilute Acids	• Basic (caustic) compounds • Amines • Hydrazines
Dilute Bases – for example, detergent and soap	• Metals • Acidic compounds • Phenol • Thiols • Some nitro and sulfonic compounds
Organic Solvents[1] - for example, alcohols, ethers, ketones, aromatics, straight-chain alkanes (e.g., hexane), and common petroleum products (e.g., fuel, oil, kerosene)	• Nonpolar compounds (e.g., some organic compounds)

[1] - WARNING: Some organic solvents can permeate and/or degrade protective clothing.

A rinsate blank consists of a sample of analyte-free (i.e. deionized) water which is passed over and through a field decontaminated sampling device and placed in a clean sample container.

Rinsate blanks should be run for all parameters of interest at a rate of 1 per 20 for each parameter, even if samples are not shipped that day. Rinsate blanks are not required if dedicated sampling equipment is used.

1.10 DATA VALIDATION

This section is not applicable to this SOP.

1.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and specific health and safety procedures.

Decontamination can pose hazards under certain circumstances even though performed to protect health and safety. Hazardous substances may be incompatible with decontamination methods. For example, the decontamination solution or solvent may react with contaminants to produce heat, explosion, or toxic products. Decontamination methods may be incompatible with clothing or equipment; some solvents can permeate or degrade protective clothing. Also, decontamination solutions and solvents may pose a direct health hazard to workers through inhalation or skin contact, or if they combust.

The decontamination solutions and solvents must be determined to be compatible before use. Any method that permeates, degrades, or damages personal protective equipment should not be used. If decontamination methods pose a direct health hazard, measures should be taken to protect personnel or the methods should be modified to eliminate the hazard.

2.0 SOIL SAMPLING: SOP #2012

2.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedures for collecting representative soil samples. Analysis of soil samples may determine whether concentrations of specific soil pollutants exceed established action levels, or if the concentrations of soil pollutants present a risk to public health, welfare, or the environment.

2.2 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed versus undisturbed), and the type of soil. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, a trier, a split-spoon, or, if required, a backhoe.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Refrigeration to 4°C, supplemented by a minimal holding time, is usually the best approach.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

2.5 EQUIPMENT/APPARATUS

- sampling plan
- maps/plot plan
- safety equipment, as specified in the health and safety plan
- compass
- tape measure
- survey stakes or flags
- camera and film
- stainless steel, plastic, or other appropriate homogenization bucket or bowl
- 1-quart mason jars w/Teflon liners
- Ziploc plastic bags
- logbook
- labels
- chain of custody forms and seals
- field data sheets
- cooler(s)
- ice
- decontamination supplies/equipment
- canvas or plastic sheet
- spade or shovel
- spatula
- scoop
- plastic or stainless steel spoons
- trowel
- continuous flight (screw) auger
- bucket auger
- post hole auger
- extension rods
- T-handle
- sampling trier
- thin-wall tube sampler
- Vehimeyer soil sampler outfit
  - tubes
  - points
  - drive head
  - drop hammer
  - puller jack and grip
- backhoe

2.6 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in

ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Use stakes, buoys, or flagging to identify and mark all sampling locations. Consider specific site factors, including extent and nature of contaminant, when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

2.7.2 Sample Collection

Surface Soil Samples

Collect samples from near-surface soil with tools such as spades, shovels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sampling team member. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. Avoid the use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

Follow these procedures to collect surface soil samples.

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled container(s) and secure the cap(s) tightly.

Sampling at Depth with Augers and Thin-Wall Tube Samplers

This system consists of an auger, a series of extensions, a "T" handle, and a thin-wall tube sampler (Appendix A, Figure 1). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin-wall tube sampler. The system is then lowered down the borehole, and driven into the soil at the completion depth. The system is withdrawn and the core collected from the thin-wall tube sampler.

Several types of augers are available. These include: bucket, continuous flight (screw), and posthole augers. Bucket augers are better for direct

sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights, which are usually at 5-feet intervals. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Posthole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil.

Follow these procedures for collecting soil samples with the auger and a thin-wall tube sampler.

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first 3 to 6 inches of surface soil for an area approximately 6 inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect sample after the auger is removed from boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin-wall tube sampler. Install proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container(s). Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel lab spoon, plastic lab spoon, or equivalent and secure the cap(s) tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into an appropriate, labeled container(s) and secure the cap(s) tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into the appropriate, labeled container(s) and secure the cap(s) tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

Follow these procedures to collect soil samples with a sampling trier.

1. Insert the trier (Appendix A, Figure 2) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

PB91-921274

OSWER Directive 9360.4-03
January 1991

COMPENDIUM OF ERT SURFACE WATER AND SEDIMENT SAMPLING PROCEDURES

Sampling Equipment Decontamination

Surface Water Sampling

Sediment Sampling

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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2.0 SURFACE WATER SAMPLING: SOP #2013

2.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of representative liquid samples, both aqueous and nonaqueous from streams, rivers, lakes, ponds, lagoons, and surface impoundments. It includes samples collected from depth, as well as samples collected from the surface.

2.2 METHOD SUMMARY

Sampling situations vary widely and therefore no universal sampling procedure can be recommended.

However, sampling of both aqueous and non-aqueous liquids from the above mentioned sources is generally accomplished through the use of one of the following samplers or techniques:

- Kemmerer bottle
- bacon bomb sampler
- dip sampler
- direct method

These sampling techniques will allow for the collection of representative samples from the majority of surface waters and impoundments encountered.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Once samples have been collected, follow these procedures:

1. Transfer the sample(s) into suitable labeled sample containers.

2. Preserve the sample if appropriate, or use pre-preserved sample bottles.

3. Cap the container, put it in a Ziploc plastic bag and place it on ice in a cooler.

4. Record all pertinent data in the site logbook and on a field data sheet.

5. Complete the chain of custody form.

6. Attach custody seals to the cooler prior to shipment.

7. Decontaminate all sampling equipment prior to the collection of additional samples.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems with surface water sampling. These include cross-contamination of samples and improper sample collection.

- Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to ERT SOP #2006, Sampling Equipment Decontamination.

- Improper sample collection can involve using contaminated equipment, disturbance of the stream or impoundment substrate, and sampling in an obviously disturbed area.

Following proper decontamination procedures and minimizing disturbance of the sample site will eliminate these problems.

2.5 EQUIPMENT/APPARATUS

Equipment needed for collection of surface water samples includes:

- Kemmerer bottles
- bacon bomb sampler
- dip sampler
- line and messengers
- sample bottle preservatives
- Ziploc bags
- ice
- cooler(s)
- chain of custody forms, field data sheets

1. Using a properly decontaminated Kemmerer bottle, set the sampling device so that the sampling end pieces are pulled away from the sampling tube, allowing the substance to be sampled to pass through this tube.

2. Lower the pre-set sampling device to the predetermined depth. Avoid bottom disturbance.

3. When the Kemmerer bottle is at the required depth, send down the messenger, closing the sampling device.

4. Retrieve the sampler and discharge the first 10 to 20 mL to clear any potential contamination on the valve. Transfer the sample to the appropriate sample container.

Bacon Bomb Sampler

A bacon bomb sampler (Figure 2, Appendix A) may be used in similar situations to those outlined for the Kemmerer bottle. Sampling procedures are as follows:

1. Lower the bacon bomb sampler carefully to the desired depth, allowing the line for the trigger to remain slack at all times. When the desired depth is reached, pull the trigger line until taut.

2. Release the trigger line and retrieve the sampler.

3. Transfer the sample to the appropriate sample container by pulling the trigger.

Dip Sampler

A dip sampler (Figure 3, Appendix A) is useful for situations where a sample is to be recovered from an outfall pipe or along a lagoon bank where direct access is limited. The long handle on such a device allows access from a discrete location. Sampling procedures are as follows:

1. Assemble the device in accordance with the manufacturer's instructions.

2. Extend the device to the sample location and collect the sample.

3. Retrieve the sampler and transfer the sample to the appropriate sample container.

Direct Method

For streams, rivers, lakes, and other surface waters, the direct method may be utilized to collect water samples from the surface. This method is not to be used for sampling lagoons or other impoundments where contact with contaminants are a concern.

Using adequate protective clothing, access the sampling station by appropriate means. For shallow stream stations, collect the sample under the water surface pointing the sample container upstream. The container must be upstream of the collector. Avoid disturbing the substrate. For lakes and other impoundments, collect the sample under the water surface avoiding surface debris and the boat wake.

When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of preservative necessary for proper sample preservation.

2.8 CALCULATIONS

This section is not applicable to this SOP.

2.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA/QC procedures apply:

- All data must be documented on field data sheets or within site logbooks.

- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

2.10 DATA VALIDATION

This section is not applicable to this SOP.

3.0 SEDIMENT SAMPLING: SOP #2016

3.1 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of representative sediment samples. Analysis of sediment may determine whether concentrations of specific contaminants exceed established threshold action levels, or if the concentrations present a risk to public health, welfare, or the environment.

The methodologies discussed in this procedure are applicable to the sampling of sediment in both flowing and standing water. They are generic in nature and may be modified in whole or part to meet the handling and analytical requirements of the contaminants of concern, as well as the constraints presented by the sampling area. However, if modifications occur, they should be documented in the site logbook or report summarizing field activities.

For the purposes of this procedure, sediments are those mineral and organic materials situated beneath an aqueous layer. The aqueous layer may be either static, as in lakes, ponds, or other impoundments or flowing, as in rivers and streams.

3.2 METHOD SUMMARY

Sediment samples may be recovered using a variety of methods and equipment, depending on the depth of the aqueous layer, the portion of the sediment profile required (surface versus subsurface), the type of sample required (disturbed versus undisturbed) and the sediment type.

