Attachment 1

Lancaster Laboratories Quality Assurance Plan

Project No. 21-02
Former Gulf States Creosoting Site
Hattiesburg, Mississippi

LABORATORY QUALITY ASSURANCE PLAN

OCTOBER 9, 1990
REVISED: October 7, 1996

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Lancaster Laboratories
A division of Thermo Analytical Inc.

1. Laboratory Quality Assurance Plan

This document provides the laboratory portion of the response to EPA's *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* QAMS-005/80, Sections 5.1 through 5.16 as revised December 29, 1980, and EPA-600/4-83-004, February 1983. Guidance was also obtained from *Preparation Aids for the Development of Category 1 Quality Assurance Project Plans*, Office of Research and Development, USEPA, EPA/600/8-91/003, February 1991.

As much as possible, the procedures in this document have been standardized to make them applicable to all types of environmental monitoring and measurement projects. However, under certain site-specific conditions, all of the procedures discussed in this document may not be appropriate. In such cases it will be necessary to adapt the procedures to the specific conditions of the investigation.

Quality Assurance Officer: Kathleen

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3. Project Description

This quality assurance project plan provides specific quality assurance and quality control procedures involved in the generation of data of acceptable quality and completeness. Tests will be performed according to the analytical methodology set forth in the USEPA SW-846 3rd Edition, Update II, 1994. SW-846 provides specific analytical procedures to be used and defines the specific application of these procedures. Proven instruments and techniques will be used to identify and measure the concentrations of volatiles, semivolatiles, and pesticide compounds and/or the inorganic elements. The laboratory will employ state-of-the-art GC/MS and/or GC procedures to perform all organic analyses, including all necessary preparation for analysis. Inorganic analyses will be performed using graphite furnace atomic absorption spectrophotometry (AA), inductively coupled plasma spectroscopy, cold vapor AA, flame AA, or hydride generation AA. Wet chemical analyses will use appropriate instrumentation. The client is responsible for providing specifics on the project site.

**Test Methods for Evaluating Solid Waste - Physical/Chemical Methods*, SW-846, 3rd Edition, Update II, September 1994.

4. Project Organization

The objectives of the laboratory Quality Assurance Program are to establish procedures which will ensure that data generated in the laboratory are within acceptable limits of accuracy and precision, to ensure that quality control measures are being carried out, and to ensure accountability of the data through sample and data management procedures. To this end, a Quality Assurance Department has been established. The Quality Assurance Officer reports directly to the President of Lancaster Laboratories and has no direct responsibilities for data production, thus avoiding any conflict of interest.

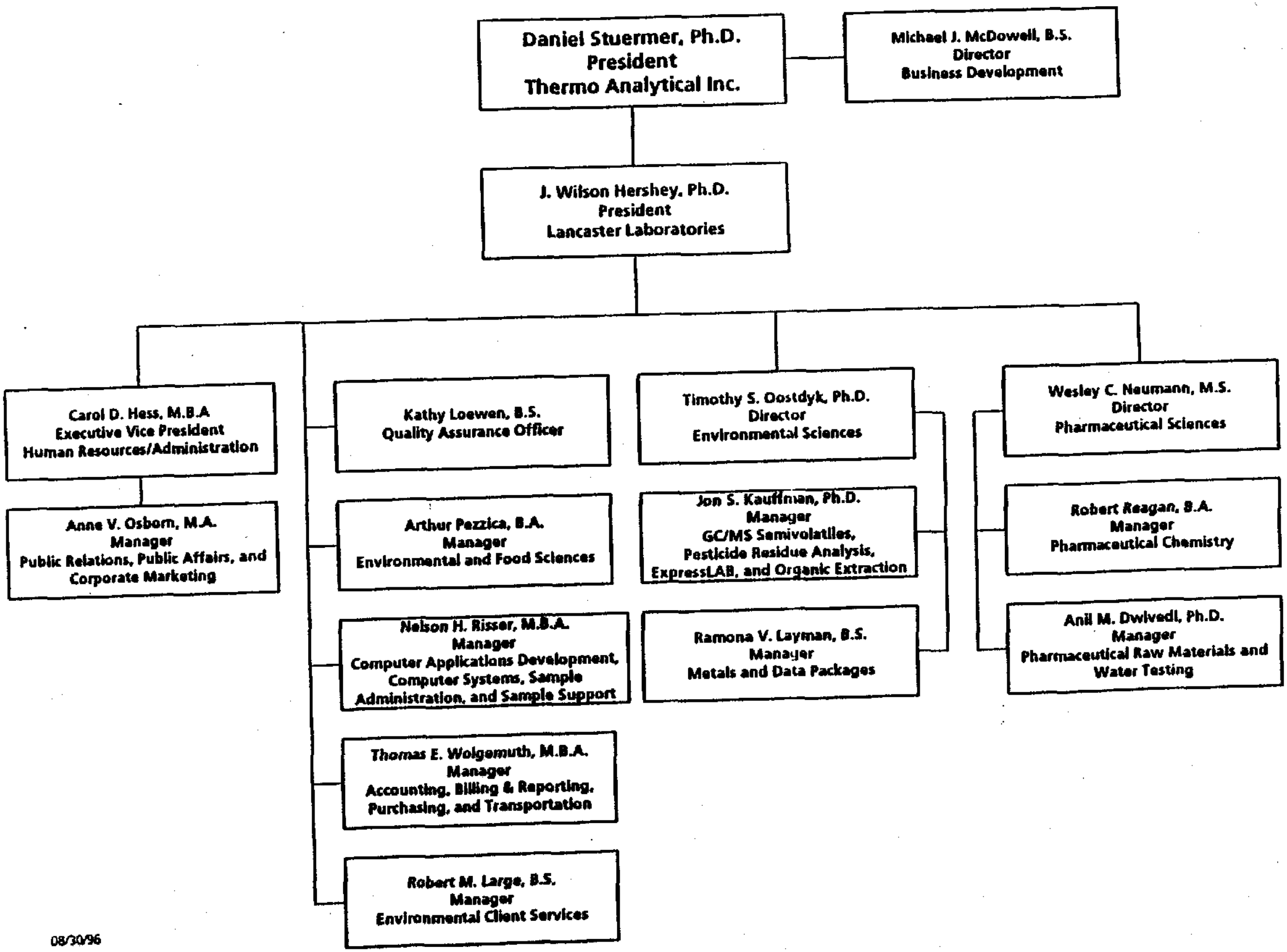
The attached organizational charts show key managerial personnel. Resumes of key individuals may be found in the enclosed *Qualifications Manual.*

The Sample Administration Group will be responsible for receiving samples, signing the external chain of custody, checking sample condition, assigning unique laboratory sample identification numbers, and initiating internal chain-of-custody forms. Sample Support personnel will be responsible for assigning storage locations, checking and adjusting preservation, homogenizing the sample as needed, and sample discard.

Group leaders listed in each technical area are responsible for performing laboratory analyses, quality control as specified in the methods, instrument calibration, and technical data review. Data is reported using a computerized sample management system, which tracks sample progress through the laboratory and generates client reports when all analyses are complete. Quality control data is entered onto the same system for purposes of charting and monitoring data quality.

The Quality Assurance Department is responsible for reviewing quality control data, conducting audits in the laboratory and reporting findings to management, maintaining current copies of all analytical methods, maintaining copies of computer code used to calculate and report results, submitting blind samples to the laboratory, and ensuring that appropriate corrective action is taken when quality problems are observed.

Data package deliverables are available upon request. The Quality Assurance Department reviews the contents of the deliverables for completeness and to be sure that all quality control checks were performed and met specifications. This step includes review of holding times, calibrations, instrument tuning, blank results, duplicate results, matrix spike results, surrogate results, and laboratory control samples (where applicable). Every attempt to meet specifications will be made, and any item outside of the specifications will be noted in the narrative. The laboratory will not validate data with regard to usability since this generally requires specific knowledge about the site.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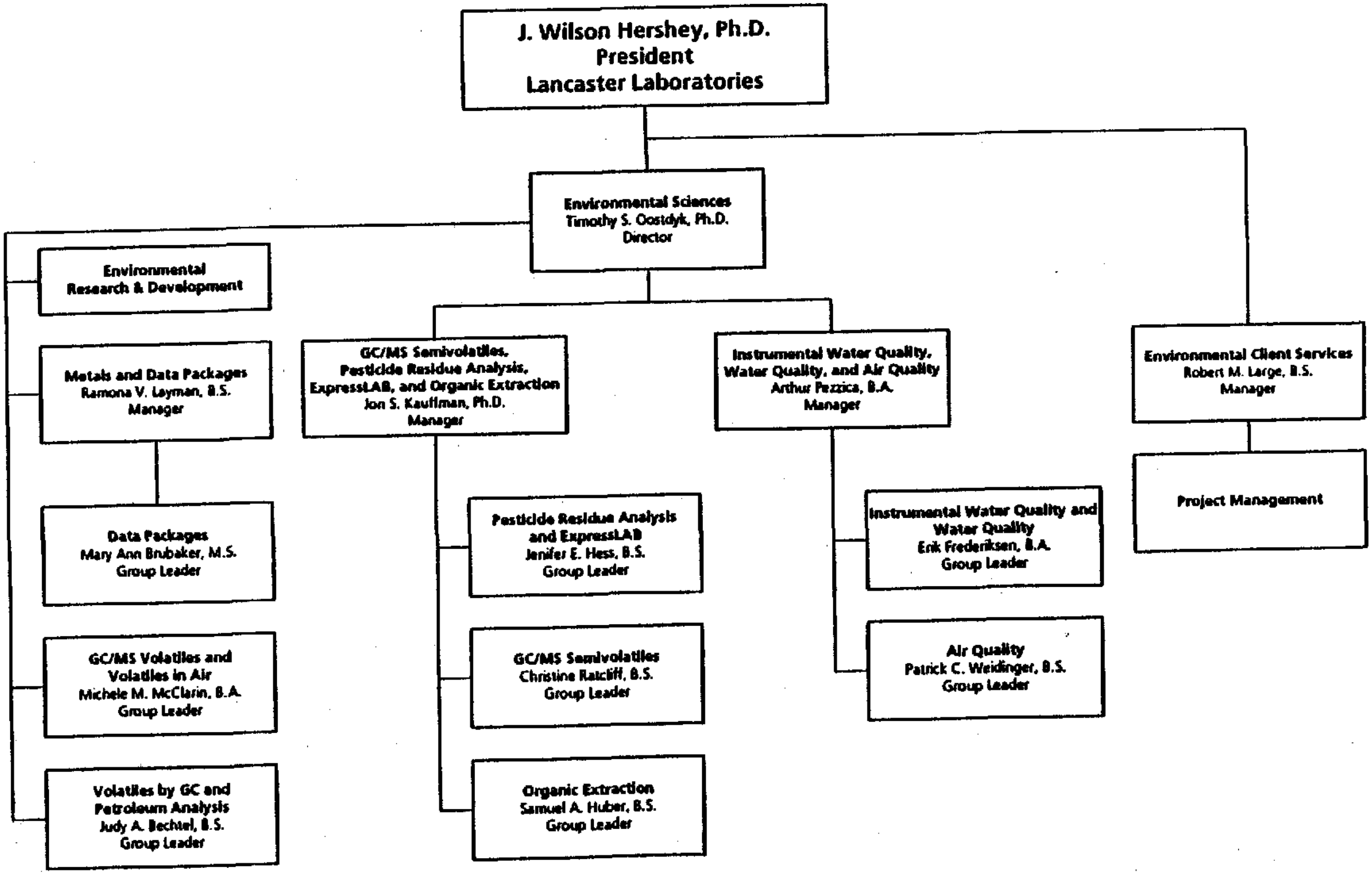
Pharmaceutical Raw Materials and Water Testing

08/30/96

Environmental Sciences



08/29/96

5. QA Objectives for Measurement Data

Quality assurance is the overall program for assuring reliability of monitoring and measurement data. Quality control is the routine application of procedures for obtaining set standards of performance in the monitoring and measurement process. Data quality requirements are based on the intended use of the data, the measurement process, and the availability of resources. The quality of all data generated and processed during this investigation will be assessed for precision, accuracy, representativeness, comparability, and completeness. These specifications will be met through precision and accuracy criteria as specified in Section 11. Detection limits are presented in Section 9.

Precision - Precision is determined by measuring the agreement among individual measurements of the same property, under similar conditions. The laboratory objective is to equal or exceed the precision demonstrated for the applied analytical method on comparable samples. The degree of agreement is expressed as the relative percent difference (RPD%). Evaluation of the RPD% is based on statistical evaluation of past lab data or guidelines within the methods for organic and inorganic analyses. External evaluation of precision is accomplished by analysis of standard reference material and interlaboratory performance data.

Accuracy - Accuracy is a measure of the closeness of an individual measurement to the true or expected value. Analyzing a reference material of known concentration or reanalyzing a sample which has been spiked with a known concentration/amount is a way to determine accuracy. Accuracy is expressed as a percent recovery (%R). Evaluation of the %R is based on statistical evaluation of past lab data or guidelines within the methods for organic and inorganic analyses.

Representativeness - Representativeness expresses the degree to which data accurately represents the media and conditions being measured. The representativeness of the data from the sampling site will depend on the sampling procedure. Sample collection is the responsibility of the client. Samples will be homogenized, if required, as part of the laboratory sample preparation. By comparing the quality control data for the samples against other data for similar samples analyzed at the same time, representativeness can be determined for this objective.

Comparability - Comparability conveys the confidence with which one set of data can be compared to another. The analytical results can be compared to other laboratories by using traceable standards and standard methodology and consistent reporting units. The Laboratory Quality Assurance Program documents internal performance, and the interlaboratory studies document performance compared to other laboratories.

Completeness - Completeness is a measure of the quantity of valid data acquired from a measurement process compared to the amount that was expected to be acquired under the measurement conditions. The completeness of an analysis can be documented by including in the data deliverables sufficient information to allow the data user to assess the quality of the results. Additional information will be stored in the laboratories archives, both hard copy and magnetic tape. Quality Assurance standard operating procedures (SOPs) are in place to provide traceability of all reported results.

To ensure attainment of the quality assurance objectives, SOPs are in place detailing the requirements for the correct performance of laboratory procedures. The laboratory SOPs fall under five general categories:

1. Corporate policy
2. Quality assurance
3. Sample administration
4. General laboratory procedures
5. Anlaytical (i.e., methods, standard preps., instrumentation)

All SOPs are approved by the QA Department prior to implementation. The distribution of current SOPs and archiving of outdated ones are controlled through a master file. Table 5-1 provides an index of QA SOPs in place in support of the Quality Assurance objectives. These requirements are supplemented by the procedures in the laboratory and analytical SOPs.

Table 5-1	
Document #	Document Title
QA-101	Sample Collection
QA-102	Sample Log-in
QA-103	Sample Storage and Disposal
QA-104	Chain-of-Custody Documentation
QA-105	Analytical Methods Manual
QA-106	Validation and Authorization of Analytical Methods
QA-107	Analytical Methods for Nonstandard Analyses
QA-108	Subcontracting to Other Laboratories
QA-109	Laboratory Notebooks and Documentation
QA-110	Reagents
QA-111	Instrument and Equipment Calibration
QA-112	Instrument and Equipment Maintenance
QA-113	Data Entry and Verification
QA-114	Data Storage and Security
QA-115	Quality Control Records
QA-116	Investigation and Corrective Action of Unacceptable Quality Control Data
QA-117	Personnel Training Records
QA-118	Quality Assurance Audits
QA-119	Proficiency Samples
QA-120	Documentation of Programming for the Sample Management System
QA-121	Guidelines for the Development, Validation, Implementation, and Maintenance of Computer Systems Used with CLP, GLP, and GMP Data
QA-122	Investigation and Corrective Action Reporting for Laboratory Problems

6. Sampling Procedures

In order for meaningful analytical data to be produced, the samples analyzed must be representative of the system from which they are drawn. It is the responsibility of the client to ensure that the samples are collected according to accepted or standard sampling methods.

The laboratory will provide the appropriate sample containers, required preservative, chain-of-custody forms, shipping containers, labels, and seals. The majority of sample containers are purchased precleaned by the supplier. Any reused bottles are cleaned in-house following laboratory standard operating procedures. Special containers with traceability documentation are available upon request. Because the laboratory does not stock this type of container, 1 month prior notice is required.

Each lot of preservative will be documented and checked for contaminants before use. The appropriate bottle will be preserved with the new preservative and filled with deionized water to represent a sample. A similar container (that does not contain preservative) will be filled with deionized water to be used as a blank check. Analysis results are documented for each preservative lot number.

Trip blanks will be prepared by the laboratory and accompany sample containers at the project required frequency. Analyte free water will also be provided for field blanks.

A list of containers, preservatives, and holding times follows in Table 6-1.

Table 6-1

Sample Containers, Preservatives, and Holding Times for Aqueous and Solid Samples

Fraction	Vol. Req. (mL) Wt. Req. (g)	Container P=Plastic G=Glass	Preservation^a	Holding Time^d From Date of Collection Water	Soil
Volatiles	3 x 40 mL 100 g	G	Cool, 4°C^b pH <2 w/HCl	14 Days	14
Pesticides	2 x 1000 mL 100 g	G	Cool, 4°C^b	7 Days to extractione	14
Herbicides	2 x 1000 mL 100 g	G	Cool, 4°C^b	7 Days to extraction^e	14
Halocarbons	3 x 40 mL 100 g	G	Cool, 4°C^b pH <2 w/ HCl^c	14 Days	14
Aromatics	3 x 40 mL 100 g	G	Cool, 4°C^b pH <2 w/ HCl	14 Days	14
Semivolatiles (Acid/Base Neutrals)	3 x 1000 mL 100 g	G	Cool, 4°C^b	7 Days to extraction^e	14
PAHs (HPLC)	2 x 1000 mL 100 g	G (amber) for waters	Cool, 4°C Na$_2$S$_2$O$_3$	7 Days to extraction^e	14
Metals	1000 mL 100 g	P,G	HNO$_3$ to pH <2	6 Months Hg 28 days	6
Cyanide	1000 mL 100 g	P,G	Cool, 4°C NaOH to pH >12	14 Days	14
Sulfide	500 mL 100 g	G	Cool, 4°C (NaOH, ZnAC Waters Only)	7 Days	7
Phenol	500 mL 100 g	G	Cool, 4°C H$_2$SO$_4$ to pH <2	28 Days	28
TPH	2 x 1000 mL 100 g	G	Cool, 4°C pH <2 w/ HCl upon receipt	28 Days	28
TPH-GRO	3 x 40 mL 100 g	G	Cool, 4°C pH <2 w/ HCl	14 Days	14
TPH-DRO	2 x 1000 mL 200 g	G	Cool, 4°C Preserve upon receipt	14 Days	14
TOX	4 x 250 mL 50 g	G	Cool, 4°C H$_2$SO$_4$ to pH <2	28 Days	N/A
TOC	125 mL 20 g	G	Cool, 4°C H$_2$SO$_4$ to pH <2	28 Days	28

[a] pH Adjustment with acid/base is performed on water samples only.

[b] Sodium thiosulfate needed for chlorinated water samples

[c] Due to the inaccurate recovery of 2-chloroethyl vinyl ether in the presence of HCl, Halocarbon samples analyzed for this compound should not be preserved.

[d] Samples will be analyzed as soon as possible after collection. The times listed are the maximum times that samples will be held before analysis and still be considered valid.

[e] Analysis 40 days from extraction.

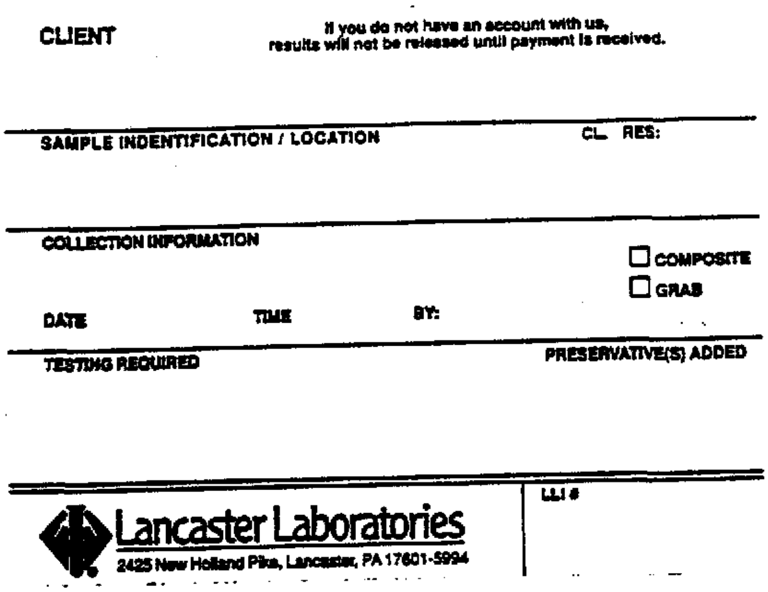
NOTE: For volatiles analysis, the container should be filled completely, with no headspace. **All sample containers, preservatives, and mailers will be supplied at no additional charge upon request, except for the special containers with traceability documentation. There is an additional charge for this type of container.**

7. Sample Custody

Samples are unpacked and inspected in the sample receipt area. At this time, the samples are examined for breakage and agreement with the associated client paperwork. The cooler temperatures will be checked upon receipt and recorded. As the samples are unpacked, the sample label information will be compared to the chain-of-custody record and any discrepancies or missing information will be documented. If necessary, the cooler will be closed and placed in cold storage until instructions and resolution of any discrepancies are received from the client.

A member of our Sample Administration Group will act as sample custodian for the project. To ensure accountability of our results, a unique identification number is assigned to each sample as soon as possible after receipt at the laboratory. When samples requiring preservation by either acid or base are received at the laboratory, the pH will be measured and documented, with the exception of samples designated for volatile analysis. Samples requiring refrigeration will be stored in our walk-in cooler which is maintained at 2° to 4°C. The use of our computer system in tracking samples (by the Lancaster Labs sample number assignment) will control custody of the sample from receipt until the time of its disposal. The security system on our laboratory building allows us to designate the entire facility as a secure area since all exterior doors are either locked or attended. Therefore, hand-to-hand chain of custody is not part of our routine procedure, but is available upon request. If requested, hand-to-hand chain of custody will be provided as per attached SOP-QA-104, "Chain-of-Custody Documentation." The laboratory chain of custody will begin with the preparation of bottles. The procedures for sample log-in, storage, and chain-of-custody documentation are detailed in the QA standard operating procedures included in Section No. 7 (SOP-QA-102, SOP-QA-103, and SOP-QA-104). Examples of sample labels and a custody seal are shown in Figure 7.1.

Figure 7.1



CLIENT

If you do not have an account with us, results will not be released until payment is received.

SAMPLE INDENTIFICATION / LOCATION

CL. RES:

COLLECTION INFORMATION

☐ COMPOSITE
☐ GRAB

DATE

TIME

BY:

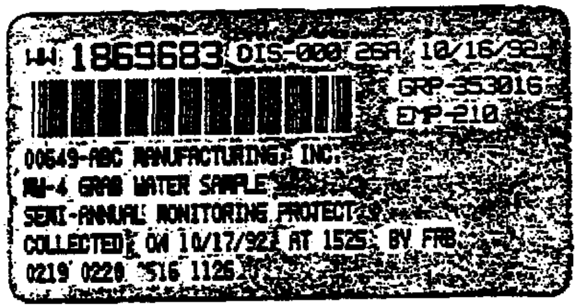
TESTING REQUIRED

PRESERVATIVE(S) ADDED

Lancaster Laboratories
2425 New Holland Pike, Lancaster, PA 17601-5994

LLI #

Sample Label (Field)



WW 1869683 DIS-000 26A 10/16/92
GRP-353016
EMP-210
00649-ABC MANUFACTURING, INC.
MW-4 GRAB WATER SAMPLE
SEMI-ANNUAL MONITORING PROJECT
COLLECTED ON 10/17/92 AT 1525 BY FRB
0219 0220 516 1126

Sample Label (Laboratory)

Lancaster Laboratories
Where quality is a science

CUSTODY SEAL

2425 New Holland Pike, Lancaster, PA 17601-5994 (717) 656-2301

DATE:

SIGNATURE:

Laboratory Custody Seal

Lancaster Laboratories
A Thermo Analytical Laboratory
Where quality is a science

Initiated Date: 03/87
Effective Date: **FEB 1 5 1996**

QUALITY ASSURANCE OPERATIONS MANUAL
SOP-QA-102

Title: Sample Log-in

Purpose:

In order to provide accountability of our results and to prevent sample loss or mix-up, a unique identification number is assigned to each sample.

Scope:

This SOP will cover the procedure used to log samples into the computerized sample management system (SMS) which are received for analysis.

Procedures:

1. All samples received by laboratory personnel shall be delivered to the Sample Administration Group immediately upon arrival at the laboratory. The only exception to this requirement will be samples which are not tracked using the SMS. There are only a few cases where samples will be not be tracked using the SMS. These include samples which will be stored for a long period of time prior to analysis, (e.g., stability storage) and samples for special projects that will be reported in a narrative R&D report instead of on the usual computerized analytical reports.

   The procedures for sample log-in described in this SOP apply only to samples which are logged into the SMS. However, a written procedure for tracking any samples not entered into the SMS must be developed by the technical department responsible for the project or analysis of those samples.

2. All client correspondence relating to samples shall also be transferred to the Sample Administration Group. This includes purchase orders, quotes, letters, and analysis request forms.

3. Personnel of the Sample Administration Group shall log the samples into the computer as soon as practical after receipt. The computer will assign a unique *identification number* to each sample. Samples shall be logged in on the same day they are received with the following exceptions:

   a. Samples received on a holiday will not be logged-in until the next normal work day. Samples received from 6 p.m. on Saturday through 11 p.m. on Sunday will be logged-in Sunday evenings by third shift Sample Administration.

   b. Samples submitted by clients without any indication of the tests to be performed or with unclear or incomplete information. Every effort shall be made to contact the client on the same day as sample receipt. These samples will be tracked in a Q&A hold database. This database is maintained by the Sample Administration Group.

   If same day entry is not possible, any special storage requirements (e.g., refrigeration) will be observed.

4. Upon assignment of a sample number, the computer will generate a label which shall be attached to the sample container. Every effort will be made as to not obscure the client label. The information on the label will include the Lancaster Laboratories' sample number, the client name, the storage location, a list of analyses requested (by analytical method number), a bottle code indicating container and preservative type, a unique bar code, and any notes to laboratory personnel.

5. Adjustment of sample pH, if necessary, will be the responsibility of the Sample Support Group. Preservation should be performed immediately after log-in. A list of preservatives required for routine analyses may be found in the Schedule of Services.

6. All entries in preservation notebooks and on client paperwork shall be made in ink. The error correction procedure given in SOP-QA-109, "Laboratory Notebooks and Documentation," shall be followed for any changes made to this documentation.

7. After samples are logged-in (or preserved, homogenized, subsampled, if required) they shall be stored in the computer-assigned location. If the computer-assigned location is inappropriate for the samples, the location code may be changed by manually overriding the computer.

8. The Lancaster Laboratories' sample number assigned to each sample shall be used to identify the sample in all records, including laboratory notebooks, instrument printouts, and laboratory reports. The sample number will also be used to identify all additional containers of the sample which may be created during the sample preparation and analysis. This includes subsamples, extracts, and digestates.

SOPQA102.W60
012496

Prepared by: Kathy L. DiNunzio Date: 1/25/96

Approved by: Date: 1/26/96

Approved by: Date: 2/2/96

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Initiated Date: 03/87
Effective Date: OCT 0 1 1996

QUALITY ASSURANCE OPERATIONS MANUAL
SOP-QA-103

Title: Sample Storage and Disposal

Purpose:

Sample integrity can be compromised by improper storage conditions. The objective of these procedures is to prevent samples from deteriorating prior to analysis. The computerized sample management system (CSMS) is used to assign storage locations and to monitor the orderly storage of samples in locations from which they are easily retrieved for analysis or discard at the appropriate date.

Scope:

This SOP will outline procedures used in storing samples, retrieving and returning samples for analysis, and discarding samples when their holding time expires.

Procedures:

1. Personnel from Sample Administration will designate the approximate size and type (e.g., refrigerator, freezer or room temperature) of sample storage required for each group of samples as they are logged onto the CSMS. The computer will assign the storage location and record the length of time the sample must be retained after the analysis report has been issued. Samples will be stored in the assigned location. If the location is not suitable (e.g., insufficient space), the storage location may be changed using the manual override on the computer. If refrigerated space has been requested and all the computerized refrigerator locations are occupied, samples will be assigned locations in overflow refrigerators and will be tracked using a manual system until computerized locations are available.

2. Analysts requiring the use of a sample may determine its location by referring to the daily sample status sheet. There are varying degrees of security on sample storage locations. The procedures for removal of samples from these locations are as follows:

   a. Free access locations are those which are neither locked nor attended by a sample custodian. These areas are usually located within an individual group's laboratory and samples may be removed from and returned to these locations without documentation. However, if the sample must be taken out of the laboratory, documentation may be requested. Care shall be exercised in returning the sample to its appropriate location.

   b. Controlled access areas are attended by a sample custodian and are usually large areas used by more than one group. Samples stored in controlled access areas can be removed only after requisitioning the sample via the CSMS. The sample custodian will retrieve the requisitioned samples from the storage locations and scan the bar code label. This process documents the sample transfer from the sample custodian to laboratory personnel. After use, the samples are returned to the sample storage center, scanned by the sample custodian and returned to the designated storage location. Only Sample Administration personnel shall be admitted to controlled access areas. The only exception to this rule will be during weekend hours when no sample custodians are on duty. During these hours, samples must be requisitioned as above, but analysts must retrieve the samples themselves by obtaining a key to the controlled access area from the security desk. Samples must be scanned out as above. After use, samples must be scanned in and placed on the return cart inside WK. Sample custodians will return these samples to their location when they come on duty.

c. Locked storage areas are available in several individual lab areas. Access to these storage areas is limited to analysts who are responsible for the analysis of the samples stored there. These areas are locked when the laboratories are unattended; keys are available from members of the department where they are located. Samples are removed and returned as needed by analysts.

d. Forensic storage areas are locked and admission to these areas is permitted only to sample custodians. Most of the samples stored in these areas require strict chain-of-custody documentation as outlined in SOP-QA-104, "Internal Chain-of-Custody Documentation," and should be requisitioned as described in b. above. Samples may not be removed or returned to these areas without signing chain-of-custody forms.

3. To prevent unnecessary deterioration of the samples, the aliquots needed for analysis shall be removed and the sample returned to storage with a minimum of delay.

4. Sample Administration will generate a discard list of samples with retention dates that have expired. The retention dates are based upon client requirements or defaulted to a given number of days past the date when the report is generated, if no client requirements were given. These samples will be removed from storage by a member of Sample Support or a member of the department responsible for the given storage location. Hazardous samples shall either be returned to clients, decontaminated or disposed of at the direction of supervisory personnel. Other samples will be discarded or returned to the client, if requested. Prior to discarding each sample, the bar code will be scanned to prevent discard of the wrong sample.

5. The temperature of each refrigerator or freezer used for storing samples or reagents requiring temperature control should be checked during each normal working day by an assigned member of the group responsible for the

samples stored within and recorded on a log posted on the outside of the unit. Units containing samples requiring more complete documentation of storage conditions are monitored by use of a computerized recording device or a temperature wheel. Refrigerator temperatures should be maintained at 2° to 4°C and freezer temperatures should be maintained at -15° ± 5°C, unless otherwise specified in a client-supplied method or protocol. If the temperature recorded does not fall within these ranges, the Maintenance Department should be contacted. Any repairs should be recorded and filed with the temperature log. All documentation of temperature checks and maintenance shall be kept in ink and any changes made shall follow the error correction procedure given in SOP-QA-109, "Laboratory Notebooks and Documentation."

SOPQA103.DOC
091196

Prepared by: ______________________ Date: 9/16/96

Approved by: ______________________ Date: 9/18/96

Approved by: ______________________ Date: 9/17/96

Initiated Date: 03/87
Effective Date: DEC 0 1 1995

QUALITY ASSURANCE OPERATIONS MANUAL

SOP-QA-104

Title: Internal Chain-of-Custody Documentation

Purpose:

In order to demonstrate reliability of data which may be used as evidence in a legal case or required by a regulatory agency or client, an accurate written record tracing the possession of samples must be maintained from the time they are received at the laboratory until the last requested analysis is verified. The chain of custody is to ensure traceability of samples while they are in the possession of the laboratory.

Scope:

Procedures for initiating and maintaining chain-of-custody (COC) documentation are described in this procedure.

Definition:

A sample is in custody if it is in any one of the following states:

1. In actual physical possession.
2. In view after being in physical possession.
3. Locked up so no one can tamper with it.

4. In a secured area, restricted to authorized personnel (e.g., in the ASRS system).

A. Procedure

1. Chain-of-custody documentation shall be kept upon the request of the client or for any samples which are known to be involved in a legal dispute. As with all analytical data, it is extremely important that this documentation is filled out completely and accurately with every sample transfer. **Everyone who handles the COC has the responsibility to check for documentation compliance to the point of their acquisition.** If changes need to be made to the form, they shall be made in accordance to the error correction procedure addressed in SOP-QA-109, "Laboratory Notebooks and Documentation." It will be the responsibility of the person who made an error in documentation to correct the error.

2. If requested by the client, the COC documentation will begin with the preparation of sampling containers. A form (Figure 1, attached) will be initiated by the person packing the bottle order for shipment to the client. If the delivery of containers is via Lancaster Laboratories Transportation Department, the driver shall sign the form when they relinquish the bottles to the client. Drivers must also sign COC forms when they pick up samples for analysis.

3. When samples arrive at the laboratory for analysis, a member of the Sample Administration Group will receive them and sign the external COC form that accompanies the samples, if provided. If the samples were picked up by our Transportation Department, the driver must sign the COC to relinquish the samples to sample administration.

4. The Sample Administration Group will track the custody of samples between receipt and entry into the Sample Management System on the SA Receipt Documentation Log (Figure 2, attached). The client's sample designation will be used for identification purposes until a unique Lancaster Laboratories' number is assigned.

5. Samples will be entered into the Sample Management System as described in SOP-QA-102, "Sample Log-in." Sample Administration will enter an analysis number for "*Laboratory* Chain of Custody" if requested. A lab note will print to inform analysts of the need for COC documentation. This note will also be automatically added to the sample labels.

B. Creating the Internal Chain of Custody

1. Sample Administration personnel shall initiate an internal Laboratory Chain of Custody form at the time of sample entry (Figure 3, attached) for each type of container in the sample group. A master list of all chains created will also be initiated for each sample group at the time of entry (Figure 4, attached). The samples will then be relinquished to a sample custodian who will store the samples in an assigned secure location. This change of custody *from sample* entry to storage shall be documented on the chain, as well as any interim exchanges for rush analysis, preservation, homogenization, or temporary storage in the SA HOLD. The internal COC forms will then accompany the samples from storage to the laboratory for analysis.

2. If samples need to be checked out from the Sample Administration Group before Lancaster Laboratories' numbers have been assigned to them, SA will be responsible for starting a COC form. They will note the available header information, the samples being relinquished (documented by the client sample designation), and the reason for transfer.

3. After sample entry, the original copy of the external client COC/analysis request form will be filed with Accounts Receivable, to be returned to the client with their invoice. Other copies of the external form will stay within SA to be filed within the client's paperwork file.

C. Documentation of Custody Changes

1. An example of how to document changes in sample custody is shown in Figures 3 and 5. Each change of sample custody must be accurately documented in a consistent format. All signatures documenting changes of custody will use the following format:

   Signatures: first initial, full last name, employee number
   Date: Month/day/year
   Time: Documented as military time
   Ink: Black ink is preferred, red ink and pencil are not acceptable

   a. When sample support releases samples to an analyst they must:

      Note the sample number(s) released, and sign the released by column of the chain.

b. When an analyst receives samples from sample support they must:

Sign the received by column, note the date and time samples are received and note the reason why they are taking the samples (reason for change of custody).

c. When an analyst returns samples to sample support they must:

Note all sample numbers being returned, sign the released by column, and note time and date of return.

d. When sample support receives samples from an analyst they must:

Sign the received by column and note the reason for sample transfer.

2. Sample handling should be kept to a minimum. Analysts requiring use of a sample will requisition it through the computer requisition program. During the hours when sample support is manned by sample custodians, a custodian will receive the computerized requisition and remove the sample from storage. The custodian will ensure that the bottle type listed on the COC form matches the bottle type being distributed. **It will be the shared responsibility of the analyst and sample custodian to insure that forms are signed, dated, and reason for sample transfer are recorded with each change of custody, as directed by Item C1 above.**

3. Each specific test that an analyst performed in conjunction with the associated sample number(s) must be accurately documented by the analyst before the samples are returned to a sample custodian in the sample storage area.

4. When an analyst requires the use of samples when a sample custodian will not be on duty, they must requisition samples earlier in the day or on the previous day. These samples and associated COCs will be pulled by a sample custodian and placed in the locked SA HOLD storage area. The sample custodian will note on the COC the change in transfer to the SA HOLD in addition to the time, date, and the sample numbers. The analyst picking up the samples will document the specific samples being checked out, record SA HOLD in the "Released by" column, sign the Received by column, note the time, date and reason for transfer. When the analyst returns the samples to the SA HOLD, they must sign the samples back into the SA HOLD.

5. The following changes of custody will be handled in the following manner:

   a. Documentation is required for all shift changes. Signatures involving transfers from one shift to another shall be the responsibility of the analyst who originally acquired the samples from sample support.

   b. Occasionally a sample container will be needed for analysis by an analyst in a department while it is in the custody of an analyst in another department. It will be the responsibility of the first person who received the sample to note on the COC the specific sample numbers requested by the second person, and to sign the released by column. The second person will sign the received by column and note the time, date, and reason for sample transfer. After the second person is finished with the sample, the sample will be returned back to the first person or to the sample storage area.

c. In situations where a sample group must be split between departments working on different analyses, a supplemental COC must be initiated by the Sample Support Group. The supplemental chain will be used to accompany that portion of the sample group which is needed by a second department, when another department has part of the sample group and the COC for the entire group. This supplemental COC will be created only when absolutely necessary to minimize paperwork and confusion. This chain must also be documented on the master list of chains initiated for the sample group.

d. Some original samples are released by Sample Support or Sample Administration to be stored in other areas of the laboratory (e.g. GC/MS Volatiles, Foods, Pharmaceuticals). During this time they may be accessed by several people in that area. Each of these people must note the specific sample numbers in their custody in addition to date, time, and reason for removal from storage. An example of a COC is attached as Figure 6.

It will be the responsibility of the department who held the samples to assure that all necessary, signatures, dates, times, and reasons for sample custody are noted on the COC forms. It is also very important to return all samples and COCs to storage as soon as possible after data verification, because the chains may be required for a client data packages.

e. If COC samples are stored in other areas of the laboratory or in a specific department, they must be stored in a locked area. When samples are taken from a departmental storage area, the released by column of the COC is documented as "department XX storage." If samples are returned to this area when complete the received by column will be noted as department XX storage.

D. Additional Chain-of-Custody Issues

1. Analysts in possession of samples shall remove the aliquot required for their analysis and return the samples to the Sample Support Group with a minimum of delay. During this time of possession, samples must fall under the definition of sample custody.

2. If additional containers of the sample are created (e.g. subsamples, extracts, distillates, leachates, digests, etc.), an additional COC form must be created by the department if they do not document this information on the original COC form (Figure 5, attached). This form will be marked with the container type and will be initiated to accompany the new sample container. Each department in the lab has specifically designed COC forms which will be used if new containers are created. All changes of custody involving handling of new containers in the department (e.g. analysis, storage, vials on instruments, etc.) will be documented on the departmental specific COC form or on the original COC form. Any specific handling or documentation requirements for departmental chains can be described in a departmental SOP.

E. When Sample Analysis is Complete

1. After sample analysis, samples shall be returned to the Sample Support Group as soon as possible. Original COC forms shall also be returned with the samples and this change of custody noted. At this time it will be the responsibility of the Sample Support Group to review the COC forms to ensure that all documentation on the forms is complete before they file the forms in their area. Sample custodians will not return a sample to its assigned storage location without signing the accompanying chain and performing this completeness check. All chains should either end with a note of "Discard" or "Storage" for the final reason of transfer.

2. All completed COC forms for the original sample containers will be retained in files within Sample Support. The Data Package Group will retrieve these forms so a copy can be included in the data package. All departmental created COC forms will be collected by the department's data package group so a copy can be included in the data package. These forms will not be returned to the Sample Support Group since these sample containers will not be returned to the Sample Support Group. The original copy of all COC forms will be retained on file by the laboratory.

3. All personnel who handle sample containers shall make every attempt to ensure that all changes of custody are accurately and completely documented. Disciplinary action may be taken for employees who fail to comply with these important requirements.

4. In the event that a signature or other information is inadvertently not recorded on a COC form, the Sample Support and Data Package Groups in conjunction with the technical centers shall determine what information is missing by checking computer requisition records, raw data, or the sample support work schedule. The responsible party shall add the missing information or make the necessary correction at the bottom of the COC form, in addition to noting the situation that caused the error in documentation. The person making this note needs to sign and date the information using the current date. Any errors in COC documentation that cause noncompliances must be noted in the case narrative of the sample data package. Examples of specific cases are on file in the data package department.

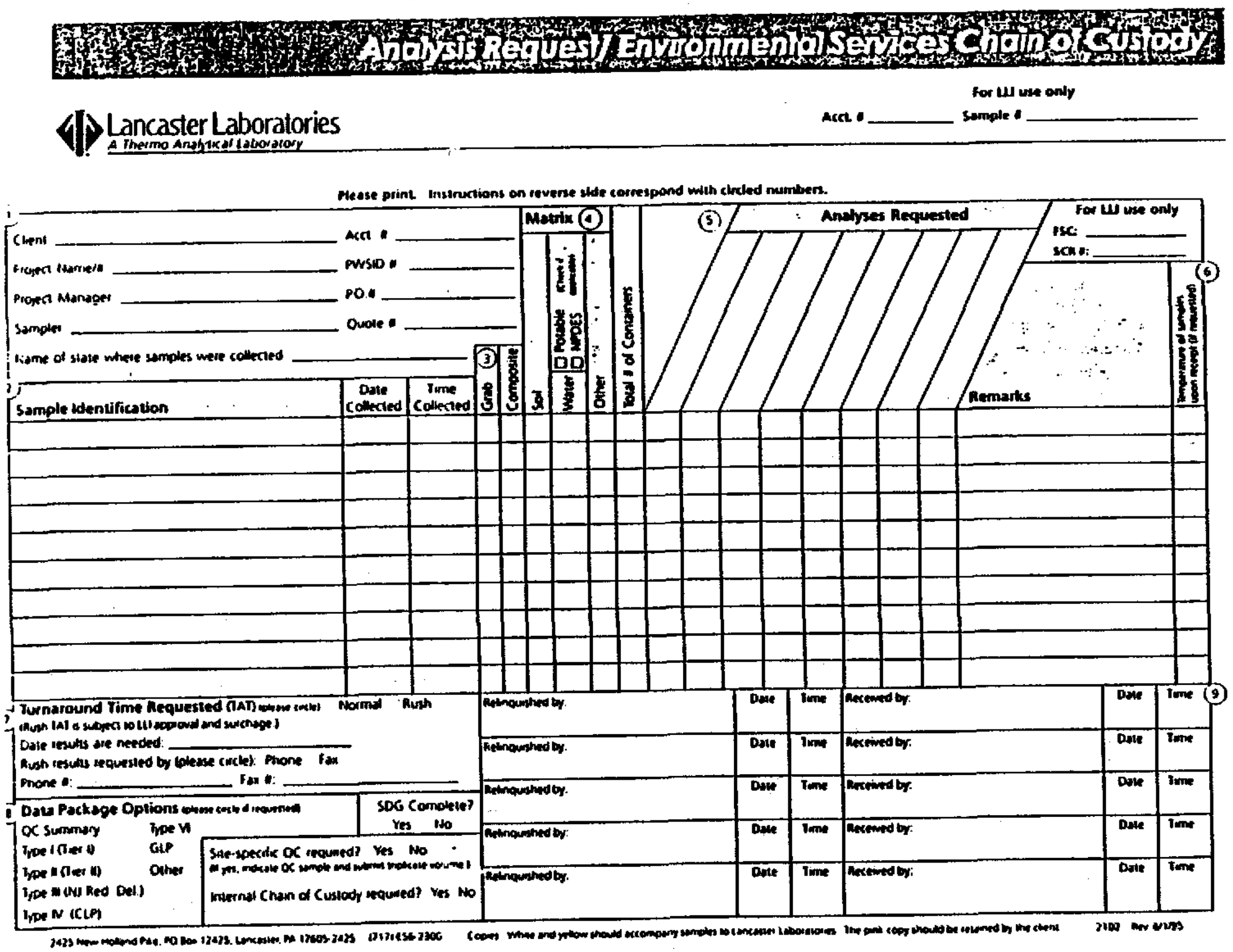
SOPQA104.W60
112895

Prepared by: Kathy L. DiNunzio Date: 11/28/95

Approved by: M Louise Alers Date: 11/29/95

Approved by: Date: 11/30/95

Figure 1



Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories
A Thermo Analytical Laboratory

For LLI use only
Acct. # ________ Sample # ____________

Please print. Instructions on reverse side correspond with circled numbers.