Sediment is collected from beneath an aqueous layer either directly, using a hand-held device such as a shovel, trowel, or auger, or indirectly using a remotely activated device such as an Ekman or Ponar dredge. Following collection, the sediment is placed into a container constructed of inert material, homogenized, and transferred to the appropriate sample containers. The homogenization procedure should not be used if sample analysis includes volatile organics.

3.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

- Chemical preservation of solids is generally not recommended. Cooling is usually the best approach, supplemented by the appropriate holding time.

- Wide-mouth glass containers with Teflon-lined caps are utilized for sediment samples. The sample volume is a function of the analytical requirements and will be specified in the work plan.

- Transfer sediment from the sample collection device to an appropriate sample container using a stainless steel or plastic lab spoon or equivalent. If composite samples are collected, place the sediment sample in a stainless steel, plastic or other appropriate composition (e.g.: Teflon) bucket, and mix thoroughly to obtain a homogeneous sample representative of the entire sampling interval. Then place the sediment sample into labeled containers.

- Samples for volatile organic analysis must be collected directly from the bucket, before mixing the sample, to minimize loss due to volatilization of contaminants.

- All sampling devices should be decontaminated, then wrapped in aluminum foil. The sampler should remain in this wrapping until it is needed. Each sampler should be used for only one sample. Dedicated samplers for sediment samples may be impractical due to the large number of sediment samples which may be required and the cost of the sampler. In this case, samplers should be cleaned in the field using the decontamination procedure described in ERT SOP# 2006, Sampling Equipment Decontamination.

tools such as spades, shovels, and scoops. Surface material can be removed to the required depth; then a stainless steel or plastic scoop should be used to collect the sample.

This method can be used to collect consolidated sediments but is limited somewhat by the depth of the aqueous layer. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel or plastic scoop or lab spoon will suffice in most applications. Care should be exercised to avoid the use of devices plated with chrome or other materials. Plating is particularly common with garden trowels.

Follow these procedures to collect sediment samples with a scoop or trowel:

1. Using a precleaned stainless steel scoop or trowel, remove the desired thickness of sediment from the sampling area.

2. Transfer the sample into an appropriate sample or homogenization container.

Sampling Surface Sediments with a Thin-Wall Tube Auger From Beneath a Shallow Aqueous Layer

This system consists of an auger, a series of extension rods, and a "T" handle (see Figure 4, Appendix A). The auger is driven into the sediment and used to extract a core. A sample of the core is taken from the appropriate depth.

Use the following procedure to collect sediment samples with a thin-walled auger:

1. Insert the auger into the material to be sampled at a 0° to 45° angle from vertical. This orientation minimizes spillage of the sample from the sampler. Extraction of samples may require tilting of the sampler.

2. Rotate the auger once or twice to cut a core of material.

3. Slowly withdraw the auger, making sure that the slot is facing upward.

4. An acetate core may be inserted into the auger prior to sampling, if characteristics of the sediments or body of water warrant. By using this technique, an intact core can be extracted.

5. Transfer the sample into an appropriate sample or homogenization container.

Sampling Deep Sediments with Augers and Thin-Wall Tube Samplers From Beneath a Shallow Aqueous Layer

This system uses an auger, a series of extension rods, a "T" handle, and a thin-wall tube sampler (Figure 4, Appendix A). The auger bores a hole to a desired sampling depth and then is withdrawn. The auger tip is then replaced with a tube core sampler, lowered down the borehole, and driven into the sediment at the completion depth. The core is then withdrawn and the sample collected. This method can be used to collect consolidated sediments, but is somewhat limited by the depth of the aqueous layer.

Several augers are available which include bucket and posthole augers. Bucket augers are better for direct sample recovery, are fast, and provide a large volume of sample. Posthole augers have limited utility for sample collection as they are designed more for their ability to cut through fibrous, rooted, swampy areas.

Follow these procedures to collect sediment samples with a hand auger:

1. Attach the auger bit to a drill extension rod, then attach the "T" handle to the drill extension rod.

2. Clear the area to be sampled of any surface debris.

3. Begin augering, periodically removing any accumulated sediment from the auger bucket.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. (When sampling directly from the auger, collect sample after the auger is removed from boring and proceed to Step 10.)

5. Remove auger tip from drill rods and replace with a precleaned thin-wall tube sampler. Install proper cutting tip.

6. Carefully lower tube sampler down borehole. Gradually force tube sampler into sediment.

subsurface sediments. It consists of a coring device, handle, and acetate core utilized in the following procedure:

1. Assemble the coring device by inserting the acetate core into the sampling tube.

2. Insert the "eggshell" check valve mechanisms into the tip of the sampling tube with the convex surface positioned inside the acetate core.

3. Screw the coring point onto the tip of the sampling tube.

4. Screw the handle onto the upper end of the sampling tube and add extension rods as needed.

5. Place the sampler in a perpendicular position on the material to be sampled.

6. This sampler may be used with either a drive hammer for firm consolidated sediments, or a "T" handle for soft sediments. If the "T" handle is used, place downward pressure on the device until the desired depth is reached. Rotate the sampler to shear off the core of the bottom, retrieve the device and proceed to Step 15.

7. If the drive hammer is selected, insert the tapered handle (drive head) of the drive hammer through the drive head.

8. With left hand holding the tube, drive the sampler into the material to the desired depth. Do not drive the tube further than the tip of the hammer's guide.

9. Record the length of the tube that penetrated the sample material, and the number of blows required to obtain this depth.

10. Remove the drive hammer and fit the keyhole-like opening on the flat side of the hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.

11. Rotate the sampler at least two revolutions to shear off the sample at the bottom.

12. Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head, and rotate about 90°.

13. Withdraw the sampler by pulling the handle (hammer) upwards and dislodging the hammer from the sampler.

14. Unscrew the coring point and remove the "eggshell" check valve.

15. Slide the acetate core out of the sampler tube. The acetate core may be capped at both ends. The sample may be used in this fashion, or the contents transferred to a stainless steel or plastic bucket and mixed thoroughly to obtain a homogeneous sample representative of the entire sampling interval.

16. Samples for volatile organic analysis must be collected directly from the bucket before mixing the sample to minimize volatilization of contaminants.

3.8 CALCULATIONS

This section is not applicable to this SOP.

3.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following QA/QC procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

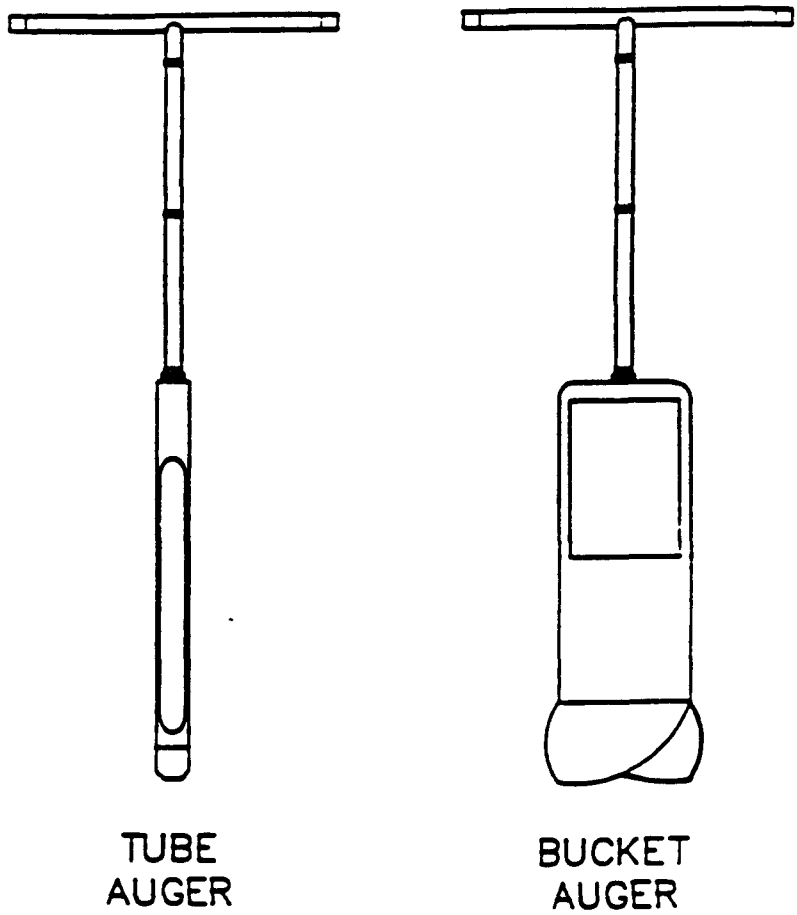
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

3.10 DATA VALIDATION

This section is not applicable to this SOP.

Figure 4: Sampling Auger

SOP #2016



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EPA/540/P-91/007
OSWER Directive 9360.4-06
January 1991

COMPENDIUM OF ERT GROUNDWATER SAMPLING PROCEDURES

Sampling Equipment Decontamination

Groundwater Well Sampling

Soil Gas Sampling

Monitoring Well Installation

Water Level Measurement

Well Development

Controlled Pumping Test

Slug Test

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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2.0 GROUNDWATER WELL SAMPLING: SOP #2007

2.1 SCOPE AND APPLICATION

The objective of this Standard Operating Procedure (SOP) is to provide general reference information on sampling of groundwater wells. This guideline is primarily concerned with the collection of water samples from the saturated zone of the subsurface. Every effort must be made to ensure that the sample is representative of the particular zone of water being sampled. These procedures are designed to be used in conjunction with analyses for the most common types of groundwater contaminants (e.g., volatile and semi-volatile organic compounds, pesticides, metals, biological parameters).