① Client ____________ Acct. # ________
Project Name/# ____________ PWSID # ________
Project Manager ____________ P.O. # ________
Sampler ____________ Quote # ________
Name of state where samples were collected ____________

For LLI use only
FSC: ________
SCR #: ________

② Sample Identification	Date Collected	Time Collected	③ Grab	Composite	Matrix ④ Soil			Total # of Containers	⑤ Analyses Requested								Remarks	⑥ Temperature of samples upon receipt (if requested)
					Soil	Water ☐ Potable ☐ NPDES (Check if applicable)	Other											

⑦ **Turnaround Time Requested (TAT)** (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed: ____________
Rush results requested by (please circle): Phone Fax
Phone #: ____________ Fax #: ____________

⑧ **Data Package Options** (please circle if requested)
QC Summary Type VI
Type I (Tier I) GLP
Type II (Tier II) Other
Type III (NJ Red. Del.)
Type IV (CLP)

SDG Complete? Yes No

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal Chain of Custody required? Yes No

Relinquished by:	Date	Time	Received by:	Date	Time ⑨
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 (717) 656-2300 Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client. 2102 Rev. 8/1/95

Figure 1 - (Continued)

DIRECTIONS FOR COMPLETING THIS FORM

(1) Client: Your company's name

Acct. #: Your account number with Lancaster Laboratories

Project Name/#: The way your company refers to the work involved with these samples. You may want to include project location as part of the description

PWSID: Potable Water Source ID#

Project Manager: The person at your company responsible for overseeing the project

P.O. #: Your company's purchase order number

Sampler: The name of the person who collected the samples

Quote #: The reference number that appears on your quote (if Lancaster Laboratories gave you a number)

State where sample was collected: Please indicate where the sample was taken, e.g., Pa., N.J., etc.

(2) Sample Identification: The unique sample description you want to appear on the analytical report

Date Collected/Time Collected: When the sample was collected

(3) Grab: Check here if sample was taken at one time from a single spot.

Composite: Check here if samples were taken from more than one spot, or periodically, and combined to make one sample

(4) Matrix: Check the type of sample you are submitting. If it is a water sample, please indicate if it is a potable water or if it is an NPDES sample

Number of Containers: Indicate the total number of containers for each sampling point

(5) Analyses Requested: Write the name of each analysis (or an abbreviation of it) here, and use the **catalog number** that appears at the beginning of each line in the *Schedule of Services*. Be sure to indicate which analyses are to be performed on which samples

(6) Remarks: List special instructions about the sample here (e.g., hazardous elements, high levels of analyte, etc.). The space can also be used (if needed) for listing additional analyses

(7) Turnaround time *Requested:* Circle **Normal** if you want routine TAT, which is usually within 10-15 days. If you need your results faster, call ahead to schedule **Rush** work.

Rush Results Requested by: Circle **Fax** or **Phone** and include the number

(8) Data Package Options: Call our Client Services Group (717-656-2301) if you have questions about these choices.

SDG Complete? Indicate **Yes** if this is a complete sample delivery group or **No** if you will be submitting additional samples to be included in the same data package.

Note: *We need to have one* quality control (QC) sample for every 20 samples you send, if you are requesting site-specific QC. Please give us this sample in triplicate volume and identify it by writing "QC" in the **Remarks** column.

The internal chain of custody is a hand-to-hand documentation recording a sample's movement throughout the company. We routinely start a chain of custody for data-package samples unless we are told otherwise. There is a $25 per sample charge for the chain-of-custody documentation.

(9) Relinquished by/Received by: The form must be signed each time the sample changes hands. We can supply chain-of-custody seals for the outside of your packages if you require them.

Thank you for using Lancaster Laboratories.
Please call our Client Services Group (717-656-2301) if you have any questions about completing this form.

Figure 2

Lancaster Laboratories

Sample Administration
Receipt Documentation Log

Client/Project: XYZ Associates / Well Monitoring Project
COC Seal: [✓ Present] / Not Present on cooler
Broken / [✓ Intact]
Date of Receipt: 11/27/95
Time of Receipt: 1350
Package: [✓ Chilled] / Not Chilled
Source Code: 60
Unpacker Emp. No.: 210

Temperature of Samples		
#1	#2	#3
Thermometer ID: 123 Corrected Temp.: N/A [✓ Bottle] / Air [✓ Wet Ice] / Ice Packs Ice Present? [✓ Yes] No	Thermometer ID: Corrected Temp.: Bottle / Air Wet Ice / Ice Packs Ice Present? Yes No	Thermometer ID: Corrected Temp.: Bottle / Air Wet Ice / Ice Packs Ice Present? Yes No
#4	#5	#6
Thermometer ID: Corrected Temp.: Bottle / Air Wet Ice / Ice Packs Ice Present? Yes No	Thermometer ID: Corrected Temp.: Bottle / Air Wet Ice / Ice Packs Ice Present? Yes No	Thermometer ID: Corrected Temp.: Bottle / Air Wet Ice / Ice Packs Ice Present? Yes No

Paperwork Discrepancy/Unpacking Problems: 40 ml vial broken upon Receipt Client ID# ABC-1. Client Called 11/27/95

Sample Administration Chain of Custody

Released by	Received by	Date	Time	Reason for Transfer
A. Hutchison 210	SA Hold	11/27/95	1400	Storage
SA Hold	D. Neslund 208	11/27/95	1600	Entry

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Figure 3

Lancaster Laboratories

Locked Storage Chain of Custody
Original Sample

Client/Project: XYZ Associates

Preservative: HCl Matrix: Water SDG: XYZ01

Sample # Range of Entry Group: 2420638-39 Bottle Type: #38
40 ml vial

Sample Number(s) in Custody	Released By	Received By	Date of Transfer	Time of Transfer	Reason for Change of Custody	Dist., Extr., or Digest Chain Created (X)
2420638-39	D. 208 Neslund	SS Storage	11/27/95	1600	Entry ē Storage	
2420638-39	SS Storage	B. 705 Weaver	11/28/95	700	Remove from SS Storage	
2420638-39	B. 705 Weaver	dept 21 storage	11/28/95	715	VOA Storage	
2420638-39	dept 21 Storage	K. 396 Witman	11/29/95	1315	VOA Analysis	X
2420638-39	K. Witman 396	L. 513 Taylor	11/29/95	1700	VOA Analyst Shift Change	
2420638-39	L 513 Taylor	dept 21 Storage.	11/29/95	2100	VOA Storage	
2420638-39	dept 21 Storage.	C. 26 Ayars	12/3/95	800	Transfer to SS Storage	
2420638-39	C. Ayars 26	L. 620 Reeder	12/3/95	815	Storage	

Figure 4

Lancaster Laboratories

Master List of Chain of Custodies

Client/Project: XYZ Associated

Sample # Range of Entry Group: 2420632-39

SDG: XYZ01 Matrix: [✓ Liquid] Solid Mixed Other

Original Sample Chains		
Bottle Type	**Started By**	**Date Started**
40 ml Glass Vial (#38)	D. Neclund 208	11/27/95
1000 ml Amber Glass (#45)	↓	↓
1000 ml Plastic (#09)	↓	↓
1000 ml Amber Glass (#29)	↓	↓

Supplemental Chains		
Bottle Type	**Started By**	**Date Started**
77	C. Aaw 366	11/27/95
21	C. Ayaw 366	11/27/95

Extraction, Digestion, Distillates, Etc.		
Bottle Type	**Started By**	**Date Started**

Figure 5

Lancaster Laboratories

Locked Storage Chain of Custody
Metals

Client/Project: XYZ Associates

Sample #: 2420632-39 SDG: XYZ01

Digest Type (circle one): Hg [✓ Metals] GF Hydrides Trial No: 2 (If not 1, fill in)

Batch No: 9 5 3 0 5 1 8 4 9 0 0 4

Sample Number(s) in Custody	Released By	Received By	Date of Transfer	Time of Transfer	Reason for Change of Custody	Dist., Extr., or Digest Chain Created (X)
2420632,34,36	S. Correa 533	J. Garrett 428	12/1/95	1631	Metals Prep Shift Change	
2420632,34,36	J. Garrett 428	B. Stracko 811	12/1/95	1930	ICP Storage	
2420632,34,36	ICP Storage	DR Sackett 142	12/1/95	2115	ICP Analysis	
2420632,34,36	DL Sackett 142	ICP Storage	12/1/95	2135	ICP Storage	

Figure 6

Lancaster Laboratories

Pharmaceutical
Locked Storage Chain of Custody
Original Sample

Client/Project: Smith Pharmaceutical.

Preservative: N/A Matrix: Tablets

Sample # Range of Entry Group: 2420320-30

Bottle Type: 40ml Vial

Sample Number(s) in Custody	Released By	Received By	Date of Transfer	Time of Transfer	Reason for Change of Custody
2420320-30	J. 074 Carruthers	M. 589 Coho	12/1/95	1300	Entry/Transfer to Pharm. Storage
2420320-30	M. 589 Coho	Pharm. Storage	12/1/95	1315	Storage
2420330-30	Pharm. Storage.	E. 572 ortiz	12/3/95	800	pH analysis
2420320-30	E. 572 ortiz	Pharm. Storage	12/3/95	1000	Storage
2420320-30	Pharm Storage	D. 330 Wright	12/5/95	930	GC assay analysis
2420320-30	D. 330 Wright	Pharm Storage	12/5/95	1400	Storage

8. Calibration Procedures

Procedures for initial calibration and continuing calibration verification are in place for all instruments within the laboratory. The calibrations generally involve checking instrument response to standards for each target compound to be analyzed. The source and accuracy of standards used for this purpose are integral to obtaining the best quality data. Standards used at Lancaster Laboratories are purchased from commercial supply houses either as neat compounds or as solutions with certified concentrations. The accuracy and quality of these purchased standards is verified through documentation provided by these commercial sources. Most solutions and all neat materials require subsequent dilution to an appropriate working range. All dilutions performed are documented and the resulting solution is checked by obtaining the instrument response of the new solution and comparing with the response to the solution currently in use. Any discrepancies between the responses are investigated and resolved before the new solution is used. Each standard is assigned a code which allows traceability to the original components. The standard container is marked with the code, name of solution, concentration, date prepared, expiration date, and the initials of the preparer. Shelf life and storage conditions for standards are included in the standard operating procedures and old standards are replaced before their expiration date.

Each instrument is calibrated with a given frequency using one or more concentrations of the standard solution. As analysis proceeds, the calibration is checked for any unacceptable change in instrument response. If the calibration check verifies the initial response, the analysis proceeds. If the calibration check indicates that a significant change in instrument response has occurred, then a new calibration is initiated. If necessary, maintenance may be performed prior to the recalibration.

Calibration records are usually kept in the form of raw data with the other instrument printouts. In cases where no data system is used, calibration data is manually recorded in notebooks. Any maintenance or repair is also recorded in a notebook. The information recorded either in the notebooks or on the instrument printout includes the date, instrument ID, employee name and/or identification number, and concentration or code number of standard.

The frequency of calibration and calibration verification, number of concentrations used, and acceptance criteria for each of the instruments to be used are listed on Table 8-1. In addition to checking the instrument response to target compounds, the GC/MS units are checked to ensure that standard mass spectral abundance criteria are met. Prior to each calibration, instruments being used for volatile compound analysis are tuned using bromofluorobenzene (BFB) and instruments being used for semivolatile analysis are tuned using decafluorotriphenylphosphine (DFTPP). The key ions and their abundance criteria are listed in Table 8-2.

Table 8-1

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
GC/MS Volatiles*	After C-cal fails	5	RF for SPCCs >0.300 except for bromoform >0.10 Max %RSD for CCCs <30%	Every 12 hours	1	RF for SPCCs >0.300 except for bromoform >0.10 %Drift for CCCs <20
GC/MS Semivolatiles*	After C-cal fails	5	RF for SPCC's >0.050 Max %RSD for CCC's <30%	Every 12 hours	1	RF for SPCCs 0.050 %Drift for CCCs <20
GC VOA Halocarbons and/or Aromatics	After C-cal fails	5	%RSD of <20% Otherwise use calibration curve	Every 8-10 hours, or every 10 samples	1	%D ± 15%
GC Pesticides	Each new run After C-cal fails	5	20% RSD of RFs of initial calibration to use avg. RF, otherwise use curve fit. Degradation for DDT, endrin 15% initially	Every 10 samples Every 20 samples for Method 8081	1	≤15% difference from initial response for quantitation
HPLC	Each new run or after C-cal fails	5	20% RSD of RFs of initial calibration to use average RF, otherwise use curve fit	Every 10 samples	1	≤15% difference from initial response for quantitation
GC TPH-GRO	After C-cal fails	5	%RSD of <20% otherwise use calibration curve	Every 8 to 10 hours or every 10 samples	1	%D ±15%
GC TPH-DRO	After C-cal fails	5	% RSD of <20% otherwise use calibration curve	Every 10 samples	1	%D ±15%
ICP/Trace ICP	Each new run Max. 86 samples-run	2	Independent calibration verification within ±10%	Every 10 samples	1	Same as initial
CVAA	Each new run	5	Independent calibration verification within ±10%	Every 10 samples	1	±20% of true value
GFAA	Each new run	5	Independent calibration verification within ±10%	Every 10 samples	1	±20% of true value
Flame AA	Each new run	5	Independent calibration verification within ±10%	Every 10 samples	1	±20% of true value
Hydride Generation	Every new run Max. 1 hr.	3	Independent calibration verification within ±10%	Every 10 samples	1	±20% of true value
Autoanalyzer	Daily	6	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value

*All compounds with %RSD >15 must use first or second order regression fit of the five calibration points. If %RSD is <15%, use of calibration curves is an alternative to average response factor calibration.

Table 8-1

	Initial Calibration			Continuing Calibration Verification		
Instrument	Frequency	# Std Conc	Acceptance Criteria	Frequency	# Std Conc	Acceptance Criteria
Infrared Spectrophotometer (FTIR)	Daily	5	Correlation coefficient >0.995	Every 10 samples	1	±10% of true value
TOC Analyzer	Daily	5	±10% @ STD	Every 10 samples	1	±10% of true value
TOX Analyzer	Each Batch	4	±5% @ STD	Every 8 samples	1	±5% of true value
Balance	Daily	4	±.5%	N/A	N/A	N/A

Abbreviations

Std Conc - The number of standard concentrations used

SPCCs - System performance check compounds

CCCs - Calibration check compounds

RF - Response factor

%RSD - Percent relative standard deviation

%D - Percent difference

C-cal - Continuing calibration

CVAA - Cold vapor atomic absorption spectrophotometer

HPLC - High Performance Liquid Chromatography

ICP - Inductively coupled plasma spectrophotometer; ICP run also includes interelement correction check standard (beginning and end of run)

GFAA - Graphite furnace atomic absorption spectrophotometer

Table 8-2

Mass	Ion Abundance Criteria
BFB Key Ion Abundance Criteria:	
50	15% to 40% of mass 95
75	30% to 60% of mass 95
95	base peak, 100% relative abundance
96	5% to 9% of mass 95
173	less than 2% of mass 174
174	greater than 50% of mass 95
175	5% to 9% of mass 174
176	greater than 95% but less than 101% of mass 174
177	5% to 9% of mass 176
DFTPP Key Ions and Ion Abundance Criteria:	
51	30% to 60% of mass 198
68	less than 2% of mass 69
70	less than 2% of mass 69
127	40% to 60% of mass 198
197	less than 1% of mass 198
198	Base peak, 100% relative abundance
199	5% to 9% of mass 198
275	10% to 30% of mass 198
365	greater than 1% of mass 198
441	Present but less than mass 443
442	greater than 40% of mass 198
443	17% to 23% of mass 442

9. Analytical Procedures

The analytical procedures to be used for organics and inorganics are those described in the USEPA SW-846 3rd Edition, Update II, 1994, for the preparation and analysis of water, sediment, and soil for the client specified compounds. Copies of the analytical procedures are located in the laboratory and available for use by analysts. Copies of analytical methods are available upon request.

Volatiles by GC/MS - This method determines the concentration of volatile (purgeable) organics. The analysis is based on purging the volatiles onto a Tenax/silica gel trap, desorbing the volatiles onto a gas chromatographic column which separates them and identifying the separated components with a mass spectrometer. Method 8240B or 8260A.

Semivolatiles - This method determines the concentration of semivolatile organic compounds that are separated into an organic solvent and are amenable to gas chromatography. The method involves solvent extraction of the sample to isolate analytes and GC/MS analysis to determine semivolatile compounds present in the sample. Method 8270B.

Volatiles by GC - This method determines the concentration of volatile (purgeable) organic compounds. The analysis is based on purging the volatiles from the sample onto an appropriate sorbent trap and desorbing the volatiles onto a gas chromatographic column. Using an appropriate temperature program, the compounds are separated by the column and both qualitative and quantitative detection is achieved with a photoionization and/or electrolytic conductivity detector. Method 5030A/8010B/8020A/8021A. Non-halogenated organics are analyzed by flame ionization detectors. Method 5030A/8015A.

Pesticides, PCBs, & Herbicides - This method determines the concentration of organochloride pesticides, polychlorinated biphenyls, herbicides, and organophosphate pesticides. The procedure includes solvent extraction of the sample, analysis of the extract on a gas chromatograph/electron capture detector (GC/EC) using a megabore capillary column, and confirmation on a GC/EC using a second megabore capillary column. A nitrogen-phosphorus detector is used for organophosphates. If the compound concentration is sufficient, confirmation may be done on GC/MS upon request. Pesticides Methods 8081 and 8141A. Herbicides Method 8151.

PAHs by HPLC - The sample aliquot is extracted with methylene chloride. The extract is filtered (soils), dried, concentrated by evaporation and exchanged into acetonitrile. Silica gel cleanup is used if necessary. The extract is analyzed by reverse-phase HPLC with both UV and fluorescence detectors. Methods 3550A/3630B/8310.

TPH-GRO - This method determines the concentration of gasoline range organics (pentane to naphthalene or methylpentane to trimethylbenzene depending on the protocol, California or API respectively). The analysis is based on purging the volatiles from the sample onto an appropriate sorbent trap and desorbing the volatiles onto a gas chromatographic column. Using an appropriate temperature program, the compounds are separated by the column and both qualitative and quantitative detection is achieved with a flame ionization detector. BTEX may be determined simultaneously on systems equipped with a photoionization detector in tandem with the FID.

Method 5030A/8000A/8020; API "Method for Determination of GRO," Revision 5, 02/02/95; or California Department of Health Services LUFT Task Force TPH Analysis - Gasoline Method, California Modified 8015 Method.

TPH-DRO - This method determines the concentration of diesel range organics (C-10 to C-28 hydrocarbons). The procedure includes solvent extraction of the sample analysis of the extract on a gas chromatograph/flame ionization detector (GC/FID) using a megabore capillary column.

Method API "Method for Determination of Diesel Range Organics," Revision 2, 02/05/95; or California Department of Health Services LUFT Task Force TPH Analysis - Diesel Method (Modified), California Modified 8015 Method.

Inductively Coupled Plasma (ICP) - This is a technique for the simultaneous determination of elements in solution after acid digestion. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic line emission spectra are produced by excitation of the sample in a radio frequency inductively coupled plasma. Because the temperature of the plasma is considerably higher, it is especially useful for refractory metals. Method 6010A.

The Trace ICP is the same technique as the ICP listed above except for the orientation of the plasma (horizontal instead of vertical) and upgraded optical and sample introduction systems, resulting in instrument detection limits approximately a magnitude lower than the traditional ICP.

Graphite Furnace Atomic Absorption (GFAA) - This is a method of analysis designed to detect trace amounts of the analyte through electrothermal atomization. Samples are digested before analysis. The graphite furnace AA spectrophotometer heats the sample within a graphite tube using an electrical current (i.e., flameless furnace) and measures the absorption of specific metallic elements at discrete wavelengths. (See attached list for method number.)

Cold Vapor Atomic Absorption - Organic mercury compounds are oxidized and the mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of a spectrophotometer and absorbance (peak height) is measured. Method 7470A/7471A.

Flame Atomic Absorption - This method is also suited to metals analysis. A solution of the sample to be analyzed is sprayed into a flame which generates sufficient heat to decompose the sample into its constituent atoms directly in the optical path. The difference in light intensity is measured at specific wavelengths using a spectrophotometer. (See attached list for method number.)