2.2 METHOD SUMMARY

Prior to sampling a monitoring well, the well must be purged. This may be done with a number of instruments. The most common of these are the bailer, submersible pump, non-gas contact bladder pump and inertia pump. At a minimum, three well volumes should be purged, if possible. Equipment must be decontaminated prior to use and between wells. Once purging is completed and the correct laboratory-cleaned sample containers have been prepared, sampling may proceed. Sampling may be conducted with any of the above instruments, and need not be the same as the device used for purging. Care should be taken when choosing the sampling device as some will affect the integrity of the sample. Sampling equipment must also be decontaminated. Sampling should occur in a progression from the least to most contaminated well, if this information is known.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirements. Samples should be collected directly from the sampling device into appropriate laboratory-cleaned containers. Check that a Teflon liner is present in the cap, if required. Attach a sample identification label. Complete a field data sheet, a chain of custody form and record all pertinent data in the site logbook.

Samples shall be appropriately preserved, labelled, logged, and placed in a cooler to be maintained at 4°C. Samples must be shipped well before the holding time is over and ideally should be shipped within 24 hours of sample collection. It is imperative that these samples be shipped or delivered daily to the analytical laboratory in order to maximize the time available for the laboratory to perform the analysis. The bottles should be shipped with adequate packing and cooling to ensure that they arrive intact.

Certain conditions may require special handling techniques. For example, treatment of a sample for volatile organic (VOA) analysis with sodium thiosulfate preservative is required if there is residual chlorine in the water (such as public water supply) that could cause free radical chlorination and change the identity of the original contaminants. However, sodium thiosulfate should not be used if chlorine is not present in the water. Special requirements must be determined prior to conducting fieldwork.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

2.4.1 General

The primary goal of groundwater sampling is to obtain a representative sample of the groundwater body. Analysis can be compromised by field personnel in two primary ways: (1) taking an unrepresentative sample, or (2) by incorrect handling of the sample. There are numerous ways of introducing foreign contaminants into a sample, and these must be avoided by following strict sampling procedures and only utilizing trained field personnel.

2.4.2 Purging

In a non-pumping well, there will be little or no vertical mixing of the water, and stratification will

occur. The well water in the screened section will mix with the groundwater due to normal flow patterns, but the well water above the screened section will remain isolated, become stagnant and lack the VOAs representative of the groundwater. Sampling personnel should realize that stagnant water may contain foreign material inadvertently or deliberately introduced from the surface, resulting in an unrepresentative sample. To safeguard against collecting nonrepresentative stagnant water, follow these guidelines during sampling:

- As a general rule, all monitoring wells should be pumped or bailed prior to sampling. Purge water should be containerized on site or handled as specified in the site-specific project plan. Evacuation of a minimum of one volume of water in the well casing, and preferably three to five volumes, is recommended for a representative sample. In a high-yielding ground water formation and where there is no stagnant water in the well above the screened section, evacuation prior to sample withdrawal is not as critical. However, in all cases where the monitoring data is to be used for enforcement actions, evacuation is recommended.

- For wells that can be pumped or bailed to dryness with the equipment being used, the well should be evacuated and allowed to recover prior to sample withdrawal. If the recovery rate is fairly rapid and the schedule allows, evacuation of more than one volume of water is preferred. If recovery is slow, sample the well upon recovery after one evacuation.

- A nonrepresentative sample can also result from excessive pre-pumping of the monitoring well. Stratification of the leachate concentration in the groundwater formation may occur, or heavier-than-water compounds may sink to the lower portions of the aquifer. Excessive pumping can dilute or increase the contaminant concentrations from what is representative of the sampling point of interest.

2.4.3 Materials

Samplers and evacuation equipment (bladders, pumps, bailers, tubing, etc.) should be limited to those made with stainless steel, Teflon, and glass in areas where concentrations are expected to be at or near the detection limit. The tendency of organics to leach into and out of many materials make the selection of materials critical for trace analyses. The use of plastics, such as PVC or polyethylene, should be avoided when analyzing for organics. However, PVC may be used for evacuation equipment as it will not come in contact with the sample.

Table 2 on page 7 discusses the advantages and disadvantages of certain equipment.

2.5 EQUIPMENT/APPARATUS

2.5.1 General

- water level indicator
  - electric sounder
  - steel tape
  - transducer
  - reflection sounder
  - airline
- depth sounder
- appropriate keys for well cap locks
- steel brush
- HNU or OVA (whichever is most appropriate)
- logbook
- calculator
- field data sheets
- chain of custody forms
- forms and seals
- sample containers
- Engineer's rule
- sharp knife (locking blade)
- tool box (to include at least: screwdrivers, pliers, hacksaw, hammer, flashlight, adjustable wrench)
- leather work gloves
- appropriate health and safety gear
- 5-gallon pail
- plastic sheeting
- shipping containers
- packing materials
- bolt cutters
- Ziploc plastic bags
- containers for evacuation of liquids
- decontamination solutions
- tap water
- non-phosphate soap
- several brushes

Table 2: Advantages and Disadvantages of Various Groundwater Sampling Devices

Device	Advantages	Disadvantages
Bailer	• The only practical limitations are size and materials • No power source needed • Portable • Inexpensive; it can be dedicated and hung in a well reducing the chances of cross-contamination • Minimal outgassing of volatile organics while sample is in bailer • Readily available • Removes stagnant water first • Rapid, simple method for removing small volumes of purge water	• Time consuming, especially for large wells • Transfer of sample may cause aeration
Submersible Pump	• Portable; can be used on an unlimited number of wells • Relatively high pumping rate (dependent on depth and size of pump) • Generally very reliable; does not require priming	• Potential for effects on analysis of trace organics • Heavy and cumbersome, particularly in deeper wells • Expensive • Power source needed • Susceptible to damage from silt or sediment • Impractical in low yielding or shallow wells
Non-Gas Contact Bladder Pump	• Maintains integrity of sample • Easy to use	• Difficult to clean although dedicated tubing and bladder may be used • Only useful to approximately 100 feet in depth • Supply of gas for operation (bottled gas and/or compressor) is difficult to obtain and is cumbersome
Suction Pump	• Portable, inexpensive, and readily available	• Only useful to approximately 25 feet or less in depth • Vacuum can cause loss of dissolved gases and volatile organics • Pump must be primed and vacuum is often difficult to maintain • May cause pH modification
Inertia Pump	• Portable, inexpensive, and readily available • Rapid method for purging relatively shallow wells	• Only useful to approximately 70 feet or less in depth • May be time consuming to use • Labor intensive • WaTerra pump is only effective in 2-inch diameter wells

- pails or tubs
- aluminum foil
- garden sprayer
- preservatives
- distilled or deionized water

2.5.2 Bailer

- clean, decontaminated bailer(s) of appropriate size and construction material
- nylon line, enough to dedicate to each well
- Teflon-coated bailer wire
- sharp knife
- aluminum foil (to wrap clean bailers)
- 5-gallon bucket

2.5.3 Submersible Pump

- pump(s)
- generator (110, 120, or 240 volt) or 12-volt battery if inaccessible to field vehicle
- 1-inch black PVC coil pipe -- enough to dedicate to each well
- hose clamps
- safety cable
- tool box supplement
  - pipe wrenches, 2
  - wire strippers
  - electrical tape
  - heat shrink
  - hose connectors
  - Teflon tape
- winch or pulley
- gasoline for generator
- flow meter with gate valve
- 1-inch nipples and various plumbing (i.e., pipe connectors)

2.5.4 Non-Gas Contact Bladder Pump

- non-gas contact bladder pump
- compressor or nitrogen gas tank
- batteries and charger
- Teflon tubing -- enough to dedicate to each well
- Swagelock fitting
- toolbox supplements -- same as submersible pump

2.5.5 Suction Pump

- pump
- black coil tubing -- enough to dedicate to each well
- gasoline -- if required
- toolbox
- plumbing fittings
- flow meter with gate valve

2.5.6 Inertia Pump

- pump assembly (WaTerra pump, piston pump)
- 5-gallon bucket

2.6 REAGENTS

Reagents will be utilized for preservation of samples and for decontamination cf sampling equipment. The preservation required is specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

2.7.2 Field Preparation

1. Start at the least contaminated well, if known.

2. Lay plastic sheeting around the well to minimize likelihood of contamination of equipment from soil adjacent to the well.

3. Remove locking well cap, note location, time of day, and date in field notebook or an appropriate log form.

4. Remove well casing cap.

5. Screen headspace of well with an appropriate monitoring instrument to determine the presence of volatile organic compounds and record in site logbook.

6. Lower water level measuring device or equivalent (i.e., permanently installed transducers or airline) into well until water surface is encountered.

7. Measure distance from water surface to reference measuring point on well casing or protective barrier post and record in site logbook. Alternatively, if there is no reference point, note that water level measurement is from top of steel casing, top of PVC riser pipe, from ground surface, or some other position on the well head.

8. Measure total depth of well (do this at least twice to confirm measurement) and record in site logbook or on log form.

9. Calculate the volume of water in the well and the volume to be purged using the calculations in Section 2.8.

10. Select the appropriate purging and sampling equipment.

2.7.3 Evacuation of Static Water (Purging)

The amount of flushing a well receives prior to sample collection depends on the intent of the monitoring program as well as the hydrogeologic conditions. Programs where overall quality determination of water resources are involved may require long pumping periods to obtain a sample that is representative of a large volume of that aquifer. The pumped volume can be determined prior to sampling so that the sample is a composite of known volume of the aquifer, or the well can be pumped until the stabilization of parameters such as temperature, electrical conductance, or pH has occurred.

However, monitoring for defining a contaminant plume requires a representative sample of a small volume of the aquifer. These circumstances require that the well be pumped enough to remove the stagnant water but not enough to induce flow from other areas. Generally, three well volumes are considered effective, or calculations can be made to determine, on the basis of the aquifer parameters and well dimensions, the appropriate volume to remove prior to sampling.

During purging, water level measurements may be taken regularly at 15- to 30-second intervals. This data may be used to compute aquifer transmissivity and other hydraulic characteristics.

The following well evacuation devices are most commonly used. Other evacuation devices are available, but have been omitted in this discussion due to their limited use.

Bailer

Bailers are the simplest purging device used and have many advantages. They generally consist of a rigid length of tube, usually with a ball check-valve at the bottom. A line is used to lower the bailer into the well and retrieve a volume of water. The three most common types of bailer are PVC, Teflon, and stainless steel.

This manual method of purging is best suited to shallow or narrow diameter wells. For deep, larger diameter wells which require evacuation of large volumes of water, other mechanical devices may be more appropriate.

Bailing equipment includes a clean decontaminated bailer, Teflon or nylon line, a sharp knife, and plastic sheeting.

1. Determine the volume of water to be purged as described in Section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of the bailer line with foreign materials.

3. Attach the line to the bailer and lower until the bailer is completely submerged.

4. Pull bailer out ensuring that the line either falls onto a clean area of plastic sheeting or never touches the ground.

5. Empty the bailer into a pail until full to determine the number of bails necessary to achieve the required purge volume.

6. Thereafter, pour the water into a container and dispose of purge waters as specified in the site-specific project plan.

Submersible Pump

Submersible pumps are generally constructed of plastic, rubber, and metal parts which may affect the analysis of samples for certain trace organics and inorganics. As a consequence, submersible pumps may not be appropriate for investigations requiring analyses of samples for trace contaminants. However, they are still useful for pre-sample purging. However, the pump must have a check valve to prevent water in the pump and the pipe from rushing back into the well.

Submersible pumps generally use one of two types of power supplies, either electric or compressed gas. Electric pumps can be powered by a 12-volt DC rechargeable battery, or a 110- or 220-volt AC power supply. Those units powered by compressed gas normally use a small electric compressor which also needs 12-volt DC or 110-volt AC power. They may also utilize compressed gas from bottles. Pumps differ according to the depth and diameter of the monitoring wells.

1. Determine the volume of water to be purged as described in section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of pumps, hoses or lines with foreign materials.

3. Assemble pump, hoses and safety cable, and lower the pump into the well. Make sure the pump is deep enough so that purging does not evacuate all the water. (Running the pump without water may cause damage.)

4. Attach flow meter to the outlet hose to measure the volume of water purged.

5. Attach power supply, and purge well until specified volume of water has been evacuated (or until field parameters, such as temperature, pH, conductivity, etc. have stabilized). Do not allow the pump to run dry. If the pumping rate exceeds the well recharge rate, lower the pump further into the well, and continue pumping.

6. Collect and dispose of purge waters as specified in the site-specific project plan.

Non-Contact Gas Bladder Pump

For this procedure, an all stainless-steel and Teflon Middleburg-squeeze bladder pump (e.g., IEA, TIMCO, Well Wizard, Geoguard, and others) is used to provide the least amount of material interference to the sample (Barcelona, 1985). Water comes into contact with the inside of the bladder (Teflon) and the sample tubing, also Teflon, that may be dedicated to each well. Some wells may have permanently installed bladder pumps (i.e., Well Wizard, Geoguard), that will be used to sample for all parameters.

1. Assemble Teflon tubing, pump and charged control box.

2. Use the same procedure for purging with a bladder pump as for a submersible pump.

3. Be sure to adjust flow rate to prevent violent jolting of the hose as sample is drawn in.

Suction Pump

There are many different types of suction pumps. They include: centrifugal, peristaltic and diaphragm. Diaphragm pumps can be used for well evacuation at a fast pumping rate and sampling at a low pumping rate. The peristaltic pump is a low-volume pump that uses rollers to squeeze the flexible tubing, thereby creating suction. This tubing can be dedicated to a well to prevent cross-contamination. Peristaltic pumps, however, require a power source.

1. Assemble the pump, tubing, and power source if necessary.

2. To purge with a suction pump, follow the exact procedures outlined for the submersible pump.

Inertia Pump

Inertia pumps, such as the WaTerra pump and piston pump, are manually operated. They are appropriate to use when wells are too deep to bail by hand, but are not inaccessible enough to warrant an automatic (submersible, etc.) pump. These

pumps are made of plastic and may be either decontaminated or discarded, after use.

1. Determine the volume of water to be purged as described in Section 2.7.2, Field Preparation.

2. Lay plastic sheeting around the well to prevent contamination of pumps or hoses with foreign materials.

3. Assemble pump, and lower to the appropriate depth in the well.

4. Begin pumping manually, discharging water into a 5-gallon bucket (or other graduated vessel). Purge until specified volume of water has been evacuated (or until field parameters such as temperature, pH, conductivity, etc. have stabilized).

5. Collect and dispose of purge waters as specified in the site-specific project plan.

2.7.4 Sampling

Sample withdrawal methods require the use of pumps, compressed air, bailers, and samplers. Ideally, purging and sample withdrawal equipment should be completely inert, economical to use, easily cleaned, sterilized, reusable, able to operate at remote sites in the absence of power resources, and capable of delivering variable rates for sample collection.

There are several factors to take into consideration when choosing a sampling device. Care should be taken when reviewing the advantages or disadvantages of any one device. It may be appropriate to use a different device to sample than that which was used to purge. The most common example of this is the use of a submersible pump to purge and a bailer to sample.

Bailer

The positive-displacement volatile sampling bailer (by GPI) is perhaps the most appropriate for collection of water samples for volatile analysis. Other bailer types (messenger, bottom fill, etc.) are less desirable, but may be mandated by cost and site conditions. Generally, bailers can provide an acceptable sample, providing that sampling personnel use extra care in the collection process.

1. Surround the monitoring well with clean plastic sheeting.

2. Attach a line to the bailer. If a bailer was used for purging, the same bailer and line may be used for sampling.

3. Lower the bailer slowly and gently into the well, taking care not to shake the casing sides or to splash the bailer into the water. Stop lowering at a point adjacent to the screen.

4. Allow bailer to fill and then slowly and gently retrieve the bailer from the well, avoiding contact with the casing, so as not to knock flakes of rust or other foreign materials into the bailer.

5. Remove the cap from the sample container and place it on the plastic sheet or in a location where it will not become contaminated. See Section 2.7.7 for special considerations on VOA samples.

6. Begin pouring slowly from the bailer.

7. Filter and preserve samples as required by sampling plan.

8. Cap the sample container tightly and place pre-labeled sample container in a carrier.

9. Replace the well cap.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to analytical laboratory.

Submersible Pump

Although it is recommended that samples not be collected with a submersible pump due to the reasons stated in Section 2.4, there are some situations where they may be used.

1. Allow the monitoring well to recharge after purging, keeping the pump just above the screened section.

2. Attach gate valve to hose (if not already fitted), and reduce flow of water to a manageable sampling rate.

3. Assemble the appropriate bottles.

4. If no gate valve is available, run the water down the side of a clean jar and fill the sample bottles from the jar.

5. Cap the sample container tightly and place pre-labeled sample container in a carrier.

6. Replace the well cap.

7. Log all samples in the site logbook and on the field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

10. Upon completion, remove pump and assembly and fully decontaminate prior to setting into the next sample well. Dedicate the tubing to the hole.

Non-Gas Contact Bladder Pump

The use of a non-gas contact positive displacement bladder pump is often mandated by the use of dedicated pumps installed in wells. These pumps are also suitable for shallow (less than 100 feet) wells. They are somewhat difficult to clean, but may be used with dedicated sample tubing to avoid cleaning. These pumps require a power supply and a compressed gas supply (or compressor). They may be operated at variable flow and pressure rates making them ideal for both purging and sampling.

Barcelona (1984) and Nielsen (1985) report that the non-gas contact positive displacement pumps cause the least amount of alteration in sample integrity as compared to other sample retrieval methods.

1. Allow well to recharge after purging.

2. Assemble the appropriate bottles.

3. Turn pump on, increase the cycle time and reduce the pressure to the minimum that will allow the sample to come to the surface.

4. Cap the sample container tightly and place pre-labeled sample container in a carrier.

5. Replace the well cap.

6. Log all samples in the site logbook and on field data sheets and label all samples.

7. Package samples and complete necessary paperwork.

8. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

9. On completion, remove the tubing from the well and either replace the Teflon tubing and bladder with new dedicated tubing and bladder or rigorously decontaminate the existing materials.

10. Collect non-filtered samples directly from the outlet tubing into the sample bottle.

11. For filtered samples, connect the pump outlet tubing directly to the filter unit. The pump pressure should remain decreased so that the pressure build-up on the filter does not blow out the pump bladder or displace the filter. For the Geotech barrel filter, no actual connections are necessary so this is not a concern.

Suction Pump

In view of the limitations of suction pumps, they are not recommended for sampling purposes.

Inertia Pump

Inertia pumps may be used to collect samples. It is more common, however, to purge with these pumps and sample with a bailer.

1. Following well evacuation, allow the well to recharge.

2. Assemble the appropriate bottles.

3. Since these pumps are manually operated, the flow rate may be regulated by the sampler. The sample may be discharged from the pump outlet directly into the appropriate sample container.

4. Cap the sample container tightly and place pre-labeled sample container in a carrier.

5. Replace the well cap.

6. Log all samples in the site logbook and on field data sheets and label all samples.

7. Package samples and complete necessary paperwork.

8. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

9. Upon completion, remove pump and decontaminate or discard, as appropriate.

2.7.5 Filtering

For samples that require filtering, such as samples which will be analyzed for total metals, the filter must be decontaminated prior to use and between uses. Filters work by two methods. A barrel filter such as the "Geotech" filter works with a bicycle pump, which is used to build up positive pressure in the chamber containing the sample. The sample is then forced through the filter paper (minimum size 0.45 μm) into a jar placed underneath. The barrel itself is filled manually from the bailer or directly via the hose of the sampling pump. The pressure must be maintained up to 30 psi by periodic pumping.