Hydride Generation Atomic Absorption - Arsenic and selenium compounds are oxidized, then reduced to arsenic (+3) and selenium (+4). The arsenic (+3) and selenium (+4) are then converted to a volatile hydride with hydrogen produced from a sodium borohydride/HCl reaction. The volatile hydride is swept into a heated quartz flow cell located in the optical path of an atomic absorption spectrophotometer. The resulting absorbance is proportional to the arsenic or selenium concentration. Arsenic Method 7061A. Selenium Method 7741A.

Total Cyanide Analysis - Digestion and flash distillation of the sample aid in breaking down the complex cyanides to HCN. Simple cyanides are converted to cyanogen chloride by reaction with Chloramine T. This reacts with pyridine and barbituric acid reagent to give a red colored complex. The absorbance is read at 570 nm and is compared to a standard curve. An autoanalyzer is used. Method 9012.

Phenols - This method is based on automated distillation of phenol and the subsequent reaction with 4-aminoantipyrine in basic buffer to produce a red colored complex. The absorbance is read at 505 nm and is compared to a standard curve. An autoanalyzer is used. Method 9066.

Moisture - A known sample weight is placed in a drying oven maintained at 103° to 105°C for 12 to 24 hours. The sample is reweighed after drying and this value is divided by the original weight. The result is used to calculate analytical concentration on a dry-weight basis. *Methods for the Chemical Analysis of Water and Wastes*, Office of R&D, USEPA-EMSL, Cincinnati, OH, USEPA 600/4-79-020. Method 160.3.

Total Petroleum Hydrocarbons - Samples are extracted with freon and the resulting solution is treated with silica gel to remove fatty acids and other polar compounds. The remaining nonpolar compounds are designated as petroleum hydrocarbons and are quantitatively measured using infrared spectroscopy. *Methods for the Chemical Analysis of Water and Wastes*, Office of R&D, USEPA-EMSL, Cincinnati, OH, March 1979, USEPA 600/4-79-020. Method 418.1 (modified for soils).

Sulfide Analysis - The sample is acidified and a known excess of iodine is added. The iodine reacts with sulfide in acid solution, oxidizing sulfide to sulfur. The excess iodine is back-titrated with sodium thiosulfate. Method 9030A.

Total Organic Carbon (TOC) - Following acidification, the sample is purged with nitrogen to remove inorganic carbon. Persulfate is injected to oxidize organic carbon to carbon dioxide which is detected by IR. An OI Model 700 TOC analyzer is used. Method 9060.

Total Organic Halogen (TOX) - Organic halogen is adsorbed onto an activated carbon column and combusted in an oxygen furnace. The resulting hydrogen halide gases are collected in an acetic acid buffer. The halides are titrated microcolormetrically through the generation of Ag+ ions. A Mitsubishi TOX analyzer is used. Method 9020B.

Inorganic Method Numbers					
	ICP	GFAA	Flame AA	Hydride AA	Cold Vapor
Aluminum	6010A		7020		
Antimony	6010A	7041	7040		
Arsenic	6010A	7060A		7061A	
Barium	6010A		7080A		
Beryllium	6010A	7091	7090		
Cadmium	6010A	7131A	7130		
Calcium	6010A		7140		
Chromium	6010A	7191	7190		
Cobalt	6010A		7200		
Copper	6010A	7211	7210		
Iron	6010A		7380		
Lead	6010A	7421	7420		
Magnesium	6010A		7450		
Manganese	6010A		7460		
Mercury					7470A/ 7471A
Molybdenum	6010A		7480		
Nickel	6010A		7520		
Potassium	6010A		7610		
Selenium	6010A	7740		7741A	
Silver	6010A	7761	7760A		
Sodium	6010A		7710		
Thallium	6010A	7841	7840		
Tin	6010A				
Vanadium	6010A		7910		
Zinc	6010A		7950		

The number of parameters analyzed and the method used will be determined by the site-specific requirements.

Volatile Priority Pollutant Compound List (GC/MS - 8240B)

Compounds	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Chloromethane	5.	3.	5.	2.
Bromomethane	5.	3.	5.	3.
Vinyl chloride	5.	2.	5.	2.
Chloroethane	5.	3.	5.	3.
Acrolein	100.	40.	100.	20.
Acrylonitrile	50.	10.	50.	10.
Methylene chloride	5.	2.	5.	2.
Trichlorofluoromethane	5.	2.	5.	2.
1,1-Dichloroethene	5.	1.	5.	2.
1,1-Dichloroethane	5.	2.	5.	1.
trans-1,2-Dichloroethene	5.	2.	5.	2.
Chloroform	5.	1.	5.	1.
1,2-Dichloroethane	5.	2.	5.	2.
1,1,1-Trichloroethane	5.	1.	5.	1.
Carbon tetrachloride	5.	1.	5.	1.
Bromodichloromethane	5.	1.	5.	2.
1,1,2,2-Tetrachloroethane	5.	2.	5.	1.
1,2-Dichloropropane	5.	1.	5.	3.
trans-1,3-Dichloropropene	5.	1.	5.	1.
Trichloroethene	5.	1.	5.	1.
Dibromochloromethane	5.	2.	5.	1.
1,1,2-Trichloroethane	5.	2.	5.	2.
Benzene	5.	1.	5.	1.
cis-1,3-Dichloropropene	5.	1.	5.	1.
2-Chloroethylvinyl ether	10.	2.	10.	2.
Bromoform	5.	1.	5.	1.
Tetrachloroethene	5.	1.	5.	1.
Toluene	5.	2.	5.	1.
Chlorobenzene	5.	1.	5.	1.
Ethylbenzene	5.	2.	5.	1.
Xylene (total)	5.	1.	5.	1.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) *but* can estimate down to the J-value when requested by the client if a valid mass spectrum is obtained. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Appendix IX Volatile Compounds (GC/MS 8240B)

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Chloromethane	5.	3.	5.	2.
Bromomethane	5.	3.	5.	3.
Vinyl chloride	5.	2.	5.	2.
Dichlorodifluoromethane	5.	2.	5.	2.
Chloroethane	5.	3.	5.	3.
Methyl iodide	5.	1.	5.	3.
Acrolein	100.	40.	100.	20.
Acrylonitrile	50.	10.	50.	10.
Acetonitrile	100.	25.	100.	25.
Methylene chloride	5.	2.	5.	2.
Acetone	20.	6.	20.	7.
Trichlorofluoromethane	5.	2.	5.	2.
Carbon disulfide	5.	3.	5.	3.
Propionitrile	100.	30.	100.	30.
1,1-Dichloroethene	5.	1.	5.	2.
Allyl chloride	5.	1.	5.	1.
1,1-Dichloroethane	5.	2.	5.	1.
trans-1,2-Dichloroethene	5.	2.	5.	2.
Chloroform	5.	1.	5.	1.
1,2-Dichloroethane	5.	2.	5.	2.
Methacrylonitrile	50.	10.	50.	5.
2-Butanone	10.	3.	10.	7.
Dibromomethane	5.	1.	5.	1.
1,1,1-Trichloroethane	5.	1.	5.	1.
1,4-Dioxane	250.	70.	250.	70.
Carbon tetrachloride	5.	1.	5.	1.
Isobutyl alcohol	250.	100.	250.	100.
Vinyl acetate	10.	2.	10.	3.
Bromodichloromethane	5.	1.	5.	2.
2-Chloro-1,3-butadiene	5.	2.	5.	2.
1,2-Dichloropropane	5.	1.	5.	3.
trans-1,3-Dichloropropene	5.	1.	5.	1.
Trichloroethene	5.	1.	5.	1.
Dibromochloromethane	5.	2.	5.	1.
1,1,2-Trichloroethane	5.	2.	5.	2.
1,2-Dibromoethane	5.	1.	5.	1.

Appendix IX Volatile Compounds (GC/MS 8240B)				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Benzene	5.	1.	5.	1.
cis-1,3-Dichloropropene	5.	1.	5.	1.
Methyl methacrylate	5.	1.	5.	1.
1,1,1,2-Tetrachloroethane	5.	1.	5.	2.
Bromoform	5.	1.	5.	1.
trans-1,4-Dichloro-2-butene	50.	15.	50.	10.
1,2,3-Trichloropropane	5.	1.	5.	1.
2-Hexanone	10.	7.	10.	3.
4-Methyl-2-pentanone	10.	5.	10.	3.
Tetrachloroethene	5.	1.	5.	1.
1,1,2,2-Tetrachloroethane	5.	2.	5.	1.
Toluene	5.	2.	5.	1.
Ethyl methacrylate	5.	1.	5.	1.
Chlorobenzene	5.	1.	5.	1.
Pentachloroethane	5.	1.	5.	1.
Ethylbenzene	5.	2.	5.	1.
1,2-Dibromo-3-chloropropane	5.	3.	5.	2.
Styrene	5.	1.	5.	1.
Xylenes (total)	5.	1.	5.	1.

For samples preserved with 1 + 1 HCl to pH <2, low recovery of acid labile compounds is likely to occur.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client if a valid mass spectrum is obtained. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

GC/MS Volatile Compound List (8260A)

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Dichlorodifluoromethane	5.	2.	5.	2.
Chloromethane	5.	3.	5.	2.
Vinyl Chloride	5.	2.	5.	2.
Bromomethane	5.	3.	5.	3.
Chloroethane	5.	3.	5.	3.
Trichlorofluoromethane	5.	2.	5.	2.
1,1-Dichloroethene	5.	1.	5.	2.
1,1-Dichloroethane	5.	1.	5.	1.
Methylene Chloride	5.	2.	5.	2.
trans-1,2-Dichloroethene	5.	2.	5.	2.
2,2-Dichloropropane	5.	1.	5.	1.
cis-1,2-Dichloroethene	5.	2.	5.	2.
Chloroform	5.	1.	5.	1.
Bromochloromethane	5.	1.	5.	1.
1,1,1-Trichloroethane	5.	1.	5.	1.
Carbon Tetrachloride	5.	1.	5.	1.
1,1-Dichloropropene	5.	1.	5.	1.
Benzene	5.	1.	5.	1.
1,2-Dichloroethane	5.	2.	5.	2.
Trichloroethene	5.	1.	5.	1.
1,2-Dichloropropane	5.	1.	5.	3.
Dibromomethane	5.	1.	5.	1.
Bromodichloromethane	5.	1.	5.	2.
Toluene	5.	2.	5.	1.
1,1,2-Trichloroethane	5.	2.	5.	2.
Tetrachloroethene	5.	1.	5.	1.
1,3-Dichloropropane	5.	1.	5.	1.
Dibromochloromethane	5.	2.	5.	1.
1,2-Dibromoethane	5.	1.	5.	1.
Chlorobenzene	5.	1.	5.	1.
1,1,1,2-Tetrachloroethane	5.	1.	5.	2.
Ethylbenzene	5.	2.	5.	1.
m+p-Xylene	5.	1.	5.	1.
o-Xylene	5.	1.	5.	1.
Styrene	5.	1.	5.	1.

GC/MS Volatile Compound List (8260A)				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Bromoform	5.	1.	5.	1.
Isopropylbenzene	5.	2.	5.	3.
1,1,2,2-Tetrachloroethane	5.	2.	5.	1.
Bromobenzene	5.	1.	5.	1.
1,2,3-Trichloropropane	5.	1.	5.	1.
n-Propylbenzene	5.	1.	5.	1.
2-Chlorotoluene	5.	1.	5.	1.
1,3,5-Trimethylbenzene	5.	1.	5.	1.
4-Chlorotoluene	5.	1.	5.	1.
tert-Butylbenzene	5.	1.	5.	1.
1,2,4-Trimethylbenzene	5.	1.	5.	1.
sec-Butylbenzene	5.	1.	5.	1.
p-Isopropyltoluene	5.	1.	5.	1.
1,3-Dichlorobenzene	5.	2.	5.	2.
1,4-Dichlorobenzene	5.	2.	5.	2.
n-Butylbenzene	5.	1.	5.	1.
1,2-Dichlorobenzene	5	2.	5.	2.
1,2-Dibromo-3-chloropropane	5.	3.	5.	2.
1,2,4-Trichlorobenzene	5.	1.	5.	1.
Hexachlorobutadiene	5.	2.	5.	2.
Naphthalene	5.	1.	5.	1.
1,2,3-Trichlorobenzene	5.	1.	5.	1.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client if a valid mass spectrum is obtained. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Semivolatile Priority Pollutant Compound List

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
2-Chlorophenol	10.	1.	330.	33.
Phenol	10.	1.	330.	33.
2-Nitrophenol	10.	2.	330.	67.
2,4-Dimethylphenol	10.	1.	330.	67.
2,4-Dichlorophenol	10.	2.	330.	33.
4-Chloro-3-methylphenol	10.	2.	330.	67.
2,4,6-Trichlorophenol	10.	1.	330.	67.
2,4-Dinitrophenol	25.	5.	830.	167.
4-Nitrophenol	25.	5.	830.	167.
2-Methyl-4,6-dinitrophenol	25.	5.	830.	167.
Pentachlorophenol	25.	1.	830.	167.
N-nitrosodimethylamine	10.	2.	330.	67.
bis (2-Chloroethyl) ether	10.	1.	330.	67.
1,3-Dichlorobenzene	10.	1.	330.	33.
1,4-Dichlorobenzene	10.	1.	330.	33.
1,2-Dichlorobenzene	10.	1.	330.	33.
bis (2-Chloroisopropyl) ether	10.	2.	330.	100.
Hexachloroethane	10.	2.	330.	67.
N-nitrosodi-*n*-propylamine	10.	2.	330.	67.
Nitrobenzene	10.	1.	330.	33.
Isophorone	10.	1.	330.	67.
bis (2-Chloroethoxy) methane	10.	1.	330.	33.
1,2,4-trichlorobenzene	10.	1.	330.	33.
Naphthalene	10.	1.	330.	33.
Hexachlorobutadiene	10.	1.	330.	67.
Hexachlorocyclopentadiene	10.	3.	330.	167.
2-Chloronaphthalene	10.	1.	330.	33.
Acenaphthylene	10.	1.	330.	33.
Dimethyl phthalate	10.	3.	330.	33.
2,6-Dinitrotoluene	10.	1.	330.	67.
Acenaphthene	10.	1.	330.	33.
2,4-Dinitrotoluene	10.	2.	330.	67.
Fluorene	10.	1.	330.	33.
4-Chlorophenyl phenyl ether	10.	2.	330.	67.
Diethyl phthalate	10.	2.	330.	67.
1,2-Diphenylhydrazine	10.	1.	330.	67.

Semivolatile Priority Pollutant Compound List				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
N-nitrosodiphenylamine	10.	2.	330.	67.
4-Bromophenyl phenyl ether	10.	2.	330.	100.
Hexachlorobenzene	10.	1.	330.	100.
Phenanthrene	10.	1.	330.	33.
Anthracene	10.	1.	330.	33.
Di-n-butyl phthalate	10.	1.	330.	33.
Fluoranthene	10.	1.	330.	33.
Pyrene	10.	1.	330.	67.
Benzidine	100.	20.	3300.	833.
Butyl benzyl phthalate	10.	2.	330.	67.
Benzo (a) anthracene	10.	1.	330.	33.
Chrysene	10.	1.	330.	33.
3,3'-Dichlorobenzidine	20.	2.	670.	133.
bis (2-Ethylhexyl) phthalate	10.	2.	330.	67.
Di-n-octyl phthalate	10.	2.	330.	67.
Benzo (b) fluoranthene	10.	2.	330.	67.
Benzo (k) fluoranthene	10.	2.	330.	133.
Benzo (a) pyrene	10.	2.	330.	67.
Indeno (1,2,3-cd) pyrene	10.	2.	330.	67.
Dibenz (a,h) anthracene	10.	2.	330.	67.
Benzo (ghi) perylene	10.	2.	330.	67.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client if a valid mass spectrum is obtained. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Appendix IX Semivolatile Compounds

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Acenaphthene	10.	1.	330.	33.
Acenaphthylene	10.	1.	330.	33.
Acetophenone	10.	2.	330.	33.
2-Acetylaminofluorene	10.	2.	330.	67.
4-Aminobiphenyl	10.	1.	330.	133.
Aniline	10.	2.	330.	100.
Anthracene	10.	1.	330.	33.
Benzo (a) anthracene	10.	1.	330.	33.
Benzo (b) fluoranthene	10.	2.	330.	67.
Benzo (k) fluoranthene	10.	2.	330.	133.
Benzo (ghi) perylene	10.	2.	330.	67.
Benzo (a) pyrene	10.	2.	330.	67.
Benzyl alcohol	20.	2.	670.	100.
bis (2-Chloroethoxy) methane	10.	1.	330.	33.
bis (2-Chloroethyl) ether	10.	1.	330.	67.
bis (2-Ethylhexyl) phthalate	10.	2.	330.	67.
4-Bromophenyl phenyl ether	10.	2.	330.	100.
Butyl benzyl phthalate	10.	2.	330.	67.
4-Chloroaniline	10.	2.	330.	100.
Chlorobenzilate	10.	4.	330.	67.
4-Chloro-3-methylphenol	10.	2.	330.	67.
2-Chloronaphthalene	10.	1.	330.	33.
2-Chlorophenol	10.	1.	330.	33.
4-Chlorophenyl phenyl ether	10.	2.	330.	67.
Chrysene	10.	1.	330.	33.
2-methyl phenol	10.	2.	330.	67.
3 and 4 methyl phenol	10.	2.	330.	100.
Diallate	10.	2.	330.	100.
Dibenzofuran	10.	1.	330.	33.
Di-n-butyl phthalate	10.	1.	330.	33.
Dibenz (a,h) anthracene	10.	2.	330.	67.
1,2-Dichlorobenzene	10.	1.	330.	33.
1,3-Dichlorobenzene	10.	1.	330.	33.
1,4-Dichlorobenzene	10.	1.	330.	33.
3,3'-Dichlorobenzidine	20.	2.	670.	133.
2,4-Dichlorophenol	10.	2.	330.	33.

Appendix IX Semivolatile Compounds				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
2,6-Dichlorophenol	10.	1.	330.	67.
Diethyl phthalate	10.	2.	330.	67.
Dimethoate	10.	2.	330.	100.
p-(Dimethylamino) azobenzene	10.	1.	330.	133.
7,12-Dimethylbenz(a) anthracene	10.	2.	330.	33.
3,3'-Dimethylbenzidine	20.	2.	670.	100.
a,a-dimethyl-1-phenethylamine	20.	1.	670.	67.
2,4-Dimethylphenol	10.	1.	330.	67.
Dimethyl phthalate	10.	3.	330.	33.
m-Dinitrobenzene	10.	2.	330.	67.
2-Methyl-4,6-dinitrophenol	25.	5.	830.	167.
2,4-Dinitrophenol	25.	5.	830.	167.
2,4-Dinitrotoluene	10.	2.	330.	67.
2,6-Dinitrotoluene	10.	1.	330.	67.
Di-n-octyl phthalate	10.	2.	330.	67.
Ethyl methanesulfonate	20.	1.	670.	67.
Fluoranthene	10.	1.	330.	33.
Fluorene	10.	1.	330.	33.
Hexachlorobenzene	10.	1.	330.	100.
Hexachlorobutadiene	10.	1.	330.	67.
Hexachlorocyclopentadiene	10.	3.	330.	167.
Hexachloroethane	10.	2.	330.	67.
Hexachloropropene	10.	2.	330.	67.
Indeno (1,2,3-cd) pyrene	10.	2.	330.	67.
Isodrin	20.	1.	670.	33.
Isophorone	10.	1.	330.	67.
Isosafrole	10.	1.	330.	33.
Methapyrilene	20.	1.	670.	133.
3-Methylchloranthene	10.	2.	330.	67.
Methyl methanesulfonate	10.	1.	330.	33.
Methylnaphthalene	10.	1.	330.	33.
Naphthalene	10.	1.	330.	33.
1,4-Naphthoquinone	10.	1.	330.	100.
1-Naphthylamine	10.	2.	330.	33.
2-Naphthylamine	10.	2.	330.	33.
2-Nitroaniline	10.	1.	330.	67.

Appendix IX Semivolatile Compounds

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
3-Nitroaniline	10.	1.	330.	67.
4-Nitroaniline	10.	2.	330.	100.
Nitrobenzene	10.	1.	330.	33.
2-Nitrophenol	10.	2.	330.	67.
4-Nitrophenol	25.	5.	830.	167.
4-Nitroquinoline 1-oxide	100.	10.	3300.	330.
N-Nitrosodi-n-butylamine	10.	2.	330.	67.
N-Nitrosodiethylamine	10.	2.	330.	100.
N-Nitrosodimethylamine	10.	2.	330.	67.
N-Nitrosodiphenylamine1	10.	2.	330.	67.
N-Nitrosodi-n-propylamine	10.	2.	330.	67.
N-Nitrosomethylethylamine	10.	2.	330.	133.
N-Nitrosomorpholine	10.	1.	330.	67.
N-Nitrosopiperidine	10.	2.	330.	67.
N-Nitrospyrrolidine	10.	2.	330.	100.
5-Nitro-o-toluidine	10.	2.	330.	100.
Pentachlorobenzene	10.	1.	330.	67.
Pentachloronitrobenzene	10.	2.	330.	100.
Pentachlorophenol	25.	1.	830.	167.
Phenacetin	10.	2.	330.	67.
Phenanthrene	10.	1.	330.	33.
Phenol	10.	1.	330.	33.
1,4-Phenylenediamine	200.	20.	6700.	667.
2-Picoline	10.	1.	330.	67.
Pronamide	10.	1.	330.	100.
Pyrene	10.	1.	330.	67.
Pyridine	10.	2.	330.	33.
Safrole	10.	2.	330.	67.
1,2,4,5-Tetrachlorobenzene	10.	1.	330.	67.
2,3,4,6-Tetrachlorphenol	10.	2.	330.	33.
Tetraethyl dithiopyrophosphate	10.	2.	330.	67.
Thionazin	20.	2.	670.	200.
o-Toluidine	10.	2.	330.	100.
1,2,4-Trichlorobenzene	10.	1.	330.	33.
2,4,5-Trichlorophenol	10.	1.	330.	67.
2,4,6-Trichlorophenol	10.	1.	330.	67.