A vacuum type filter involves two chambers, the upper chamber contains the sample and a filter (minimum size 0.45 μm) divides the chambers. Using a hand pump or a Gilian type pump, air is withdrawn from the lower chamber, creating a vacuum and thus causing the sample to move through the filter into the lower chamber where it is drained into a sample jar, repeated pumping may be required to drain all the sample into the lower chamber. If preservation of the sample is necessary, this should be done after filtering.

2.7.6 Post Operation

After all samples are collected and preserved, the sampling equipment should be decontaminated prior to sampling another well. This will prevent cross-contamination of equipment and monitoring wells between locations.

1. Decontaminate all equipment.

2. Replace sampling equipment in storage containers.

3. Prepare and transport water samples to the laboratory. Check sample documentation and make sure samples are properly packed for shipment.

2.7.7 Special Considerations for VOA Sampling

The proper collection of a sample for volatile organics requires minimal disturbance of the sample to limit volatilization and therefore a loss of volatiles from the sample.

Sample retrieval systems suitable for the valid collection of volatile organic samples are: positive displacement bladder pumps, gear driven submersible pumps, syringe samplers and bailers (Barcelona, 1984; Nielsen, 1985). Field conditions and other constraints will limit the choice of appropriate systems. The focus of concern must be to provide a valid sample for analysis, one which has been subjected to the least amount of turbulence possible.

The following procedures should be followed:

1. Open the vial, set cap in a clean place, and collect the sample during the middle of the cycle. When collecting duplicates, collect both samples at the same time.

2. Fill the vial to just overflowing. Do not rinse the vial, nor excessively overfill it. There should be a convex meniscus on the top of the vial.

3. Check that the cap has not been contaminated (splashed) and carefully cap the vial. Place the cap directly over the top and screw down firmly. Do not overtighten and break the cap.

4. Invert the vial and tap gently. Observe vial for at least 10 seconds. If an air bubble appears, discard the sample and begin again. It is imperative that no entrapped air is in the sample vial.

5. Immediately place the vial in the protective foam sleeve and place into the cooler, oriented so that it is lying on its side, not straight up.

6. The holding time for VOAs is 7 days. Samples should be shipped or delivered to the laboratory daily so as not to exceed the holding time. Ensure that the samples remain at 4°C, but do not allow them to freeze.

2.8 CALCULATIONS

There are no calculations necessary to implement this procedure. However, if it is necessary to calculate the volume of the well, utilize the following equation:

$$\text{Well volume} = nr^2h\ (cf) \qquad \text{[Equation 1]}$$

where:

- n = pi
- r = radius of monitoring well (feet)
- h = height of the water column (feet) [This may be determined by subtracting the depth to water from the total depth of the well as measured from the same reference point.]
- cf = conversion factor (gal/ft^3) = 7.48 gal/ft^3 [In this equation, 7.48 gal/ft^3 is the necessary conversion factor.]

Monitoring wells are typically 2, 3, 4, or 6 inches in diameter. If you know the diameter of the monitoring well, there are a number of standard conversion factors which can be used to simplify the equation above.

The volume, in gallons per linear foot, for various standard monitoring well diameters can be calculated as follows:

$$v = nr^2\ (cf) \qquad \text{[Equation 2]}$$

where:

- v = volume in gallons per linear foot
- n = pi
- r = radius of monitoring well (feet)
- cf = conversion factor (7.48 gal/ft^3)

For a 2-inch diameter well, the volume in gallons per linear foot can be calculated as follows:

$$\begin{aligned} v &= nr^2\ (cf) \qquad \text{[Equation 2]} \\ &= 3.14\ (1/12\ ft)^2\ \ 7.48\ gal/ft^3 \\ &= 0.1632\ gal/ft \end{aligned}$$

Remember that if you have a 2-inch diameter, well you must convert this to the radius in feet to be able to use the equation.

The volume in gallons per linear foot for the common size monitoring wells are as follows:

Well Diameter	v (volume in gal/ft.)
2 inches	0.1632
3 inches	0.3672
4 inches	0.6528
6 inches	1.4688

If you utilize the conversion factors above, Equation 1 should be modified as follows:

$$\text{Well volume} = (h)(v) \qquad \text{[Equation 3]}$$

where:

- h = height of water column (feet)
- v = volume in gallons per linear foot as calculated from Equation 2

2.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

- All data must be documented on field data sheets or within site logbooks.

- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless

5.0 WATER LEVEL MEASUREMENT: SOP #2151

5.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to set guidelines for the determination of the depth to water in an open borehole, cased borehole, monitoring well or piezometer.

Generally, water level measurements from boreholes, piezometers, or monitoring wells are used to construct water table or potentiometric surface maps. Therefore, all water level measurements at a given site should be collected within a 24-hour period. Certain situations may necessitate that all water level measurements be taken within a shorter time interval. These situations may include:

- the magnitude of the observed changes between wells appears too large
- atmospheric pressure changes
- aquifers which are tidally influenced
- aquifers affected by river stage, impoundments, and/or unlined ditches
- aquifers stressed by intermittent pumping of production wells
- aquifers being actively recharged due to precipitation events

5.2 METHOD SUMMARY

A survey mark should be placed on the casing for use as a reference point for measurement. Many times the lip of the riser pipe is not flat. Another measuring reference should be located on the grout apron. The measuring point should be documented in the site logbook and on the groundwater level data form (see Appendix C).

Water levels in piezometers and monitoring wells should be allowed to stabilize for a minimum of 24 hours after well construction and development, prior to measurement. In low yield situations, recovery may take longer.

Working with decontaminated equipment, proceed from the least to the most contaminated wells. Open the well and monitor headspace with the appropriate monitoring instrument to determine the presence of volatile organic compounds. Lower the water level measurement device into the well until water surface or bottom of casing is encountered. Measure distance from water surface to the reference point on the well casing and record in the site logbook and/or groundwater level data form. Remove all downhole equipment, decontaminate as necessary, and replace well casing cap.

5.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

This section is not applicable to this SOP.

5.4 INTERFERENCES AND POTENTIAL PROBLEMS

- The chalk used on steel tape may contaminate the well.
- Cascading water may obscure the water mark or cause it to be inaccurate.
- Many types of electric sounders use metal indicators at 5-foot intervals around a conducting wire. These intervals should be checked with a surveyor's tape to ensure accuracy.
- If there is oil present on the water, it can insulate the contacts of the probe on an electric sounder or give false readings due to thickness of the oil. Determining the thickness and density of the oil layer may be warranted, in order to determine the correct water level.
- Turbulence in the well and/or cascading water can make water level determination difficult with either an electric sounder or steel tape.

- An airline measures drawdown during pumping. It is only accurate to 0.5 foot unless it is calibrated for various "drawdowns".

5.5 EQUIPMENT/APPARATUS

There are a number of devices which can be used to measure water levels, such as steel tape or airlines. The device should be adequate to attain an accuracy of 0.01 feet.

The following equipment is needed to measure water levels:

- air monitoring equipment
- water level measurement device
- electronic water level indicator
- metal tape measure
- airline
- steel tape
- chalk
- ruler
- notebook
- paper towels
- decontamination solution and equipment
- groundwater level data forms

5.6 REAGENTS

No chemical reagents are used in this procedure, with the exception of decontamination solutions. Where decontamination of equipment is required, refer to ERT SOP #2006, Sampling Equipment Decontamination and the site-specific work plan.

5.7 PROCEDURES

5.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

5.7.2 Procedures

1. Make sure water level measuring equipment is in good operating condition.

2. If possible and where applicable, start at those wells that are least contaminated and proceed to those wells that are most contaminated.

3. Clean all equipment entering the well by the following decontamination procedure:

   - Triple rinse equipment with deionized water.

   - Wash equipment with an Alconox solution followed by a deionized water rinse.

   - Rinse with an approved solvent (e.g., methanol, isopropyl alcohol, acetone) as per the work plan, if organic contamination is suspected.

   - Place equipment on clean surface such as a Teflon or polyethylene sheet.

4. Remove locking well cap, note location, time of day, and date in site notebook or an appropriate groundwater level data form.

5. Remove well casing cap.

6. If required by site-specific condition, monitor headspace of well with PID or FID to determine presence of volatile organic compounds and record in site logbook.

7. Lower electric water level measuring device or equivalent (i.e., permanently installed tranducers or airline) into the well until water surface is encountered.

8. Measure the distance from the water surface to the reference measuring point on the well casing or protective barrier post and record in the field logbook. In addition, note that the

water level measurement was from the top of the steel casing, top of the PVC riser pipe, from the ground surface, or from some other position on the well head.

9. The groundwater level data form in Appendix C should be completed as follows:

   - site name
   - logger name: person taking field notes
   - date: the date when the water levels are being measured
   - location: monitor well number and physical location
   - time: the military time at which the water level measurement was recorded
   - depth to water: the water level measurement in feet, or in tenths or hundreds of feet, depending on the equipment used
   - comments: any information the field personnel feels to be applicable
   - measuring point: marked measuring point on PVC riser pipe, protective steel casing or concrete pad surrounding well casing from which all water level measurements for individual wells should be measured. This provides consistency in future water level measurements.

10. Measure total depth of well (at least twice to confirm measurement) and record in site notebook or on log form.

11. Remove all downhole equipment, replace well casing cap and lock steel caps.

12. Rinse all downhole equipment and store for transport to next well.

13. Note any physical changes such as erosion or cracks in protective concrete pad or variation in total depth of well in field notebook and on field data sheets.

14. Decontaminate all equipment as outlined in Step 3 above.

5.8 CALCULATIONS

To determine groundwater elevation above mean sea level, use the following equation:

$$Ew = E - D$$

where:

Ew = Elevation of water above mean sea level
E = Elevation above sea level at point of measurement
D = Depth to water

5.9 QUALITY ASSURANCE/ QUALITY CONTROL

The following general quality assurance procedures apply:

- All data must be documented on standard chain of custody forms, field data sheets or within personal/site logbooks.
- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.
- Each well should be tested at least twice in order to compare results.