Appendix IX Semivolatile Compounds				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
0,0,0-Triethylphosphorothioate	10.	2.	330.	67.
1,3,5-Trinitrobenzene	10.	5.	330.	167.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client if a valid mass spectrum is obtained. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

[1] N-Nitrosodiphenylamine decomposes in the GC inlet forming diphenylamine. The result reported for N-Nitrosodiphenylamine represents the combined total of both compounds.

LOQ and J-values are evaluated annually and subject to change.

Volatiles by GC
Volatile Organics List

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (µg/kg)	J-Value (µg/kg)
Chloromethane	5.	0.09	5.	0.5
Bromomethane	5.	1.18	5.	0.5
Dichlorodifluoromethane	2.	0.2	2.	0.2
Vinyl chloride	1.	0.2	1.	0.1
Chloroethane	1.	0.52	1.	0.1
Methylene chloride	1.	0.25	1.	0.1
Trichlorofluoromethane	1.	0.1	1.	0.1
1,1-Dichloroethene	1.	0.13	1.	0.1
1,1-Dichloroethane	1.	0.07	1.	0.1
1,2-Dichloroethene (cis/trans)	1.	0.1	1.	0.1
Chloroform	1.	0.05	1.	0.1
1,2-Dichloroethane	1.	0.1	1.	0.1
1,1,1-Trichloroethane	1.	0.03	1.	0.1
Carbon tetrachloride	1.	0.12	1.	0.1
Bromodichloromethane	1.	0.09	1.	0.1
1,2-Dichlorpropane	1.	0.04	1.	0.1
trans-1,3-Dichloropropene	1.	0.2	1.	0.1
Trichloroethene	1.	0.12	1.	0.1
Dibromochloromethane	1.	0.09	1.	0.1
1,1,2-Trichloroethane	1.	0.105	1.	0.1
cis-1,3-Dichloropropene	1.	0.34	1.	0.1
2-Chloroethylvinyl-ether	10.	0.9	10.	1.
Bromoform	2.	0.2	2.	0.2
1,1,2,2-Tetrachloroethane	2.	0.05	2.	0.2
Tetrachloroethene	1.	0.04	1.	0.1
Chlorobenzene	1.	0.25	1.	0.1
Benzene	1.	0.2	1.	0.2
Toluene	1.	0.2	1.	0.1
Ethylbenzene	1.	0.1	1.	0.2
o-Xylene	1.	0.2	1.	0.2
m-Xylene	1.	0.2	1.	0.2
p-Xylene	1.	0.2	1.	0.2

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Pesticide/PCB Priority Pollutant Compound List

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
alpha-BHC	0.01	0.001	0.01	0.00042
beta-BHC	0.01	0.0011	0.01	0.0011
gamma-BHC (Lindane)	0.01	0.001	0.01	0.00055
delta-BHC	0.01	0.003	0.01	0.00061
Heptachlor	0.01	0.0016	0.01	0.00077
Aldrin	0.01	0.0063	0.01	0.0014
Heptachlor epoxide	0.01	0.001	0.01	0.00059
4,4-DDE	0.01	0.001	0.01	0.00068
4,4-DDD	0.01	0.0048	0.01	0.0002
4,4-DDT	0.01	0.009	0.01	0.0006
Dieldrin	0.01	0.001	0.01	0.00042
Endrin	0.01	0.0071	0.01	0.0004
Chlordane	0.3	0.02	0.05	0.013
Toxaphene	4.	0.40	2.	0.019
Endosulfan I	0.01	0.002	0.01	0.0012
Endosulfan II	0.01	0.0049	0.01	0.00079
Endosulfan sulfate	0.03	0.003	0.03	0.00065
Endrin aldehyde	0.1	0.0048	0.1	0.0011
Methoxychlor	0.05	0.016	0.05	0.0016
PCB-1016	1.	0.043	0.2	0.034
PCB-1221	1.	0.12	0.2	0.049
PCB-1232	1.	0.048	0.2	0.026
PCB-1242	1.	0.10	0.2	0.013
PCB-1248	1.	0.038	0.2	0.035
PCB-1254	1.	0.14	0.2	0.028
PCB-1260	1.	0.036	0.2	0.032

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Appendix IX Organochlorines				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Aldrin	0.01	0.0063	0.01	0.0014
alpha-BHC	0.01	0.001	0.01	0.0042
beta-BHC	0.01	0.0011	0.01	0.0011
delta-BHC	0.01	0.003	0.01	0.00061
gamma-BHC (Lindane)	0.01	0.001	0.01	0.00055
Chlordane	0.3	0.02	0.05	0.013
4,4-DDT	0.01	0.009	0.01	0.0006
4,4-DDE	0.01	0.001	0.01	0.00068
4,4-DDD	0.01	0.0048	0.01	0.0002
Dieldrin	0.01	0.001	0.01	0.00042
Endosulfan I	0.01	0.002	0.01	0.0012
Endosulfan II	0.01	0.0049	0.01	0.00072
Endosulfan sulfate	0.03	0.003	0.03	0.00065
Endrin	0.01	0.0071	0.01	0.0004
Endrin aldehyde	0.1	0.0048	0.1	0.0011
Heptachlor	0.01	0.0016	0.01	0.00077
Heptachlor epoxide	0.01	0.001	0.01	0.00059
Kepone	0.7	0.3	0.7	0.1
Methoxychlor	0.05	0.016	0.05	0.0016
PCB-1016	1.	0.043	0.2	0.034
PCB-1221	1.	0.12	0.2	0.049
PCB-1232	1.	0.048	0.2	0.026
PCB-1242	1.	0.10	0.2	0.013
PCB-1248	1.	0.038	0.2	0.035
PCB-1254	1.	0.14	0.2	0.028
PCB-1260	1.	0.036	0.2	0.032
Toxaphene	4.	0.40	2.	0.019

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Appendix IX Herbicide Compounds				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
2,4-D	1.	0.071	0.2	0.02
Dinoseb	1.	0.016	0.2	0.005
2,4,5-TP	0.1	0.011	0.05	0.002
2,4,5-T	0.1	0.0059	0.05	0.002

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Appendix IX Organophosphates				
	Waters		Soils**	
Compound	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Disulfoton	0.3	0.065	0.3	0.066
Methyl parathion	0.2	0.046	0.08	0.016
Ethyl parathion	0.2	0.064	0.08	0.016
Famphur	0.5	0.077	0.1	0.024
Phorate	0.3	0.063	0.1	0.019

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

PAHs by HPLC 8310

Compound	Waters		Soils**	
	LOQ* (µg/L)	J-Value (µg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Naphthalene	10.	0.9	0.67	0.059
Acenapthylene	20.	0.7	0.67	0.049
Acenaphthene	20.	2.	0.67	0.180
Fluorene	2.	1.	0.67	0.011
Phenanthrene	2.	0.04	0.167	0.017
Anthracene	1.	0.03	0.167	0.0017
Fluoranthene	0.5	0.02	0.067	0.00078
Pyrene	2.	0.5	0.067	0.0041
Benzo(a)anthracene	0.1	0.04	0.003	0.00063
Chrysene	1.	0.2	0.03	0.0018
Benzo(b)fluoranthene	0.2	0.03	0.0067	0.00035
Benzo(k)fluoranthene	0.1	0.01	0.0067	0.00034
Benzo(a)pyrene	0.2	0.02	0.0067	0.00097
Dibenzo(a,h)anthracene	0.2	0.04	0.0067	0.003
Benzo(g,h,i)perylene	0.5	0.2	0.0167	0.01
Indeno(1,2,3-cd)pyrene	0.5	0.1	0.0167	0.0027

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

TPH GRO/DRO				
	Waters		Soils**	
Compound	LOQ* (mg/L)	J-Value (mg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
TPH-GRO	0.05	0.02	1.	0.2
TPH-DRO	0.4	0.2	7.	4.

NOTE: J-values listed are higher than determined MDLs. This is because the method sums total detectable area under the chromatographic plot in region of interest, instead of actual fuel peak area as the respective fuel.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Inorganic Appendix IX Analyte List

Analyte	Waters		Soils**	
	LOQ* (mg/L)	J-Value (mg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Antimony	0.2	0.015	20.	2.2
Arsenic[1]	0.01	0.0027	1.	0.25
Barium	0.1	0.0022	10.	2.2
Beryllium	0.01	0.0013	0.5	0.074
Cadmium	0.01	0.0027	2.	0.13
Chromium	0.03	0.0043	4.	0.47
Cobalt	0.05	0.0055	5.	0.52
Copper	0.025	0.0038	4.	0.50
Lead[1]	0.005	0.0020	0.5	0.16
Mercury[2]	0.0002	0.000043	0.1	0.028
Nickel	0.05	0.0054	5.	0.46
Selenium[1]	0.01	0.0027	0.5	0.18
Silver	0.02	0.0036	2.	0.45
Thallium[1]	0.02	0.0045	2.	0.39
Tin	0.3	0.025	25.	2.2
Vanadium	0.02	0.0070	2.	0.68
Zinc	0.025	0.012	10.	0.40
Cyanide	0.005	0.004	0.1	0.08
Sulfide	2.	0.49	30.	8.61

[1] Analysis by Trace ICP

[2] Analysis by Cold Vapor

Except for cyanide and sulfide, all other elements analyzed by ICP.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Inorganic Priority Pollutants List (PPL)

Analyte	Waters		Soils**	
	LOQ* (mg/L)	J-Value (mg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Antimony	0.2	0.015	20.	2.2
Arsenic[1]	0.01	0.0027	1.	0.25
Beryllium	0.01	0.0013	0.5	0.074
Cadmium	0.01	0.0027	2.	0.13
Chromium	0.03	0.0043	4.	0.47
Copper	0.025	0.0038	4.	0.50
Lead[1]	0.005	0.0020	0.5	0.16
Mercury[2]	0.0002	0.000043	0.1	0.028
Nickel	0.05	0.0054	5.	0.46
Selenium[1]	0.01	0.0027	0.5	0.18
Silver	0.02	0.0036	2.	0.45
Thallium[1]	0.02	0.0045	2.	0.39
Zinc	0.025	0.012	10.	0.40
Cyanide	0.005	0.004	0.1	0.08

[1] Analyzed by Trace ICP

[2] Analyzed by Cold Vapor

Except for cyanide, all other elements analyzed by ICP.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

Parameter	Waters		Soils**	
	LOQ* (mg/L)	J-Value (mg/L)	LOQ* (mg/kg)	J-Value (mg/kg)
Phenols	0.005	0.004	0.1	0.0007
TOC	1.0	10.	50.	10.
TOX	5. µg/L	5. µg/L	100.	100.
TPH	0.3	0.1	20.	7.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on a dry-weight basis will be higher.

The laboratory routinely reports at the limit of quantitation (LOQ) but can estimate down to the J-value when requested by the client. Values reported below the LOQ are reported with a J-flag and are defined as estimated values.

LOQ and J-values are evaluated annually and subject to change.

10. Data Reduction, Validation, and Reporting

Raw analytical data generated in the laboratories is collected on printouts from the instruments and associated data system or manually in bound notebooks. Analysts review data as it is generated to determine that the instruments are performing within specifications. This review includes calibration checks, surrogate recoveries, blank checks, retention time reproducibility, and other QC checks described in Sections No. 8 and 11. If any problems are noted during the analytical run, corrective action is taken and documented.

Each analytical run is reviewed by a chemist for completeness and accuracy prior to interpretation and data reduction. The following calculations are used to reduce raw data to reportable results.

GC/MS calculation used by the data system to determine concentration in extract for **semivolatiles** or in the sample itself for **volatiles:**

$$Q = (Ax)(Is) / (AIs)(RRF)(Vi)$$

Where:

Ax = Peak area

AIs = Internal standard peak area

Is = Amount of internal standard injected (ng)

RRF = Relative response factor

Vi = Volume of extract injected (L) or volume sample purged (mL)

The extract concentration is further reduced by considering the initial sample weight or volume and the final extract volume:

$$Concentration = (Q)\,(D)\,(F)\,(1000) \,/\, (I)$$

Where:

Q = Concentration determined by the data system (mg/L)

D = Dilution factor if needed

F = Final extract volume (mL)

I = Initial sample weight (grams) or volume (mL)

Results are reported in µg/L for water samples and µg/kg for solid samples. Soil samples are reported on an as received and on a dry-weight basis. The results are reported on Lancaster Labs Analysis Report Forms shown in Appendix A.

For **volatiles by GC**, a five-point external calibration procedure is used. The resulting point-to-point calibration curve is used by the data system to calculate analyte concentrations. The equations that the data system uses for calculating analyte concentrations are shown below.

A. When analyte peak height, Hx, falls between the peak heights of two calibration points, Hn and Hn+1, the analyte concentration is calculated as follows when using a point-to-point calibration curve:

$$Concentration = ([(Hx - Hn) / S] + An) \times (DF)$$
$$S = (Hn + 1 - Hn) / (An + 1 - An)$$

Where:

Hx = Analyte peak height

Hn = Analyte peak height in the nth calibration level

Hn+1 = Analyte peak height in the n+1 calibration level

S = Slope between the n and n+1 calibration points for the analyte

An = The concentration of the analyte in the nth calibration level

An+1 = The concentration of the analyte in the n+1 calibration level

DF = Dilution factor

B. When the analyte peak height is below the peak height for the lowest calibration standard, the analyte concentration is calculated as follows when using a point-to-point calibration curve with extrapolation to zero:

$$Concentration = [(Hx) \times (A1 / H1)] \times (DF)$$

Where:

Hx = Analyte peak height

A1 = Concentration of analyte in the first calibration level

H1 = Analyte peak height in first calibration level

DF = Dilution factor

Results are reported in µg/L for water samples and in µg/kg for solid samples. Soil samples are reported on an as received and on a dry weight basis.

The results for the **pesticides/PCBs** analysis are calculated using the following equation:

$$Concentration = (Ax)\,(Is)\,(Vt)\,(DF) / (As)\,(Vi)\,(Vs)$$

Where:

Ax = Peak height for the parameter being measured

Is = Amount of standard injected (ng)

Vt = Volume of total extract (L)

DF = Dilution factor, if needed

As = Peak height for the external standard

Vi = Volume of extract injected (L)

Vs = Volume (mL) or weight (gm) of sample extracted

Results are reported as µg/L for water samples and mg/kg for solid samples. Soil samples are reported on an as received and on a dry weight basis. Results are reported on Lancaster Labs Analysis Report Forms shown in Appendix A.

For **Herbicides**, a five-point calibration curve is constructed for each compound. The results are calculated from the curve when the %RSD is >20%. Otherwise, the results are calculated using the average response factor.

A. Curve

$$\textit{Sample Concentration, mg / kg or } \mu g / L = \textit{Extract Concentration} \times \frac{DF \times FV}{IW\ (or\ IV)}$$

Where:

Extract Conc., = (peak ht. - Y-intercept)/slope

FV = final volume = 100 mL (solids), 10 mL (waters)

IW or IV = initial weight = 10 g, initial volume 1000 mL

DF = Dilution Factor

B. Average response factor

The calculation performed by single point is the same as above except the extract concentration is calculated as follow:

$$Extract\ Conc.,\ \mu g / mL = \frac{pk\ ht\ in\ sample}{Average\ Response\ Factor\ (ARF)} \times \frac{Int\ std\ ht\ in\ L3\ std}{Int\ std\ ht\ in\ sample}$$

Where:

ARF = Average Response Factor [(RF Calib1 + ... + RF Calib 5)/5]

The results for the **PAHs by HPLC** analysis are calculated using the following equation:

$$\frac{Pk\ Ht \times RF \times FV \times DF \times AF}{IV\ (or\ IW)} = Concentration\ (\mu g / L)\ or\ mg / kg$$

Where:

Pk Ht = Peak height found in sample

RF = Response factor (ppm/peak height) of analyte in standard

FV = Final volume of sample extract* (mL)

DF = Dilution factor (where applicable)

IV = Initial volume of sample extracted (L)

IW = Initial weight of the sample extracted (gm)

**AF = Additional factor

*Please note that the final volume of the extract is 3 mL for aqueous and 10 mL for solids

**Additional factor is five to compensate for the dilution into ACN

Results are reported as μg/L for water samples and mg/kg for solid samples. Soil samples are reported on an as received and on a dry weight basis. Results are reported on Lancaster Labs Analysis Report Forms shown in Appendix A.

For **TPH-GRO and TPH-DRO**, a five-point external calibration procedure is used. The resulting point-to-point calibration curve is used by the data system to calculate analyte concentrations. The equations that the data system uses for calculating analyte concentrations are shown below:

$$Concentration = (Ax / Rf) \times (DF)$$

Where:

Ax = Total peak area under the curve in region defined as analyte

DF = Dilution factor

RF = Average response factor from the calibration curve, calculated as shown below:

$$RF = [(As1 / Qs1) + (As2 / Qs2) + (As3 / Qs3) + (As4 / Qs4) + (As5 / Qs5)] / 5$$

Where:

As# = Analyte peak sum area for all components of calibration level #

Qs# = Analyte concentration sum for all components of calibration level #

Results are reported in mg/L for water samples and in mg/kg for solid samples. Soil samples are reported on an as received an on a dry weight basis.

For DRO, calculation also includes the Factor "F/I"

Where:

F = Final extract volume (mL)

I = Initial sample weight (grams) or volume (mL)

The results for **inorganic** analyses are calculated using the following equation:

$$\text{Concentration} = (A)(D)(E) \ / \ (F)$$

Where:

A = The concentration determined by AA, ICP, or FTIR using calibration data programmed into the instrument (mg/L)

D = Dilution factor if needed

E = Final extract volume (mL)

F = Initial sample volume (mL) or weight (gm)

Results are usually reported in mg/L for water samples and in mg/kg for solid samples. Alternate units are available upon request. Soil samples are reported on an as received and on a dry weight basis. The results are reported on Lancaster Labs Analysis Report Forms shown in Appendix A.

The principle criteria used to validate data will be the acceptance criteria described in Sections No. 8 and 11 and protocols specified in laboratory SOPs. Following review, interpretation, and data reduction by the analyst, data is transferred to the laboratory sample management system either by direct data upload from the analytical data system or manually. This system stores client information, sample results, and QC results. A security system is in place to control access of laboratory personnel and to provide an audit trail for information changes. The data is again reviewed by the group leader or another analyst whose function is to provide an independent review and verified on the sample management system.

The person performing the verification step reviews all data including quality control information prior to verifying the data. Any errors identified and corrected during the review process are documented and addressed with appropriate personnel to ensure generation of quality data. If data package deliverables have been requested, the laboratory will complete the appropriate forms (see Appendix A) summarizing the quality control information, and transfer copies of all raw data (instrument printouts, spectra, chromatograms, laboratory notebooks, etc.) to the Data Packages Group. This group will combine the information from the various analytical groups and the analytical reports from the laboratory sample management system into one package in the client requested format. This package is reviewed by the Quality Assurance Department for conformance with SOPs and to ensure that all QC goals have been met. Any analytical problems are discussed in the case narrative, which is also included with the data package deliverables.

The validation of the data by the Quality Assurance Department includes spot checking raw data versus the final report, checking that all pertinent raw data is included and does refer to the samples analyzed, review of all QC results for conformance with the method, and review of the case narrative for description of any unusual occurrences during analysis. This validation is performed using techniques similar to those used by the Sample Management Office for the USEPA's Contract Laboratory Program. The validation performed by the laboratory does not address usability of the data, which usually requires some knowledge of the site. The laboratory will make every attempt to meet the requirements of this QAPP, thus reducing the need to assess usability of the data.

The laboratory sample management system is programmed to accept and track the results of quality control samples including blanks, surrogates, recoveries, duplicates, controls, and reference materials. The computer is programmed with the acceptance criteria for each type of QC sample and will display an out-of-spec message if the data is not within specifications. All data outside of specifications appears on a report to the Quality Assurance Department on the next working day. These are reviewed by the Quality Assurance Department for severity of the problems and trends in the data. The reports are then sent to the analytical groups for the purpose of documenting the corrective action taken. The sample management system also produces control charts and has searching capabilities to aid in data review. The flow of data from the time the samples enter the laboratory until the data is reported are summarized in Table 10-1.

Any data recorded manually will be collected in bound notebooks. All entries will be in ink, with no erasures or white-out being permitted. Any changes in data will be made using a single line to avoid obliteration of the original entry and will be dated and signed. Any data resulting from instrument printouts will be dated and will contain the signature and/or identification of the analyst responsible for its generation. After copies of the data are incorporated into the data package deliverables, the originals will be stored in locked archives at the laboratory for a period of 7 years.

Project files will be created per client/project and will contain chain-of-custody records, analysis requirements, and laboratory acknowledgments which document samples received, laboratory sample number assignment, and analysis requested. Raw data is filed per batch number assignment and laboratory sample number which correlates to the sample receipt documents. When the project is complete, all documentation is archived in a limited access area and retained for 5 years.

Table 10-1

Sample and Data Routing at Lancaster Laboratories

Action	Personnel Involved
Sample received at Lancaster Labs	Sample Administration
Sample is entered onto sample management system (lab ID number assigned, analyses scheduled, chain of custody started, storage location assigned)	Sample Administration
Sample stored in assigned location (refrigerator, freezer, etc.)	Sample Support
Acknowledgment sent to client	Sample Administration
Removed from storage for analysis; necessary aliquot taken and sample returned to storage	Technical Personnel
Analysis is performed according to selected analytical method; raw data recorded, reviewed, and transferred to computer by chemist or technician*	Technical Personnel
Computer performs calculations as programmed according to methods	Data Processing
Chemist or supervisor verifies raw data	Technical Personnel
Data package deliverables are assembled	Data Package Group
Data packages are reviewed prior to mailing	Quality Assurance Dept. Laboratory Management

*Analyses requiring the chemist's interpretation may involve manual data reduction prior to entry onto the computer.