5.10 DATA VALIDATION

This section is not applicable to this SOP.

5.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and specific health and safety procedures.

EPA/540/P-91/008
OSWER Directive 9360.4-07
January 1991

COMPENDIUM OF ERT WASTE SAMPLING PROCEDURES

Sampling Equipment Decontamination

Drum Sampling

Tank Sampling

Chip, Wipe, and Sweep Sampling

Waste Pile Sampling

Interim Final

Environmental Response Team
Emergency Response Division

Office of Emergency and Remedial Response
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Washington, DC 20460

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2.0 DRUM SAMPLING: SOP #2009

2.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide technical guidance on safe and cost-effective response actions at hazardous waste sites containing drums with unknown contents. Container contents are sampled and characterized for disposal, bulking, recycling, grouping, and/or classification purposes.

2.2 METHOD SUMMARY

Prior to sampling, drums must be inventoried, staged, and opened. An inventory entails recording visual qualities of each drum and any characteristics pertinent to the contents' classification. Staging involves the organization, and sometimes consolidation of drums which have similar wastes or characteristics. Opening of closed drums can be performed manually or remotely. Remote drum opening is recommended for worker safety. The most widely used method of sampling a drum involves the use of a glass thief. This method is quick, simple, relatively inexpensive, and requires no decontamination.

2.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples collected from drums are considered waste samples. No preservatives should be added since there is a potential reaction of the sample with the preservative. Samples should, however, be cooled to 4°C and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample.

Sample bottles for collection of waste liquids, sludges, or solids are typically wide-mouth amber jars with Teflon-lined screw caps. Actual volume required for analysis should be determined in conjunction with the laboratory performing the analysis.

Follow these waste sample handling procedures:

1. Place sample container in two Ziploc plastic bags.
2. Place each bagged container in a 1-gallon covered can containing absorbent packing material. Place the lid on the can.
3. Mark the sample identification number on the outside of the can.
4. Place the marked cans in a cooler, and fill remaining space with absorbent packing material.
5. Fill out chain of custody form for each cooler, place in plastic, and affix to inside lid of cooler.
6. Secure and custody seal the lid of cooler.
7. Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved.

2.4 INTERFERENCES AND POTENTIAL PROBLEMS

The practice of tapping drums to determine their contents is neither safe nor effective and should not be used if the drums are visually overpressurized or if shock-sensitive materials are suspected. A laser thermometer may be used instead.

Drums that have been overpressurized, to the extent that the head is swollen several inches above the level of the chime, should not be moved. A number of devices have been developed for venting critically swollen drums. One method that has proven to be effective is a tube and spear device. A light aluminum tube (3 meters long) is positioned at the vapor space of the drum. A rigid, hooking device attached to the tube goes over the chime and holds the tube securely in place. The spear is inserted in the tube and positioned against the drum wall. A sharp blow on the end of the spear drives the sharpened tip through the drum and the gas vents along the grooves. The venting should be done from behind a wall or barricade. This device can be cheaply and easily designed and constructed where needed. Once the pressure has been relieved, the bung can be removed and the drum sampled.

2.5 EQUIPMENT/APPARATUS

The following are standard materials and equipment required for sampling:

- personal protection equipment
- wide-mouth glass jars with Teflon cap liner, approximately 500 mL volume
- uniquely numbered sample identification labels with corresponding data sheets
- 1-gallon covered cans half-filled with absorbent (vermiculite)
- chain of custody forms
- decontamination materials
- glass thief tubes or Composite Liquid Waste Samplers (COLIWASA)
- laser thermometer
- drum opening devices

Drum opening devices include the following:

2.5.1 Bung Wrench

A common method for opening drums manually is using a universal bung wrench. These wrenches have fittings made to remove nearly all commonly encountered bungs. They are usually constructed of cast iron, brass, or a bronze-beryllium, non-sparking alloy formulated to reduce the likelihood of sparks. The use of a non-sparking bung wrench does not completely eliminate the possibility of a spark being produced. (See Figure 1, Appendix B.)

2.5.2 Drum Deheader

When a bung is not removable with a bung wrench, a drum can be opened manually by using a drum deheader. This tool is constructed of forged steel with an alloy steel blade and is designed to cut the lid of a drum off or part way off by means of a scissors-like cutting action. A limitation of this device is that it can be attached only to closed head drums. Drums with removable heads must be opened by other means. (See Figure 2, Appendix B.)

2.5.3 Hand Pick, Pickaxe, and Hand Spike

These tools are usually constructed of brass or a non-sparking alloy with a sharpened point that can penetrate the drum lid or head when the tool is swung. The hand picks or pickaxes that are most commonly used are commercially available; whereas the spikes are generally uniquely fabricated 4-foot long poles with a pointed end. (See Figure 3, Appendix B.)

2.5.4 Backhoe Spike

The most common means used to open drums remotely for sampling is the use of a metal spike attached or welded to a backhoe bucket. In addition to being very efficient, this method can greatly reduce the likelihood of personal exposure. (See Figure 4, Appendix B.)

2.5.5 Hydraulic Drum Opener

Another remote method for opening drums is with remotely operated hydraulic devices. One such device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump which pressurizes soil through a length of hydraulic line. (See Figure 5, Appendix B.)

2.5.6 Pneumatic Devices

A pneumatic bung remover consists of a compressed air supply that is controlled by a heavy-duty, two-stage regulator. A high-pressure air line of desired length delivers compressed air to a pneumatic drill, which is adapted to turn a bung fitting selected to fit the bung to be removed. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. This remote bung opener does not permit the slow venting of the container, and therefore appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed with this device. (See Figure 6, Appendix B.)

2.6 REAGENTS

Reagents are not typically required for preserving drum samples. However, reagents are used for decontaminating sampling equipment. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

2.7 PROCEDURES

2.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

2.7.2 Drum Inspection

Appropriate procedures for handling drums depend on the contents. Thus, prior to any handling, drums should be visually inspected to gain as much information as possible about their contents. Those in charge of inspections should be on the look-out for:

- drum condition, corrosion, rust, and leaking contents
- symbols, words, or other markings on the drum indicating hazards (i.e., explosive, radioactive, toxic, flammable)
- signs that the drum is under pressure
- shock sensitivity

Monitor around the drums with radiation instruments, organic vapor monitors (OVA) and combustible gas indicators (CGI).

Classify the drums into categories, for instance:

- radioactive
- leaking/deteriorating
- bulging
- drums containing lab packs
- explosive/shock sensitive

All personnel should assume that unmarked drums contain hazardous materials until their contents have been categorized, and that labels on drums may not accurately describe their contents.

If it is presumed that there are buried drums on-site, geophysical investigation techniques such as magnetometry, ground penetrating radar, and metal detection can be employed in an attempt to determine depth and location of the drums. See ERT SOP #2159, General Surface Geophysics.

2.7.3 Drum Staging

Prior to sampling, the drums should be staged to allow easy access. Ideally, the staging area should be located just far enough from the drum opening area to prevent a chain reaction if one drum should explode or catch fire when opened.

While staging, physically separate the drums into the following categories: those containing liquids, those containing solids, lab packs, or gas cylinders, and those which are empty. This is done because the strategy for sampling and handling drums/containers in each of these categories will be different. This may be achieved by:

- Visual inspection of the drum and its labels, codes, etc. Solids and sludges are typically disposed of in open-top drums. Closed-head drums with a bung opening generally contain liquid.

- Visual inspection of the contents of the drum during sampling followed by restaging, if needed.

Once a drum has been excavated and any immediate hazard has been eliminated by overpacking or transferring the drum's contents, affix a numbered tag to the drum and transfer it to a staging area. Color-coded tags, labels, or bands should be used to mark similar waste types. Record a description of each drum, its condition, any unusual markings, and the location where it was buried or stored, on a drum data sheet (Appendix A). This data sheet becomes the principal

recordkeeping tool for tracking the drum onsite.

Where there is good reason to suspect that some drums contain radioactive, explosive, and shock-sensitive materials, these drums should be staged in a separate, isolated area. Placement of explosives and shock-sensitive materials in diked and fenced areas will minimize the hazard and the adverse effects of any premature detonation of explosives.

Where space allows, the drum opening area should be physically separated from the drum removal and drum staging operations. Drums are moved from the staging area to the drum opening area one at a time using forklift trucks equipped with drum grabbers or a barrel grappler. In a large-scale drum handling operation, drums may be conveyed to the drum opening area using a roller conveyor.

2.7.4 Drum Opening

There are three basic techniques available for opening drums at hazardous waste sites:

- Manual opening with non-sparking bung wrenches,
- Drum deheading, and
- Remote drum puncturing or bung removal.

The choice of drum opening techniques and accessories depends on the number of drums to be opened, their waste contents, and physical condition. Remote drum opening equipment should always be considered in order to protect worker safety. Under OSHA 1910.120, manual drum opening with bung wrenches or deheaders should be performed only with structurally sound drums having contents that are known to be (1) not shock sensitive, (2) non-reactive, (3) non-explosive, and (4) non-flammable.

Manual Drum Opening with a Bung Wrench

Manual drum opening with bung wrenches (Figure 1, Appendix B) should not be performed unless the drums are structurally sound (no evidence of bulging or deformation) and their contents are known to be non-explosive. If opening the drum with bung wrenches is deemed reasonably cost-effective and safe, then follow these procedures to minimize the hazard:

1. Fully outfit field personnel with protective gear.
2. Position drum upright with the bung up, or, for drums with bungs on the side, lay the drum on its side with the bung plug up.
3. Wrench the bung with a slow, steady pulling motion across the drum. If the length of the bung wrench handle provides inadequate leverage for unscrewing the plug, attach a "cheater bar" to the handle to improve leverage.

Manual Drum Opening with a Drum Deheader

Drums are opened with a drum deheader (Figure 2, Appendix B) by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw so that the deheader is held against the side of the drum. Moving the handle of the deheader up and down while sliding the deheader along the chime will cut off the entire top. If the top chime of a drum has been damaged or badly dented, it may not be possible to cut off the entire top. Since there is always the possibility that a drum may be under pressure, make the initial cut very slowly to allow for the gradual release of any built-up pressure. A safer technique would be to use a remote method to puncture the drum prior to using the deheader.

Self-propelled drum openers which are either electrically or pneumatically driven can be used for quicker and more efficient deheading.

Manual Drum Opening with a Hand Pick, Pickaxe, or Spike

When a drum must be opened and neither a bung wrench nor a drum deheader is suitable, the drum can be opened for sampling by using a hand pick, pickaxe, or spike (Figure 3, Appendix B). Often the drum lid or head must be hit with a great deal of force in order to penetrate it. The potential for splash or spraying is greater than with other opening methods and, therefore, this method of drum opening is not recommended, particularly when opening drums containing liquids. Some spikes used have been modified by the addition of a circular splash plate near the penetrating end. This plate acts as a shield and reduces the amount of splash in the direction of the person using the spike. Even with this shield, good splash gear is essential.

Since drums cannot be opened slowly with these tools, spray from drums is common requiring appropriate safety measures. Decontaminate the pick or spike after each drum is opened to avoid cross-contamination and/or adverse chemical reaction from incompatible materials.

Remote Drum Opening with a Backhoe Spike

Remotely operated drum opening tools are the safest available means of drum opening. Remote drum opening is slow, but is much safer compared to manual methods of opening.

Drums should be "staged" or placed in rows with adequate aisle space to allow ease in backhoe maneuvering. Once staged, the drums can be quickly opened by punching a hole in the drum head or lid with the spike.

The spike (Figure 4, Appendix B) should be decontaminated after each drum is opened to prevent cross-contamination. Even though some splash or spray may occur when this method is used, the operator of the backhoe can be protected by mounting a large shatter-resistant shield in front of the operator's cage. This, combined with the required level of personal protection gear, should be sufficient to protect the operator. Additional respiratory protection can be afforded by providing the operator with an on-board airline system.

Remote Drum Opening with Hydraulic Devices

A piercing device with a metal point is attached to the end of a hydraulic line and is pushed into the drum by hydraulic pressure (Figure 5, Appendix B). The piercing device can be attached so that the sampling hole can be made on either the side or the head of the drum. Some of the metal piercers are hollow or tube-like so that they can be left in place if desired and serve as a permanent tap or sampling port. The piercer is designed to establish a tight seal after penetrating the container.

Remote Drum Opening with Pneumatic Devices

Pneumatically-operated devices utilizing compressed air have been designed to remove drum bungs remotely (Figure 6, Appendix B).

2.7.5 Drum Sampling

After the drum has been opened, monitor headspace gases using an explosimeter and organic vapor analyzer. In most cases it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, take a sample that represents the entire depth of the vessel.

When sampling a previously sealed vessel, check for the presence of a bottom sludge. This is easily accomplished by measuring the depth to the apparent bottom, then comparing it to the known interior depth.

Glass Thief Sampler

The most widely used implement for sampling is a glass tube commonly referred to as a glass thief (Figure 7, Appendix B). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate. Glass thieves are typically 6mm to 16mm I.D. and 48 inches long.

Procedures for using a glass thief are as follows:

1. Remove cover from sample container.
2. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About one foot of tubing should extend above the drum.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring liquid does not come into contact with stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.
6. Release stopper and allow the glass thief to drain until the container is approximately 2/3 full.
7. Remove tube from the sample container, break it into pieces and place the pieces in the drum.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the drum.

10. Log all samples in the site logbook and on field data sheets.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

In many instances a drum containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by the use of a stainless steel lab spoon.

It should be noted that in some instances disposal of the tube by breaking it into the drum may interfere with eventual plans for the removal of its contents. This practice should be cleared with the project officer or other disposal techniques evaluated.

COLIWASA Sampler

Some equipment is designed to collect a sample from the full depth of a drum and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) and modifications thereof. The COLIWASA (Figure 8, Appendix B) is a much cited sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end.

Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper. One model of the COLIWASA is shown in Appendix B; however, the design can be modified and/or adapted somewhat to meet the needs of the sampler.

The major drawbacks associated with using a COLIWASA concern decontamination and costs. The sampler is difficult, if not impossible to decontaminate in the field and its high cost in relation to alternative procedures (glass tubes) make it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

Follow these procedures for using the COLIWASA:

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

2. Slowly lower the sampler into the liquid waste. Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

4. Slowly withdraw the sample from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.

5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.

6. Cap the sample container tightly and place prelabeled sample container in a carrier.

7. Replace the bung or place plastic over the drum.

8. Log all samples in the site logbook and on field data sheets.

3.0 TANK SAMPLING: SOP #2010

3.1 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide protocols for sampling tanks and other confined spaces from outside the vessel.

3.2 METHOD SUMMARY

The safe collection of a representative sample should be the criterion for selecting sample locations. A representative sample can be collected using techniques or equipment that are designed for obtaining liquids or sludges from various depths. The structure and characteristics of storage tanks present problems with collection of samples from more than one location; therefore, the selection of sampling devices is an important consideration.

Depending on the type of vessel and characteristics of the material to be sampled, one can choose a bailer, glass thief, bacon bomb sampler, sludge judge, COLIWASA, or subsurface grab sampler to collect the sample. For depths of less than 5-feet, a bailer, COLIWASA, or sludge judge can be used. A sludge judge, subsurface grab sampler, bailer, or bacon bomb sampler can be used for depths greater than 5-feet. A sludge judge or bacon bomb can be used to determine if the tank consists of various strata.

All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with an LEL reading greater than 25%.

All personnel involved in tank sampling should be advised as to the hazards associated with working in unfavorable conditions.

3.3 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Samples collected from tanks are considered waste samples and, as such, addition of preservatives is not required due to the potential reaction of the sample with the preservative. Samples should, however, be cooled to 4°C and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample.

Sample bottles for collection of waste liquids, sludges, or solids are typically wide-mouth amber jars with Teflon-lined screw caps. Actual volume required for analysis should be determined in conjunction with the laboratory performing the analysis.

Waste sample handling procedures should be as follows:

1. Place sample container in two Ziploc plastic bags.
2. Place each bagged container in a 1-gallon covered can containing absorbent packing material. Place the lid on the can.
3. Mark the sample identification number on the outside of the can.
4. Place the marked cans in a cooler, and fill remaining space with absorbent packing material.
5. Fill out a chain of custody form for each cooler, place it in plastic, and affix it to the inside lid of the cooler.
6. Secure and custody seal the lid of cooler.
7. Arrange for the transportation appropriate for the type of hazardous waste involved.

3.4 INTERFERENCES AND POTENTIAL PROBLEMS

Sampling a storage tank requires a great deal of manual dexterity, often requiring the sampler to climb to the top of the tank upon a narrow vertical or spiral stairway or ladder while wearing protective clothing and carrying sampling equipment.

Before climbing onto the vessel, perform a structural survey of the tank to ensure the sampler's

safety and accessibility prior to initiating field activities.

As in all opening of containers, take extreme caution to avoid ignition or combustion of volatile contents. All tools used must be constructed of a non-sparking material and electronic instruments must be intrinsically safe.

All sample locations should be surveyed for air quality prior to sampling. At no time should sampling continue with an LEL reading greater than 25%.

3.5 EQUIPMENT/APPARATUS

Storage tank materials include liquids, sludges, still bottoms, and solids of various structures. The type of sampling equipment chosen should be compatible with the waste. Samplers commonly used for tanks include: the bacon bomb sampler, the sludge judge, glass thief, bailer, COLIWASA, and subsurface grab sampler.

- sampling plan
- safety equipment
- tape measure
- weighted tape line or equivalent
- camera/film
- stainless steel bucket or bowl
- sample containers
- Ziploc plastic bags
- logbook
- labels
- field data sheets
- chain of custody forms
- flashlight (explosion proof)
- coolers
- ice
- decontamination supplies
- bacon bomb sampler
- sludge judge
- glass thief
- bailer
- COLIWASA
- subsurface grab sampler
- water/oil level indicator
- OVA (organic vapor analyzer or equivalent)
- explosimeter/oxygen meter
- high volume blower

3.6 REAGENTS

Reagents are not typically required for the preservation of waste samples. However, reagents will be utilized for decontamination of equipment. Decontamination solutions required are specified in ERT SOP #2006, Sampling Equipment Decontamination.

3.7 PROCEDURES

3.7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and which equipment and supplies are needed.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or preclean equipment, and ensure that it is in working order.

4. Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.

6. Identify and mark all sampling locations.

3.7.2 Preliminary Inspection

1. Inspect the external structural characteristics of each tank and record in the site logbook. Potential sampling points should be evaluated for safety, accessibility, and sample quality.

2. Prior to opening a tank for internal inspection, the tank sampling team should:

   - Review safety procedures and emergency contingency plans with the Safety Officer,

   - Ensure that the tank is properly grounded,

   - Remove all sources of ignition from the immediate area.

3. Each tank should be mounted using appropriate means. Remove manway covers using non-sparking tools.

4. Collect air quality measurements for each potential sample location using an explosimeter/oxygen meter for a lower explosive limit (LEL/O_2) reading and an OVA/HNU for an organic vapor concentration. Both readings should be taken from the tank headspace, above the sampling port, and in the breathing zone.