11. Internal Quality Control Checks

The particular types and frequencies of quality control checks analyzed with each sample are defined in USEPA SW-846 3rd Edition, Update II, 1994. The quality control checks routinely performed during sample analysis include surrogates, matrix spikes, duplicates, blanks, internal standards, and laboratory control samples. In addition to these checks, some inorganic analyses employ serial dilutions and interference check samples.

Surrogates (used for organic analysis only) - Each sample, matrix spike, matrix spike duplicate, and blank are spiked with surrogate compounds prior to purging and extraction in order to monitor preparation and analysis. Surrogates are used to evaluate analytical efficiency by measuring recovery.

Matrix Spikes - A matrix (soil or water) is spiked with known quantities of specific compounds and subjected to the entire analytical procedure in order to indicate the appropriateness of the method for the matrix by measuring recovery.

Duplicates (matrix spike duplicate - organics and inorganics; duplicate - inorganics) - A second aliquot of a matrix/sample is analyzed at the same time as the original sample in order to determine the precision of the method. Recovery of the original compared to the duplicate is expressed as relative percent differences (RPD).

Blanks (method, preparation) - Blanks are an analytical control consisting of a volume of deionized, distilled laboratory water for water samples, or a purified solid matrix for soil/sediment samples. (Metals use a digested reagent blank with soils.) They are treated with the same reagents, internal standards, and surrogate standards and carried through the entire analytical procedure. The blank is used to define the level of laboratory background contamination.

Internal Standards (used for GC/MS and some GC analysis) - Internal standards are compounds added to every standard, blank matrix, spike, matrix spike duplicate, and sample at a known concentration, prior to analysis. Comparison of the peak areas of the internal standards are used for internal standard quantitation as well as to determine when changes in the instrument response will adversely affect quantification of target compounds.

Serial Dilutions (used for inorganics GFAA and ICP only) - If the analyte concentration is sufficiently high an analysis of a five-fold dilution must agree within 10% of the original determination. If the dilution analysis is not within 10%, a chemical or physical interference effect should be suspected.

Interference Check Sample (ICP) - To verify interelement and background correction factors a solution containing both interfering and analyte elements of known concentration is analyzed at the beginning and end of each analysis run or a minimum of twice per 8 hours.

Laboratory Control Samples - Aqueous and solid control samples of known composition are analyzed using the same sample preparation, reagents, and analytical methods employed for the sample. For inorganics, LCS recovery must fall within established control limits. For organics, an LCS is run when MS/MSD recovery falls outside established limits. The LCS recovery must fall within acceptance limits based on statistical evaluation of past lab data.

The results of quality control samples are entered into the computer along with sample results. The computer is programmed to compare the individual values with the acceptance limits. If the results are not within the acceptance criteria, appropriate corrective action is taken where necessary. Management is kept informed by daily reports of QC outliers generated by the computerized system. Monthly reports on results of all QC analyses showing mean and standard deviation will indicate trends or method bias. Control charts are plotted via computer and may be accessed at any time by all analysts.

The tables that follow show the types and frequency of QC performed, along with the acceptance limits and corrective action.

Table 11-1

Quality Control

GC/MS Volatiles (8240B)

Type	Acceptance Limits(%)		Frequency	Corrective Action
	WATERS	SOILS		
Surrogates:			Each sample, MS, MSD, LCS, and blank	Reanalyze sample if outside limits; if reanalysis confirms original, document on report and/or case narrative
Toluene-d8	88 - 110	81 - 117		
Bromofluorobenzene	86 - 115	74 - 121		
1,2-Dichloroethane-d4	76 - 114	70 - 121		
Matrix Spikes: Spike all compounds of interest	See Table 11-2 and 11-3 for acceptance criteria		Each group (≤20) of samples per matrix/level	LCS run for compounds outside acceptance limits
Laboratory Control Samples: Spike all compounds of interest	Same as for matrix spikes		Each group (≤20) when MS/MSD falls outside established limits	Reanalyze LCS and associated samples for compounds outside acceptance limits
Matrix Spike Duplicates (RPD): Spike all compounds of interest	≤30%		Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	≤LOQ for all compounds		Once for each 12-hour time period	Reanalyze blank and associated samples if blank outside limits
Internal Standards: Bromochloromethane 1,4-Difluorobenzene Chlorobenzene-d5	-50% to +100% of internal standard area of 12-hour STD RT Change ≤30 sec.		Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report or case narrative

Accuracy is subject to change over time.

Table 11-2

GC/MS Statistical Acceptance Limits for Volatile Compounds not Included in Table 11-3

Compound Name	Acceptance Limit (%)
Dichlorodifluoromethane	24 - 157
Ethyl Ether	67 - 123
Acrolein	22 - 169
Freon 113	72 - 174
Acetone	19 - 150
Methyl Iodide	45 - 130
Carbon Disulfide	29 - 183
Acetonitrile	1 - 199
Allyl Chloride	55 - 142
Acrylonitrile	51 - 138
Vinyl Acetate	19 - 190
2-Chloro-1,3-butadiene	77 - 129
2-Butanone	22 - 167
Propionitrile	56 - 139
Ethyl Acetate	69 - 147
Methacrylonitrile	69 - 128
Isobutyl Alcohol	1 - 234
Methyl Methacrylate	66 - 131
Dibromomethane	76 - 136
1,4-Dioxane	3 - 164
2-Nitropropane	54 - 106
4-Methyl-2-pentanone	50 - 124
Ethyl Methacrylate	68 - 270
2-Hexanone	52 - 140
1,2-Dibromoethane	45 - 135
1,1,1,2-Tetrachloroethane	23 - 149
Xylene (total)	61 - 165
Styrene	74 - 136
Cyclohexanone	43 - 123
1,2,3-Trichloropropane	72 - 125
trans-1,4-Dichloro-2-butene	56 - 141
Pentachloroethane	56 - 132
1,2-Dibromo-3-chloropropane	40 - 154
n-Pentane	27 - 195
1,2-Diethylbenzene	56 - 148

Table 11-2

GC/MS Statistical Acceptance Limits for Volatile Compounds not Included in Table 11-3

Compound Name	Acceptance Limit (%)
1,3-Diethylbenzene	57 - 147
1,4-Diethylbenzene	57 - 149
Methyl Tertiary Butyl Ether	80 - 123
Tertiary Butyl Alcohol	25 - 195

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Table 11-3

TABLE 6.
CALIBRATION AND QC ACCEPTANCE CRITERIA[a]

Parameter	Range for Q (μg/L)	Limit for s (μg/L)	Range for $\bar{x}$ (μg/L)	Range p, p_s (%)
Benzene	12.8-27.2	6.9	15.2-26.0	37-151
Bromodichloromethane	13.1-26.9	6.4	10.1-28.0	35-155
Bromoform	14.2-25.8	5.4	11.4-31.1	45-169
Bromomethane	2.8-37.2	17.9	D-41.2	D-242
Carbon tetrachloride	14.6-25.4	5.2	17.2-23.5	70-140
Chlorobenzene	13.2-26.8	6.3	16.4-27.4	37-160
2-Chloroethyl vinyl ether	D-44.8	25.9	D-50.4	D-305
Chloroform	13.5-26.5	6.1	13.7-24.2	51-138
Chloromethane	D-40.8	19.8	D-45.9	D-273
Dibromochloromethane	13.5-26.5	6.1	13.8-26.6	53-149
1,2-Dichlorobenzene	12.6-27.4	7.1	11.8-34.7	18-190
1,3-Dichlorobenzene	14.6-25.4	5.5	17.0-28.8	59-156
1,4-Dichlorobenzene	12.6-27.4	7.1	11.8-34.7	18-190
1,1-Dichloroethane	14.5-25.5	5.1	14.2-28.4	59-155
1,2-Dichloroethane	13.6-26.4	6.0	14.3-27.4	49-155
1,1-Dichloroethene	10.1-29.9	9.1	3.7-42.3	D-234
trans-1,2-Dichloroethene	13.9-26.1	5.7	13.6-28.4	54-156
1,2-Dichloropropane	6.8-33.2	13.8	3.8-36.2	D-210
cis-1,3-Dichloropropene	4.8-35.2	15.8	1.0-39.0	D-227
trans-1,3-Dichloropropene	10.0-30.0	10.4	7.6-32.4	17-183
Ethyl benzene	11.8-28.2	7.5	17.4-26.7	37-162
Methylene chloride	12.1-27.9	7.4	D-41.0	D-221
1,1,2,2-Tetrachloroethane	12.1-27.9	7.4	13.5-27.2	46-157
Tetrachloroethene	14.7-25.3	5.0	17.0-26.6	64-148
Toluene	14.9-25.1	4.8	16.6-26.7	47-150
1,1,1-Trichloroethane	15.0-25.0	4.6	13.7-30.1	52-162
1,1,2-Trichloroethane	14.2-25.8	5.5	14.3-27.1	52-150
Trichloroethene	13.3-26.7	6.6	18.5-27.6	71-157
Trichlorofluoromethane	9.6-30.4	10.0	8.9-31.5	17-181
Vinyl chloride	0.8-39.2	20.0	D-43.5	D-251

Q = Concentration measured in QC check sample, in μg/L.
s = Standard deviation of four recovery measurements, in μg/L.
$\bar{x}$ = Average recovery for four recovery measurements, in μg/L.
p, p_s = Percent recovery measured.
D = Detected; result must be greater than zero.

[a] Criteria from 40 CFR Part 136 for Method 624 and were calculated assuming a QC check sample concentration of 20 μg/L. These criteria are based directly upon the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 7.

Table 11-4

Quality Control

GC/MS Volatiles (8260A)

Type	Acceptance Limits(%) WATERS	 SOILS	Frequency	Corrective Action
Surrogates:			Each sample, MS, MSD, LCS, and blank	Reanalyze sample if outside limits; if reanalysis confirms original, document on report and/or case narrative
Toluene-d8	88 - 110	81 - 117		
Bromofluorobenzene	86 - 115	74 - 121		
1,2-Dichloroethane-d4	80 - 120	80 - 120		
Dibromofluoromethane	86 - 118	80 - 120		
Matrix Spikes: Spike all compounds of interest	See Table 11.4 for acceptance criteria		Each group (≤20) of samples per matrix/level	LCS run for compounds outside acceptance limits
Laboratory Control Samples: Spike all compounds of interest	Same as for matrix spikes		Each group (≤20) when MS/MSD falls outside established limits	Reanalyze LCS and associated samples for compounds outside acceptance limits
Matrix Spike Duplicates (RPD): Spike all compounds of interest	≤30%		Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	≤LOQ for all compounds		Once for each 12-hour time period	Reanalyze blank and associated samples if blank outside limits
Internal Standards: Bromochloromethane 1,4-Difluorobenzene Chlorobenzene-d5	-50% to +100% of internal standard area of 12-hour STD RT Change ≤30 sec.		Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report or case narrative

Accuracy is subject to change over time.

Table 11-5

GC/MS Statistical Acceptance Limits for Volatile Compounds (8260A)

Compound Name	Acceptance Limit (%)
Dichlorofluoromethane	11 - 215
Chloromethane	22 - 172
Vinyl Chloride	28 - 172
Bromomethane	29 - 155
Chloroethane	21 -171
Trichlorofluoromethane	3 - 201
1,1-Dichloroethene	38 - 170
Methylene Chloride	4 -196
trans-1,2-Dichloroethene	42 - 150
1,1-Dichloroethane	42 - 156
2,2-Dichloropropane	32 - 182
cis-1,2-Dichloroethene	37 - 151
Chloroform	44 - 152
Bromochloromethane	35 - 155
1,1,1-Trichloroethane	49 - 163
Carbon Tetrachloride	49 - 163
1,1-Dichloropropene	38 - 164
Benzene	42 - 150
1,2-Dichloroethane	48 - 150
Trichloroethane	43 - 163
1,2-Dichloropropane	49 - 145
Dibromomethane	38 - 164
Bromodichloromethane	48 - 150
Toluene	49 - 151
1,1,2-Trichloroethane	46 - 142
Tetrachloroethene	45 - 171
1,3-Dichloropropane	37 - 157
Dibromochloromethane	48 - 144
1,2-Dibromomethane	37 - 151
Chlorobenzene	49 - 145
1,1,1,2-Tetrachloroethane	39 - 159
Ethylbenzene	50 - 152
m+p-Xylene	78 - 138
o-Xylene	41 - 161
Styrene	50 - 140

Table 11-5

GC/MS Statistical Acceptance Limits for Volatile Compounds (8260A)

Compound Name	Acceptance Limit (%)
Bromoform	41 - 143
Isopropylbenzene	0 - 210
1,1,2,2-Tetrachloroethane	44 - 140
Bromobenzene	41 - 155
1,2,3-Trichloropropane	37 - 157
1,2-Dichloroethene	43 - 163
Acetone	60 - 132
Carbon Disulfide	12 - 174
n-Propylbenzene	40 - 166
2-Chlorotoluene	42 - 162
1,3,5-Trimethylbenzene	38 - 170
4-Chlorotoluene	40 - 160
tert-Butylbenzene	41 - 167
1,2,4-Trimethylbenzene	43 - 163
sec-Butylbenzene	39 - 171
p-Isopropyltoluene	38 - 176
1,3-Dichlorobenzene	42 - 150
1,4-Dichlorobenzene	42 - 150
n-Butylbenzene	33 - 177
1,2-Dichlorobenzene	49 -139
1,2-Dibromo-3-chloropropane	23 - 143
1,2,4-Trichlorobenzene	16 - 154
Hexachlorobutadiene	0 - 211
Naphthalene	0 - 156
1,2,3-Trichlorobenzene	0 - 162
trans-1,3-Dichloropropene	26 - 152
4-Methyl-1,2-pentanone	73 - 121
cis-1,3-Dichloropropene	68 - 122
Xylene	76 - 118
2-Hexanone	77 - 119
2-Butanone	66 - 126

Table 11-6
Quality Control
GC/MS Semivolatiles

Type	Acceptance Limits (%)		Frequency	Corrective Action
	WATERS	SOILS		
Surrogate:			Each sample, MS, MSD, LCS, and blank	Repeat analysis if more then one surrogate out per fraction (acid/base) or any recovery <10%; if reanalysis confirms originals, document on report and/or case narrative
Nitrobenzene-d5	35 - 114	23 - 120		
2-Fluorobiphenyl	43 - 116	30 - 115		
Terphenyl-d14	33 - 141	18 - 137		
Phenol-d6	10 - 94	24 - 113		
2-Fluorophenol	21 - 100	25 - 121		
2,4,6-Tribromophenol	10 - 123	19 - 122		
Matrix Spikes: Spike all compounds of interest	See Table 11-7 for acceptance limits		Each group (≤20) of samples per matrix/level	Run LCS for compounds outside acceptance limits
Laboratory Control Sample: Spike all compounds of interest	Same as for spikes		Each group (≤20) when MS/MSD falls outside established limits	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits
Matrix Spike Duplicates (RPD): Same as for matrix spikes	≤30%		Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	≤LOQ for all compounds		Once per case or group (≤20) of samples, each matrix, level, instrument	Re-extract and reanalyze blank and associated samples
Internal Standards: 1,4-Dichlorobenzene-d4 Naphthalene-d8 Acenaphthene-d10 Phenanthrene-d10 Chrysene-d12 Perylene-d12	-50 to +100 of internal standard area of 12-hour STD RT change ≤30 sec.		Each sample, MS, MSD, LCS, and blank	Reanalyze samples; if reanalysis confirms original, document on report and/or case narrative

Accuracy is subject to change over time.

Table 11-7

**Semivolatile Matrix Spike/
Matrix Spike Duplicate Sample Recovery**

Compound Name	Acceptance Limits (%)
N-Nitrosodimethylamine	35.0 - 100.8
Phenol	5.0 - 112.0
bis (2-Chloroethyl) ether	12.0 - 158.0
2-Chlorophenol	23.0 - 134.0
1,3-Dichlorobenzene	1.0 - 172.0
1,4-Dichlorobenzene	20.0 - 124.0
1,2-Dichlorobenzene	32.0 - 129.0
bis (2-Chloroisopropyl) ether	36.0 - 166.0
N-Nitroso-di-*n*-propylamine	1.0 - 230.0
Hexachloroethane	40.0 - 113.0
Nitrobenzene	35.0 - 180.0
Isophorone	21.0 - 196.0
2-Nitrophenol	29.0 - 182.0
2,4-Dimethylphenol	32.0 - 119.0
bis (2-Chloroethoxy) methane	33.0 - 184.0
2,4-Dichlorophenol	39.0 - 135.0
1,2,4-Trichlorobenzene	44.0 - 142.0
Naphthalane	21.0 - 133.0
Hexachlorobutadiene	24.0 - 116.0
4-Chloro-3-methylphenol	22.0 - 147.0
Hexachlorocyclopentadiene	1.0 - 100.0
2,4,6-Trichlorophenol	37.0 - 144.0
2-Chloronaphthalene	60.0 - 118.0
Dimethylphthalate	1.0 - 112.0
Acenaphthylene	33.0 - 145.0
2,6-Dinitrotoluene	50.0 - 158.0
Acenaphthene	47.0 - 145.0
2,4-Dinitrophenol	1.0 - 191.0
4-Nitrophenol	1.0 - 132.0
2,4-Dinitrotoluene	39.0 - 139.0
Diethylphthalate	1.0 - 114.0
4-Chlorophenyl-phenylether	25.0 - 158.0
Fluorene	59.0 - 121.0
4,6-Dinitro-2-methylphenol	1.0 - 181.0
N-Nitrosodiphenylamine	37.8 - 147.0

Table 11-7

Semivolatile Matrix Spike/
Matrix Spike Duplicate Sample Recovery

Compound Name	Acceptance Limits (%)
1,2-Diphenylhydrazine	25.7 - 124.9
4-Bromophenyl-phenylether	53.0 - 127.0
Hexachlorobenzene	1.0 - 152.0
Pentachlorophenol	14.0 - 176.0
Phenanthrene	54.0 - 120.0
Anthracene	27.0 - 133.0
Di-*n*-butylphthalate	1.0 - 118.0
Fluoranthene	26.0 - 137.0
Benzidine	1.0 -155.0
Pyrene	52.0 - 115.0
Butylbenzylphthalate	1.0 - 152.0
3,3'-Dichlorobenzidine	20.8 - 100.0
Benzo(a)anthracene	33.0 - 143.0
Chrysene	17.0 - 168.0
bis(2-Ethylhexyl)phthalate	8.0 - 158.0
Di-*n*-octylphthalate	4.0 - 146.0
Benzo(b)fluoranthene	24.0 - 159.0
Benzo(k)fluoranthene	11.0 - 163.0
Benzo(a)pyrene	17.0 - 163.0
Indeno(1,2,3-cd)pyrene	1.0 - 171.0
Dibenz(a,h)anthracene	1.0 - 227.0
Benzo(g,h,i)perylene	1.0 - 219.0
Aniline	28.0 - 100.0
Acetophenone	37.7 - 118.3
Ethyl methanesulfonate	37.8 - 123.2
Methyl methanesulfonate	4.7 - 100.0
N-nitrosodiethyalmine	37.4 - 135.0
N-nitrosomethylethylamine	37.3 - 132.9
N-nitrosomorpholine	33.0 - 129.6
N-nitrosopiperidine	36.7 - 128.5
N-nitrosopyrrolidine	36.2 - 129.0
2-picoline	1.0 - 140.0
o-Toluidine	37.3 - 109.1
Benzyl Alcohol	65.9 - 100.0
2-chlorophenol	23.0 - 134.0

Table 11-7

Semivolatile Matrix Spike/ Matrix Spike Duplicate Sample Recovery

Compound Name	Acceptance Limits (%)
2-methylphenol	45.9 - 122.5
3- or 4-methylphenol	53.6 - 175.2
Pyridine	28.1 - 100.0
2,6-dichlorophenol	36.6 - 126.8
1,3-dinitrobenzene	41.3 - 133.1
Hexachloropropene	1.0 - 100.0
Isosafrole	32.5 - 123.7
1,4-naphthoquinone	1.0 - 100.0
N-nitrosodi-*n*-butylamine	35.9 - 131.1
1,4-phenylenediamine	1.0 - 100.0
Safrole	32.3 - 122.1
1,2,4,5-tetrachlorobenzene	35.2 - 119.6
O,O,O-triethylphosphorothioate	34.0 - 122.8
a,a-dimethylphenethylamine	3.9 - 100.0
4-chloroaniline	17.4 - 116.0
2-methylnaphthalene	27.6 - 123.2
2-nitroaniline	53.1 - 142.9
2,4,5-trichlorophenol	39.2 - 151.4
2,3,4,6-tetrachlorophenol	36.7 - 150.5
Dimethoate	1.0 - 105.1
1-naphthylamine	1.0 - 100.0
2-naphthylamine	1.0 - 100.0
5-nitro-*o*-toluidine	40.7 - 107.1
Pentachlorobenzene	37.0 - 122.4
Phenacetin	35.1 - 135.7
Tetraethyl dithiopyrophosphate	25.6 - 125.6
1,3,5-trinitrobenzene	35.4 - 130.6
Diallate (trans/cis)	34.6 - 131.2
Diphenylamine	37.8 - 147.0
Thionazin	34.0 - 132.1
Dibenzofuran	28.4 - 131.4
3-nitroaniline	7.0 - 143.0
4-nitroaniline	38.0 - 122.0
2-acetylaminofluorene	32.4 - 148.6
4-aminobiphenyl	3.8 - 104.2

Table 11-7

**Semivolatile Matrix Spike/
Matrix Spike Duplicate Sample Recovery**

Compound Name	Acceptance Limits (%)
Chlorobenzilate	18.2 - 135.8
p-(dimethylamino) azobenzene	29.0 - 139.3
7,12-dimethylbenz(a) anthracene	18.8 - 127.2
3,3'-dimethylbenzidine	20.8 - 100.0
Isodrin	29.0 - 135.8
3-methylcholanthrene	34.2 - 135.8
4-nitroquinoline-1-oxide	1.0 - 275.2
Pentachloronitrobenzene	50.4 - 127.6
Pronamide	39.3 - 122.7
Methapyrilene	4.8 - 127.2

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Acceptance limits for semivolatile compounds not included in Table 11-5 will be evaluated when enough points can be generated to make a statistical determination.