5. Prior to sampling, the tank headspace should be cleared of any toxic or explosive vapor concentration using a high volume blower. No work should start if LEL readings exceed 25%. At 10% LEL, work can continue but with extreme caution.

3.7.3 Sampling Procedures

1. Determine the depth of any and all liquid-solid interface, and depth of sludge using a weighted tape measure, probe line, sludge judge, or equivalent.

2. Collect liquid samples from 1-foot below the surface, from mid-depth of liquid, and from 1-foot above the bottom sludge layer. This can be accomplished with a subsurface grab sampler or bacon bomb. For liquids less than 5-feet in depth, use a glass thief or COLIWASA to collect the sample.

   If sampling storage tanks, vacuum trucks, or process vessels, collect at least one sample from each compartment in the tank. Samples should always be collected through an opened hatch at the top of the tank. Valves near the bottom should not be used, because of their questionable or unknown integrity. If such a valve cannot be closed once opened, the entire tank contents may be lost to the ground surface. Also, individual strata cannot be sampled separately through a valve near the bottom.

3. Compare the three samples for visual phase differences. If phase differences appear, systematic iterative sampling should be performed. By halving the distance between two discrete sampling points, one can determine the depth of the phase change.

4. If another sampling port is available, sample as above to verify the phase information.

5. Measure the outside diameter of the tank and determine the volume of wastes using the depth measurements. (See Appendix C for calculations.)

6. Sludges can be collected using a bacon bomb sampler, glass thief, or sludge judge.

7. Record all information on the sample data sheet or site logbook. Label the container with the appropriate sample tag.

8. Decontaminate sampling equipment as per ERT SOP #2006, Sampling Equipment Decontamination.

3.7.4 Sampling Devices

Bacon Bomb Sampler

The bacon bomb sampler (Figure 9, Appendix B) is designed to collect material from various levels within a storage tank. It consists of a cylindrical body, usually made of chrome-plated brass and bronze with an internal tapered plunger that acts as a valve to admit the sample. A line attached to the top of the plunger opens and closes the valve. A line is attached to the removable top cover which has a locking mechanism to keep the plunger closed after sampling.

1. Attach the sample line and the plunger line to the sampler.

2. Measure and then mark the sampling line at the desired depth.

3. Gradually lower the bacon bomb sampler by the sample line until the desired level is reached.

4. When the desired level is reached, pull up on the plunger line and allow the sampler to fill before releasing the plunger line to seal off the sampler.

5. Retrieve the sampler by the sample line. Be careful not to pull up on the plunger line and thereby prevent accidental opening of the bottom valve.

6. Rinse or wipe off the exterior of the sampler body.

7. Position the sampler over the sample container and release its contents by pulling up on the plunger line.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the tank.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Sludge Judge

A sludge judge (Figure 10, Appendix B) is used for obtaining an accurate reading of solids which can settle, in any liquid, to any depth. The sampler consists of 3/4-inch plastic pipe in 5-foot sections, marked at 1-foot increments, with screw-style fittings. The top section includes a nylon line for raising the sampler.

1. Lower the sludge judge to the bottom of the tank.

2. When the bottom has been reached, and the pipe has filled to surface level, tug slightly on the rope as you begin to raise the unit. This will seat the check valve, trapping the column of material.

3. When the unit has been raised clear of the tank liquid, the amount of sludge in the sample can be read using the 1-foot increments marked on the pipe sections.

4. By touching the pin extending from the bottom section against a hard surface, the material is released from the unit.

5. Cap the sample container tightly and place prelabeled sample container in a carrier.

6. Replace the bung or place plastic over the tank.

7. Log all samples in the site logbook and on field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Subsurface Grab Sampler

Subsurface grab samplers (Figure 11, Appendix B) are designed to collect samples of liquids at various depths. The sampler is usually constructed of aluminum or stainless steel tubing with a polypropylene or Teflon head that attaches to a 1-liter sample container.

1. Screw the sample bottle onto the sampling head.

2. Lower the sampler to the desired depth.

3. Pull the ring at the top which opens the spring-loaded plunger in the head assembly.

4. When the bottle is full, release the ring, lift sampler, and remove sample bottle.

5. Cap the sample container tightly and place prelabeled sample container in a carrier.

6. Replace the bung or place plastic over the tank.

7. Log all samples in the site logbook and on field data sheets and label all samples.

8. Package samples and complete necessary paperwork.

9. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

Glass Thief

The most widely used implement for sampling is a glass tube commonly referred to as a glass thief (Figure 7, Appendix B). This tool is simple, cost effective, quick, and collects a sample without having to decontaminate. Glass thieves are typically 6mm to 16mm I.D. and 48 inches long.

1. Remove cover from sample container.

2. Insert glass tubing almost to the bottom of the

tank or until a solid layer is encountered. About 1 foot of tubing should extend above the tank.

3. Allow the waste in the tank to reach its natural level in the tube.

4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring liquid does not come into contact with stopper.

5. Carefully remove the capped tube from the tank and insert the uncapped end in the sample container. Do not spill liquid on the outside of the sample container.

6. Release stopper and allow the glass thief to drain until the container is approximately 2/3 full.

7. Remove tube from the sample container, break it into pieces and place the pieces in the tank.

8. Cap the sample container tightly and place prelabeled sample container in a carrier.

9. Replace the bung or place plastic over the tank.

10. Log all samples in the site logbook and on field data sheets and label all samples.

11. Package samples and complete necessary paperwork.

12. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

In many instances a tank containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by the use of a stainless steel lab spoon.

Bailer

The positive-displacement volatile sampling bailer (manufactured by GPI or equivalent) (Figure 12, Appendix B) is perhaps the most appropriate for collecting water samples for volatile analysis. Other bailer types (messenger, bottom fill, etc.) are less desirable, but may be mandated by cost and site conditions. Generally, bailers can provide an acceptable sample, providing that the sampling personnel use extra care in the collection process.

1. Make sure clean plastic sheeting surrounds the tank.

2. Attach a line to the bailer.

3. Lower the bailer slowly and gently into the tank so as not to splash the bailer into the tank contents.

4. Allow the bailer to fill completely and retrieve the bailer from the tank.

5. Begin slowly pouring from the bailer.

6. Cap the sample container tightly and place prelabeled sample container in a carrier.

7. Replace the bung or place plastic over the tank.

8. Log all samples in the site logbook and on field data sheets and label all samples.

9. Package samples and complete necessary paperwork.

10. Transport sample to decontamination zone to prepare it for transport to an analytical laboratory.

COLIWASA

Some equipment is designed to collect a sample from the full depth of a tank and maintain it in the transfer tube until delivery to the sample bottle. These designs include primarily the Composite Liquid Waste Sampler (COLIWASA) (Figure 8, Appendix B) and modifications thereof. The COLIWASA is a much cited sampler designed to permit representative sampling of multiphase wastes from tanks and other containerized wastes. One configuration consists of a 152 cm by 4 cm I.D. section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end. Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper.

The major drawbacks associated with using a COLIWASA concern decontamination and costs. The sampler is difficult if not impossible to decontaminate in the field and its high cost in relation to alternative procedures (glass tubes) make it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

2. Slowly lower the sampler into the liquid waste. Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

4. Slowly withdraw the sample from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.

5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.

6. Cap the sample container tightly and place prelabeled sample container in a carrier.

7. Replace the bung or place plastic over the tank.

8. Log all samples in the site logbook and on field data sheets and label all samples.

9. Package samples and complete necessary paperwork.

10. Transport sample to decontamination zone to prepare it for transport to the analytical laboratory.

3.8 CALCULATIONS

Refer to Appendix C for calculations to determine tank volumes.

3.9 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

- All data must be documented on field data sheets or within site logbooks.

- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

3.10 DATA VALIDATION

This section is not applicable to this SOP.

3.11 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and specific health and safety procedures. More specifically, the hazards associated with tank sampling may cause bodily injury, illness, or death to the worker. Failure to recognize potential hazards of waste containers is the cause of most accidents. It should be assumed that the most unfavorable conditions exist, and that the danger of explosion and poisoning will be present. Hazards specific to tank sampling are:

- Hazardous atmospheres can be flammable, toxic, asphyxiating, or corrosive.

- If activating electrical or mechanical equipment would cause injury, each piece of equipment should be manually isolated

APPENDIX D

CLP GUIDELINES

ROUTINE ANALYTICAL SERVICES

(RAS)

Contract Laboratory Program

USEPA Sample Management Office

Low/Medium Concentration Inorganic RAS

- Target Analyte List
  - Total Metals (Unfiltered)
  - Dissolved Metals (Field Filtered)
  - Cyanide
- AA or ICP Methods
- 35-day Data Turnaround

High Concentration Inorganic RAS

- Target Analyte List
  - Total Metals
  - Cyanide
- Hydride ICP
- Lab Screens for Concentration
- 35-Day Data Turnaround

Laboratory Quality Control (QC)
High Concentration Inorganic RAS

- Matrix Spike
- Duplicate
- Lab Control Sample
- Double Volume Field Sample for Waters
- QC Needed for Each SDG

CLP Samples

A Sample is *All* Volume:

1) Of One Matrix
2) From One Station Location
3) For One Analytical Program
4) For One Laboratory

Each Sample is Assigned a Unique Sample Number

RAS Requests - Required Information

- Site Name
- Location: City and State
- Site/Spill Code
- Type of Activity
- Sampling Organization, Contact, and Phone Number
- Sampling and Shipping Dates
- Number of Samples By Concentration and Matrix
- Parameters Required
- Known or Suspected Hazards

Sample Documentation

- Creates a Legal "Paper Trail" for Enforcement
- Data Base on Sample Level
- CLP Paperwork and Tracking Systems Audited
- Case Numbers, SAS Numbers Reflect Different Contracts
- Contract Compliance Screening
- Late Data Tracking
- Billing and Accounting

REFERENCE 2