Table 11-8

Quality Control
Pesticides/PCBs

Type	Acceptance Limits (%)		Frequency	Corrective Action
	WATERS	SOILS		
Surrogate:			Added to each sample, MS/MSD, blank, LCS/LCSD during the extraction phase	At least one surrogate must be in spec unless matrix related problems are evident; if matrix related problems are evident, report results and comment in case narrative
Organochlorine Pesticides;				
DCB	60 - 120	50 - 120		
TCMX	60 - 120	50 - 120		
Herbicides;				
2,4-DB or	60 - 120	50 - 120		
DCAA	60 - 120	50 - 120		
Organophosphate Pesticides;				
2NMX	60 - 120	50 - 120		
Matrix Spikes:			Each extraction group (≤20) of samples per matrix/level	Run LCS for compounds outside acceptance limits
Organochlorine Pesticides; Spike all compounds of interest, except PCBs, chlordane, and toxaphene	See Table 11-9			
Herbicides;				
2,4-D	72 - 151	0 - 165		
2,4,5-TP	64 - 146	38 - 120		
2,4,5-T	55 - 154	23 - 135		
Dinoseb	11 - 124	D - 120		
Organophosphate Pesticides;				
Phorate	72 - 120	55 - 120		
Disulfoton	70 - 120	58 - 121		
Famphur	80 - 120	60 - 128		
Methyl Parathion	62 - 120	48 - 129		
Ethyl Parathion	80 - 120	82 - 120		

Table 11-8

Quality Control
Pesticides/PCBs

Type	Acceptance Limits (%) WATERS	SOILS	Frequency	Corrective Action
Laboratory Control Sample:			Each group (≤20) when MS/MSD fails outside established limits	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits
Organochlorine Pesticides; Spike all compounds of interest, except PCBs, chlordane, and toxaphene	See attached Table 11-9			
Herbicides;				
2,4-D	72 - 151	0 - 165		
2,4,5-TP	64 - 146	38 - 120		
2,4,5-T	55 - 154	23 - 135		
Dinoseb	11 - 124	D - 120		
Organophosphate Pesticides;				
Phorate	72 - 120	55 - 120		
Disulfoton	70 - 120	58 - 121		
Famphur	80 - 120	66 - 128		
Methyl Parathion	62 - 120	48 - 129		
Ethyl Parathion	80 - 120	82 - 120		
Matrix Spike Duplicates (RPD):	Water ≤30%		Each group (20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Organochlorine Pesticides; Spike all compounds of interest, except PCBs, chlordane, and toxaphene	Soils ≤50%			
Herbicides;				
2,4-D				
2,4,5-TP				
2,4,5-T				
Dinoseb				
Organophosphate Pesticides;				
Phorate				
Disulfoton				
Famphur				
Methyl Parathion				
Ethyl Parathion				

Table 11-8

Quality Control
Pesticides/PCBs

Type	Acceptance Limits (%)		Frequency	Corrective Action
	WATERS	SOILS		
Blanks:	≤LOQ for all compounds		Once per case or extraction group (≤20) of samples, each matrix, level, instrument	Inject a hexane or solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be reextracted.

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Table 11-9

Quality Control
Pesticides/PCBs

Organochlorine Pesticides Spike Acceptance Limits

Compound Name	Matrix Spike and Laboratory Control Sample Limits	
	Waters (%)	Soils (%)
Lindane	66 - 120	73 - 120
Heptachlor	54 - 120	69 - 120
Aldrin	42 - 120	67 - 120
DDT	71 - 120	61 - 121
Dieldrin	83 - 120	79 - 130
Endrin	73 - 129	68 - 126
Methoxychlor	57 - 140	57 - 141
Delta-BHC	69 - 126	62 - 120
Heptachlor Epoxide	64 - 120	60 - 120
Endosulfanl	60 - 120	60 - 120
Endrin Aldehyde	59 - 126	57 - 123
Alpha-BHC	67 - 122	45 - 127
Beta-BHC	74 - 120	50 - 137
DDE	60 - 120	72 - 120
DDD	67 - 121	72 - 123
Endosulfan II	67 - 120	62 - 120
Endosulfan Sulfate	53 - 128	66 - 120

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Table 11-10

Quality Control
Volatiles by GC

Type	Acceptance Limits (%) WATERS	SOILS	Frequency	Corrective Action
Surrogates:			Each sample, MS, MSD, and blank	Results would not be reported if the surrogate recovery is outside the limits unless matrix related problems are evident
Halocarbons;				
Bromochloromethane (Hall)	75 - 125	70 - 130		
1-Chloro-3-fluorobenzene (Hall)	75 - 125	70 - 130		
Aromatics;				
n-propylbenzene (PID)	75 - 125	70 - 130		
1,2,3-Trichloropropane (Hall)	75 - 125	70 - 130		
Halocarbons/Aromatics;				
Bromochloromethane (Hall)	75 - 125	70 - 130		
1-Chloro-3-fluorobenzene (Hall)	75 - 125	70 - 130		
1-Chloro-3-fluorobenzene (PID)	75 - 125	70 - 130		
Non-halogenated;				
2-hexanone (FID)	75 - 125	70 - 130		
Matrix Spikes: Spike all compounds of interest except: Dichlorodifluoromethane *trans*-1,2- Dichloroethene *trans*-1,3- Dichloropropene 1,1,2-Trichloroethane *cis*-1,3-Dichloropropene 2-Chloroethylvinylether 1,1,2,2- Tetrachloroethane	See Table 11-7 for acceptance limits		Each group of samples of similar matrix/level (≤20) each method	See Table 11-11
Laboratory Control Sample/Check Standard: Spike all compounds of interest except: Dichlorodifluoromethane *trans*-1,2-Dichloroethene *trans*-1,3-Dichloropropene 1,1,2-Trichloroethane *cis*-1,3-Dichloropropene 1,1,2,2-Tetrachloroethane	See Table 11-7 for acceptance limits		Each group (≤20) when MS/MSD falls outside established limits	See Table 11-10B

Table 11-10

Quality Control
Volatiles by GC

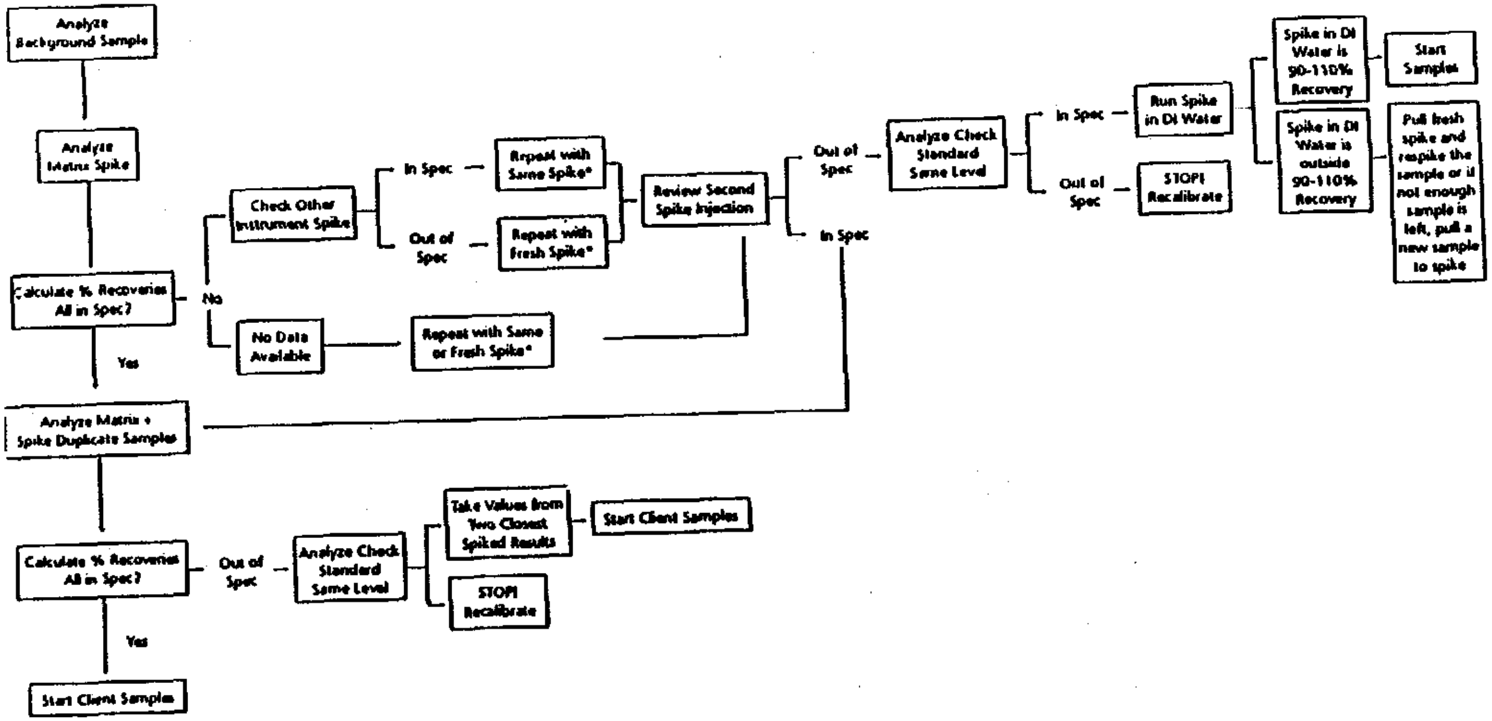
Type	Acceptance Limits (%)		Frequency	Corrective Action
	WATERS	SOILS		
Matrix Spike Duplicate (RPD): Same compounds as matrix spikes	See Table 11-9 for acceptance limits		Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	≤LOQ for all compounds		Every 8 to 10 hours	Reanalyze blank and associated samples if blank is outside limits

Accuracy is subject to change over time.

Table 11-10A
Volatiles by GC

Lancaster Laboratories

Batch QC Protocol Flowchart



For data package groups with the background, spike, and spike dup. as independent LLI numbers, the 2nd injection of the spiked sample (*) should be from the matrix spike dup. vial. If the result of the 2 spikes match but are both out of spec. (values), run a check std. and a spike in deionized water. If the check std. is in spec., samples can be started. If the check std. is out of spec., STOP! and recalibrate. The spike in deionized water purpose is to help us evaluate the bkg./sp./sp. dup. results. Being in spec. is not required to continue with samples. The critical determinate is the check std., this must be in spec. for all compounds being reported before continuing with samples. When one spike result is in spec. and the other out of spec., run a 3rd injection of a spiked sample using either the spike or spike dup. vial. This will be decided through analyst experience. Then follow protocol (+) from the point of the spike dup. injection.

2397 6/17/92

Table 11-10B
Volatiles by GC

Check Std. Analysis Protocol Flowchart

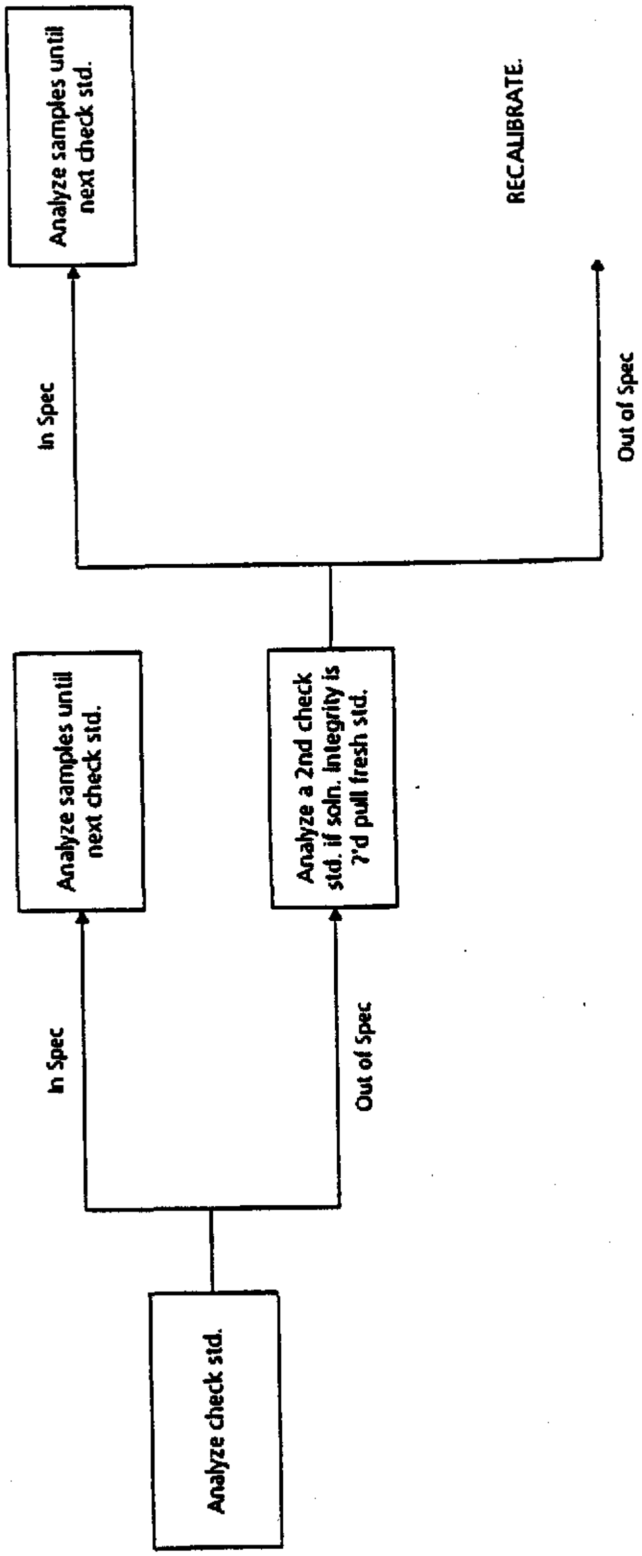


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Table 11-11
Quality Control
Volatiles by GC
Spike Acceptance Limits

Compound Name	MS% Waters	MS% Soils	Max. % RPD Waters	Max. % RPD Soils	LCS%
Chloromethane	25 - 168	65 - 135	20	25	59.5 - 140.5
Bromomethane	46 - 136	65 - 135	20	25	58.5 - 141.5
Vinyl Chloride	48 - 163	65 - 135	20	25	68.5 - 131.5
Chloroethane	46 - 137	65 - 135	20	25	77.0 - 123.0
Methyl Chloride	78 - 128	70 - 130	20	25	77.5 - 122.5
Trichlorofluoromethane	75 - 143	70 - 130	20	25	66.5 - 133.5
1,1-Dichloroethene	74 - 137	70 - 130	15	20	63.0 - 137.0
1,1-Dichloroethane	91 - 130	70 - 130	15	20	84.0 - 116.0
1,2-Dichloroethene (cis/trans)	92 - 126	70 - 130	15	20	64.0 - 136.0
Chloroform	91 - 127	70 - 130	15	20	75.0 - 125.0
1,2-Dichloroethane	80 - 130	70 - 130	15	20	71.5 - 128.5
1,1,1-Trichloroethane	87 - 138	70 - 130	15	20	71.0 - 129.0
Carbon Tetrachloride	91 - 134	70 - 130	15	20	68.5 - 131.5
Bromodichloromethane	87 - 123	70 - 130	15	20	76.0 - 124.0
1,2-Dichloropropane	87 - 128	70 - 130	15	20	74.0 - 126.0
Trichloroethene	91 - 131	70 - 130	15	20	77.0 - 123.0
Dibromochloromethane	88 - 131	70 - 130	15	20	65.5 - 134.5
Bromoform	74 - 119	70 - 130	15	20	73.5 - 126.5
Tetrachloroethene	91 - 129	70 - 130	15	20	70.0 - 130.0
Chlorobenzene	90 - 125	70 - 130	15	20	72.0 - 128.0
Benzene (Hall)	93 - 124	70 - 130	15	20	77.0 - 123.0
Toluene (Hall)	92 - 120	70 - 130	15	20	77.5 - 122.5
Ethylbenzene (Hall)	94 - 119	70 - 130	15	20	63.0 - 137.0
o-Dichlorobenzene	84 - 114	70 - 130	15	20	68.0 - 132.0
m-Dichlorobenzene	85 - 116	70 - 130	15	20	72.5 - 127.5
p-Dichlorobenzene	82 - 113	70 - 130	15	20	69.5 - 130.5
o-Xylene	88 - 116	70 - 130	15	20	80.0 - 120.0
m-Xylene	87 - 117	70 - 130	15	20	80.0 - 120.0
p-Xylene	88 - 116	70 - 130	15	20	80.0 - 120.0
Benzene (PID)	86 - 118	70 - 130	15	20	77.0 - 123.0
Toluene (PID)	85 - 115	70 - 130	15	20	77.5 - 122.5
Ethylbenzene (PID)	88 - 116	70 - 130	15	20	63.0 - 137.0

Acceptance limits are based on statistical evaluation of compiled laboratory data and/or the referenced method and subject to change.

Table 11-12

Quality Control
PAHs by HPLC (8310)

Type	Acceptance Limits (%) WATERS	SOILS	Frequency	Corrective Action
Surrogate: Nitrobenzene	60 - 120	50 - 120	Added to each sample, MS/MSD, blank, LCS/LCSD during the extraction phase	Surrogate must be in spec unless matrix related problems are evident. If matrix related problems are evident, report results and comment in case narrative.
Matrix Spike: Spike all compounds of interest	See Table 11-13		Each group (≤20) of samples per matrix/level	Run LCS for compounds outside acceptance limits
Laboratory Control Sample: Spike all compounds of interest	See Table 11-13		Each group (≤20) when MS/MSD falls outside established limits	Re-extract and reanalyze LCS and associated samples for compounds outside acceptance limits
Matrix Spike Duplicates (RPD): Spike all compounds of interest	≤30%	≤50%	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Blanks:	≤LOQ for all compounds		Once per case or extraction group (≤20) of samples, each matrix, level, instrument	Inject a hexane or solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected, if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be re-extracted.

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Table 11-13

Quality Control

PAHs by HPLC Spike Acceptance Limits

Compound Name	Matrix Spike and Laboratory Control Sample Limits	
	Waters (%)	Soils (%)
Naphthalene	64 - 120	62 - 120
Acenapthylene	70 - 120	68 - 120
Acenapthene	67 - 120	69 - 120
Fluorene	71 - 120	71 - 120
Phenanthrene	75 - 120	77 - 120
Anthracene	65 - 120	64 - 120
Fluoranthene	73 - 120	71 - 124
Pyrene	69 - 120	68 - 120
Benzo(a)anthracene	74 - 120	70 - 120
Chrysene	75 - 120	67 - 121
Benzo(b)fluoranthene	76 - 120	67 - 123
Benzo(k)fluoranthene	76 - 120	66 - 122
Benzo(a)pyrene	75 - 120	62 - 120
Dibenzo(a,h)anthracene	75 - 120	64 - 123
Benzo(g,h,i)perylene	71 - 120	54 - 122
Indeno(1,2,3-CD)pyrene	77 - 120	62 - 123

Acceptance limits are based on statistical evaluation of compiled laboratory data and are subject to change.

Table 11-14

Quality Control
TPH-DRO

Type	Acceptance Limits(%) WATERS	SOILS	Frequency	Corrective Action
Surrogate:			Added to each sample, MS/MSD, blank, LCS/LCSD during the extraction phase	At least one surrogate must be in spec unless matrix related problems are evident. If matrix related problems are evident, report results and comment in case narrative.
Chlorobenzene	50 - 150	50 - 150		
o-Terphenyl	50 - 150	50 - 150		
Matrix Spike:			Each group (≤20) of samples per matrix/level	Reinject if surrogates appear low. If still out of spec, evaluate for matrix effect. If matrix effect, accept based on LCS data. If no matrix effect, repeat batch.
No. 2 Fuel:				
API	60 - 120	60 - 120		
California				
Laboratory Control Sample:			Each group ≤20	Reinject if surrogates appear low. If still out of spec, repeat batch.
No. 2 Fuel	60 - 120	60 - 120		
Laboratory Control Duplicates (RPD):			Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
No. 2 Fuel	≤20% for waters and soils			
Blanks:	≤LOQ for analyte		Once per case or extraction group (≤20) of samples, each matrix, level, instrument	Inject a solvent blank first to be sure the analytical system is clean then reinject the blank itself. If the reinjected blank is acceptable, any samples extracted with this blank should be reinjected, if they, too, contain the analyte which was contaminating the blank. If the reinjected blank is unacceptable, any affected samples must be re-extracted.

Table 11-15

Quality Control
TPH-GRO

Type	Acceptance Limits(%) WATERS	SOILS	Frequency	Corrective Action
Surrogate:			Each sample, MS/MSD, and blank	Results would not be reported if the surrogate recovery is outside the limits unless matrix related problems are evident
n-propylbenzene (FID)	75 - 125	70 - 130		
trifluorotoluene (FID)	75 - 125	70 - 130		
Matrix Spike:			Each group of samples of similar matrix/level (≤20) each method	See Table 11-15A
Gasoline:				
API	50 - 100	50 - 100		
California	75 - 125	70 - 130		
Laboratory Control Sample/Check Standard:			Each group (≤20) when MS/MSD falls outside established limits	See Table 11-15B
2-methylpentane	85 - 115	85 - 115		
benzene/iso-octane	85 - 115	85 - 115		
n-heptane	85 - 115	85 - 115		
toluene	85 - 115	85 - 115		
ethylbenzene	85 - 115	85 - 115		
p/*m*-xylene	85 - 115	85 - 115		
o-xylene	85 - 115	85 - 115		
1,2,4-trimethylbenzene	85 - 115	85 - 115		
Matrix Spike Duplicate (RPD):	Maximum RPD 20%	Maximum RPD 25%	Each group (≤20) of samples per matrix/level	Evaluated by analyst in relationship to other QC results
Same compounds as matrix spikes				
Blanks:	≤LOQ for analytes		Every 8 to 10 hours	Reanalyze blank and associated samples if blank is outside limits

Table 11-15A
Volatiles by GC and TPH-GRO

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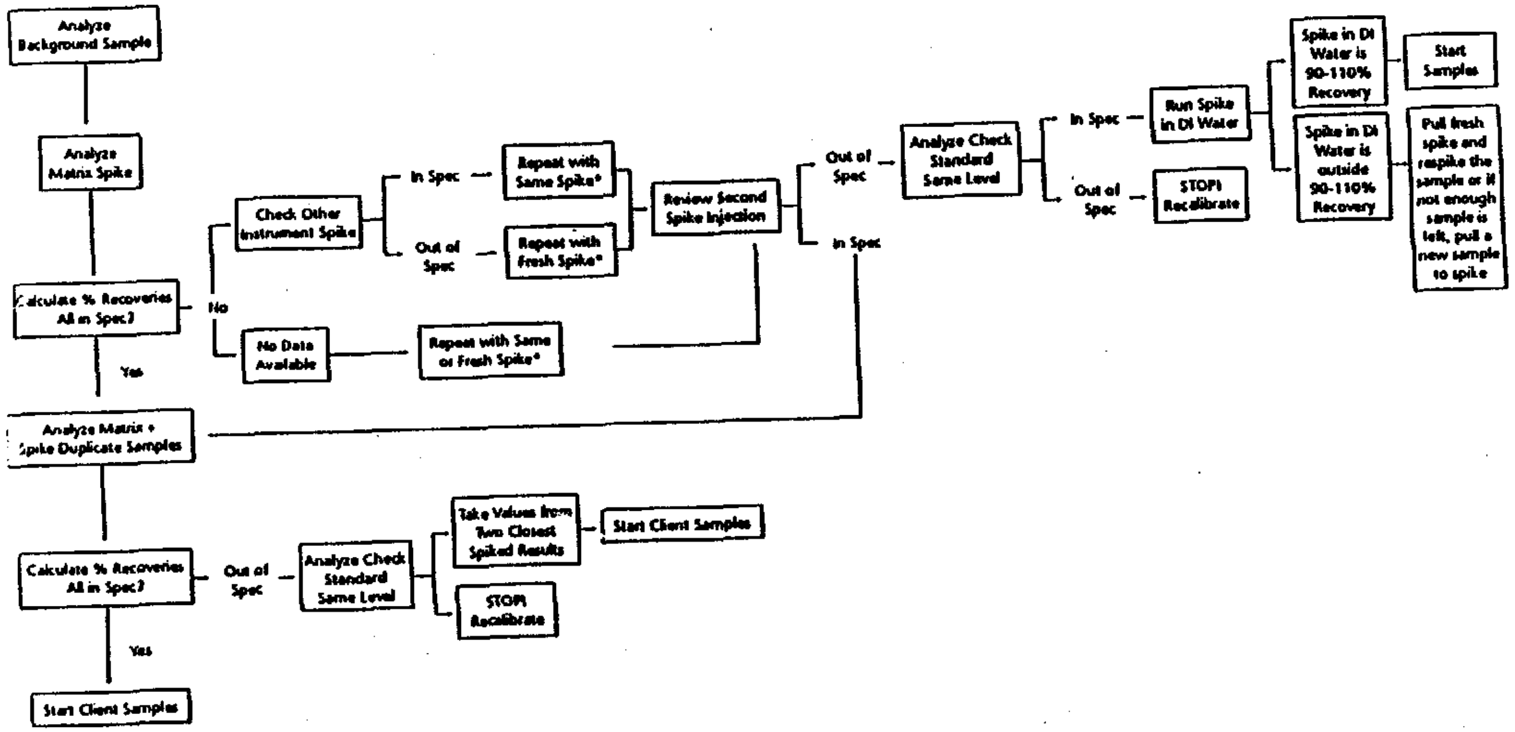
Batch QC Protocol Flowchart



For data package groups with the background, spike, and spike dup. as independent LLI numbers, the 2nd injection of the spiked sample (*) should be from the matrix spike dup. vial. If the result of the 2 spikes match but are both out of spec. (values), run a check std. and a spike in deionized water. If the check std. is in spec., samples can be started. If the check std. is out of spec., STOP! and recalibrate. The spike in deionized water purpose is to help us evaluate the bkg./sp./sp. dup. results. Being in spec. is not required to continue with samples. The critical determinate is the check std., this must be in spec. for all compounds being reported before continuing with samples. When one spike result is in spec. and the other out of spec., run a 3rd injection of a spiked sample using either the spike or spike dup. vial. This will be decided through analyst experience. Then follow protocol (+) from the point of the spike dup. injection.

Table 11-15B
TPH-GRO

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601-5994

Check Std. Analysis Protocol Flowchart

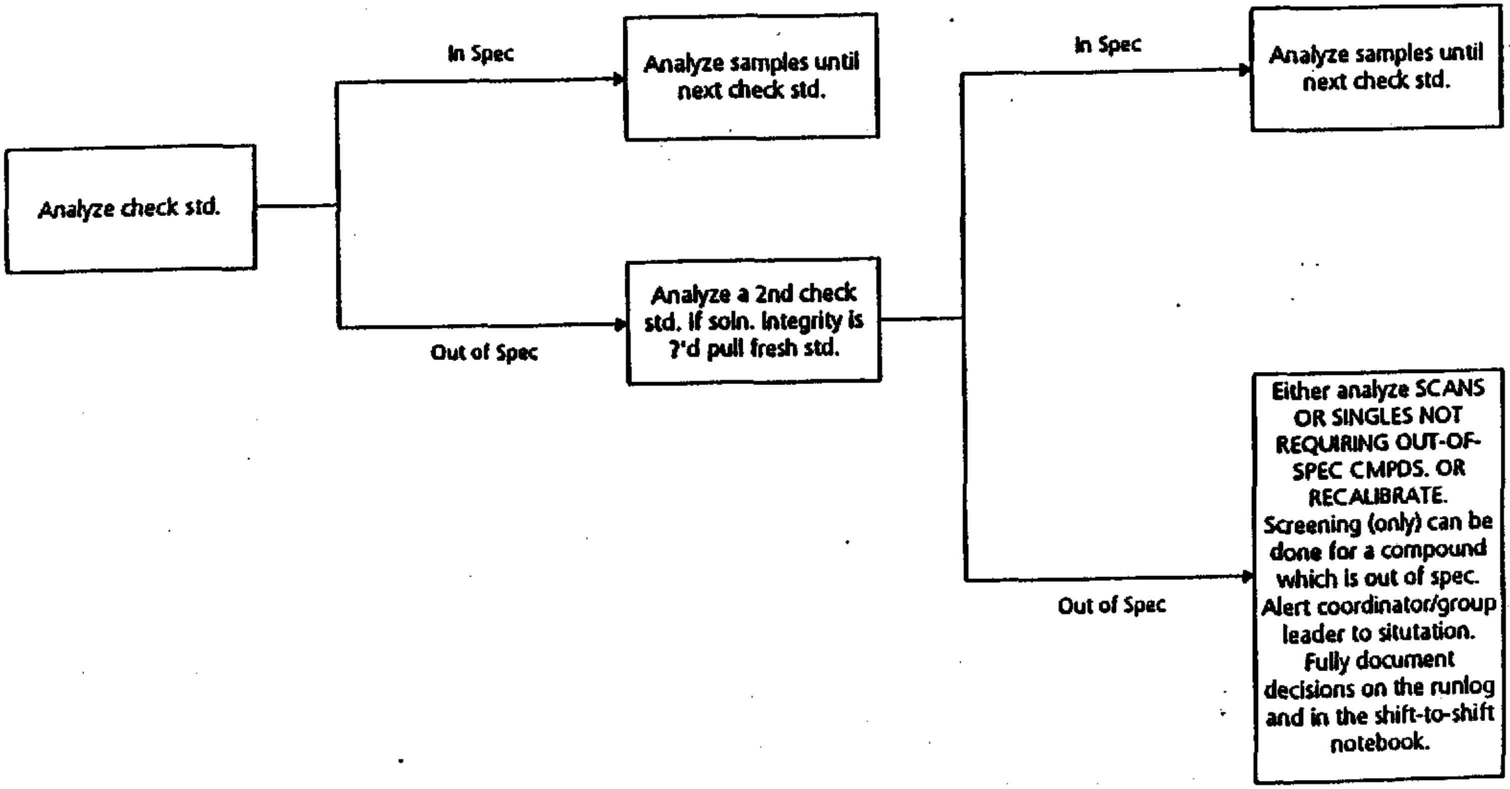


Table 11-16

Quality Control
Inorganics

Type	Acceptance Limits (%) WATERS	SOILS	Frequency	Corrective Action
Matrix Spikes:	80% to 120% except where sample conc. exceeds spike conc. by ≥4x		Each group of samples of similar matrix/level (≤20) each method	Analyze post-digestion spike sample
Matrix Spike Duplicate (RPD):	Same as above ±20% RPD		Each group of samples of similar matrix/level (20) each method	Analyze post-digestion spike sample if not already run for MS, flag the data
Duplicates (RPD):	±20% RPD for sample values ≥5x LOQ		Each group of samples of similar matrix/level (≤20) each method	Flag the data
Blanks:			Each wavelength immediately after calibration verification at 10% frequency or every 2 hours (beginning and end of run min.)	Correct problem, recalibrate, and rerun
Initial Calibration (ICB) Continuing Calibration (CCB)	≤LOQ			
Preparation Blank	≤LOQ >LOQ then lowest conc. in sample must be 20x blk. conc.		Each SDG or batch (≤20 samples) Exception: As/Se by Hydride Generation ≤10 samples	Redigest and reanalyze blank and associated samples if sample result <20x blank result
Serial Dilutions (ICP & GFAA only):	Within ±10% of the original determination		Each group of (≤20) of similar matrix/level	Flag the data
Interference Check Sample (ICP only):	±20% of the true value for the analytes		Each wavelength after Initial Calibration Verification at beginning and end of the run or min. of 2x per 8 hour	Recalibrate the instrument

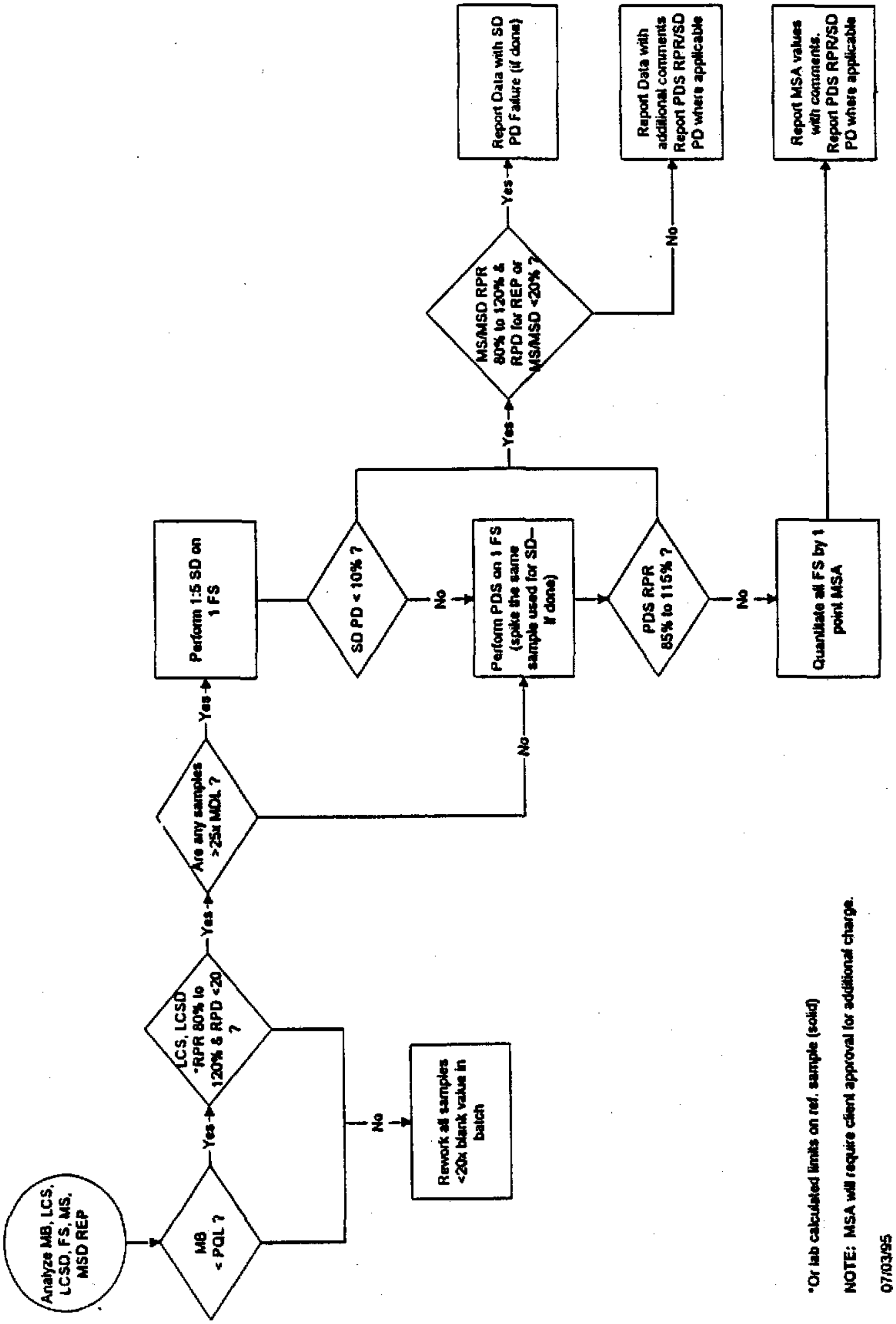
Table 11-16

Quality Control
Inorganics

Type	Acceptance Limits (%)		Frequency	Corrective Action
	WATERS	SOILS		
Laboratory Control Sample:	Aqueous 80% to 120% (except Ag and Sb) Solids commercial certified standard advisory range See Table 11-17		Each SDG or batch (≤20 samples), each method	Redigest and reanalyze LCS and associated samples
Post Digestion Spike:	85% to 115%		When matrix spikes are outside 80% to 120% range (not performed on Hg or GFAA analyses)	Flag the data
Analytical Spike:	85% to 115%		One per 20 field samples	See Table 11-16A

Table 11-16A

SW846 Method 7000A GFAA Batch QC Decision Tree



*Or lab calculated limits on ref. sample (solid)

NOTE: MSA will require client approval for additional charge.

07/03/95

Table 11-17

ENVIRONMENTAL
RESOURCE ASSOCIATES
ARVADA, COLORADO 1-800-372-0122

Certification

PriorityPollutnT™/CLP Inorganic Soils Quality Control Standards

Catalog Nº PPS-46 Lot Nº 229

Parameter	Certified Value	Performance Acceptance Limits™
TRACE METALS PriorityPollutnT™ (Catalog No 640)	**mg/Kg**	**mg/Kg**
aluminum	4590	2280 - 7590
antimony	39.8	8.37 - 119
arsenic	75.4	37.1 - 112
barium	106	74.3 - 139
beryllium	51.0	11.7 - 90.3
boron	94.1	26.9 - 161
cadmium	45.4	11.9 - 79.0
calcium	1290	875 - 1750
chromium	71.0	38.0 - 100
cobalt	49.6	29.6 - 70.5
copper	112	63.9 - 162
iron	9160	5560 - 13000
lead	53.5	28.1 - 75.9
magnesium	1160	691 - 1670
manganese	154	107 - 208
mercury	1.50	0.389 - 2.35
molybdenum	47.4	29.2 - 70.2
nickel	39.4	21.5 - 57.5
potassium	1420	880 - 1870
selenium	72.3	37.8 - 108
silver	116	58.2 - 170
sodium	198	111 - 287
strontium	109	46.3 - 173
thallium	40.0	20.0 - 60.0
tin	102	35.9 - 168
titanium	230	60.0 - 400
vanadium	65.9	32.0 - 88.9
zinc	134	72.2 - 199
CYANIDE PriorityPollutnT™ (Catalog No 541)	**mg/Kg**	**mg/Kg**
total cyanide	323	123 - 559

The *Trace Metals Certified Values* are equal to the mean recoveries for each parameter as determined in an interlaboratory round robin study. The standard was digested using Method 3050, SW-846 and the digest analyzed by ICP and atomic absorption spectroscopy.

The *Cyanide Certified Value* is equal to the mean recovery as determined in an interlaboratory round robin study. The standard was distilled and analyzed following the procedure outlined in Method 9010, SW-846.

The *Performance Acceptance Limits (PALs™)* are listed as guidelines for acceptable analytical results given the limitations of the USEPA methodologies commonly used to determine these parameters and closely approximate the 95% confidence interval. The PALs™ are based on data generated by your peer laboratories in ERA's InterLaB™ program using the same samples you are analyzing and data from USEPA methods, WP, WS and CLP interlaboratory studies. If your result falls outside of the PALs™, ERA recommends that you investigate potential sources of error in your preparation and/or analytical procedures. For further technical assistance, call ERA at 1-800-372-0122.

For users of internal standards, ERA has determined that scandium is present in this soil at 1.66 mg/Kg and that yttrium is present at 9.43 mg/Kg.

*Each lot of standards will have different certified values and the advisory range will be adjusted accordingly.

Table 11-18

Quality Control Acceptance Criteria

Parameter	Blank	Spike Recovery (%)	Duplicate RPD (%)	Lab Control Recovery
Phenols	<LOQ	75 - 125	≤20	80 - 120%
Total Petroleum Hydrocarbons	<LOQ	20.4 - 150.0	≤64.18	9.3 - 12.7 mg/L
TOC	<LOQ	75 - 125	≤20	80 - 120%
TOX	<LOQ	75 - 125	≤20	80 - 120%
Sulfide	<LOQ	88.2 - 99.2	≤20	80 - 120%

Corrective Action: If either the LCS or Blank are outside the criteria, the QC and associated samples will be reprepped and reanalyzed.

Maximum batch size is 20 field samples.

Acceptance limits are based on statistical evaluation of compiled laboratory data and/or the referenced method and subject to change.

12. Performance and System Audits

System audits are conducted on each department at Lancaster Laboratories by members of the Quality Assurance Department. The audits include checks on methodology, reagent preparation, equipment calibration and maintenance, quality control results, and training of personnel. The results of the audits and corrective action, where necessary, are communicated to laboratory personnel and management by means of a written report. Audits by outside organizations including clients, regulatory personnel, and the USEPA are permitted by arrangement with the Quality Assurance Department.

The Quality Assurance Department reviews summaries of the quality control data entered onto the computerized sample management system by analysts. Control charts and statistics are reviewed for trends which may indicate problems with the analytical data. In this way, small problems are identified before they have any significant impact on laboratory results.

Performance audits consist of both intralaboratory and interlaboratory check samples. QC samples from commercial suppliers are analyzed quarterly to assess laboratory accuracy including a double blind program. The Laboratory also participates in a number of interlaboratory performance evaluation studies which involve analysis of samples with concentrations of analytes that are known to the sponsoring organization, but unknown to the laboratory. Inorganics, pesticide/herbicides, trihalomethanes, volatile organic compounds, semivolatile organic compounds, and traditional wet chemistry analyses are analyzed by Lancaster Labs for studies conducted by the USEPA and the New York Department of Health. Lancaster Labs has participated in the USEPA Contract Laboratory Program which provides laboratory analysis in support of the Superfund program. Part of maintaining this contract includes analysis of quarterly blind samples. Representative results from some of these studies are attached to this section.

LANCASTER LABORATORIES
Account # 7176562301 ID # LANC
LANCASTER PA OCL

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: UT

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
TRACE METALS IN MICROGRAMS PER LITER:					
001-ARSENIC	001	049.0	49.3	41.9- 56.3	Accept.
002-BARIUM	002	0771.	773	657- 889	Accept.
003-CADMIUM	001	010.2	10.2	8.16- 12.2	Accept.
004-CHROMIUM	001	071.5	72.9	62- 83.8	Accept.
005-LEAD	001	013.2	13.8	9.66- 17.9	Accept.
006-MERCURY	001	07.70	8.16	5.71- 10.6	Accept.
007-SELENIUM	001	051.3	57.9	46.3- 69.5	Accept.
091-COPPER	001	054.0	55.7	50.1- 61.3	Accept.
140-ANTIMONY	002	021.4	18.0	12.6- 23.4	Accept.
141-BERYLLIUM	001	03.27	4.26	3.62- 4.9	Not Accept.
142-NICKEL	001	055.9	55.0	46.8- 63.3	Accept.
143-THALLIUM	002	02.40	2.38	1.67- 3.09	Accept.
226-BORON	002	0953.	929	876- 1030	Accept.
236-MANGANESE	001	047.8	48.1	43- 51.4	Accept.
237-MOLYBDENUM	002	053.1	54.0	42.6- 65.4	Accept.
239-ZINC	001	0588.	600	536- 652	Accept.
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
009-NITRATE AS N	001	08.45	8.30	7.47- 9.13	Accept.
092-NITRITE AS N	001	0.493	0.502	0.427-0.577	Accept.
261-ORTHOPHOSPHATE AS P	001	01.11	1.10	0.957- 1.21	Accept.
INSECTICIDES IN MICROGRAMS PER LITER:					
011-ENDRIN	001	0.301	0.231	0.162- 0.3	Not Accept.

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: UT

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
012-LINDANE	001	0.353	0.381	0.21-0.552	Accept.
013-METHOXYCHLOR	001	015.5	18.5	10.2- 26.8	Accept.
014-TOXAPHENE	002	07.04	8.81	4.85- 12.8	Accept.
093-ALACHLOR	005	05.36	4.87	2.68- 7.06	Accept.
094-ATRAZINE	005	07.30	6.80	3.74- 9.86	Accept.
095-HEPTACHLOR	004	0.367	0.563	0.31-0.816	Accept.
096-HEPTACHLOR EPOXIDE	004	0.406	0.403	0.222-0.584	Accept.
097-CHLORDANE (TOTAL)	003	02.39	4.44	2.44- 6.44	Not Accept.
113-SIMAZINE	005	06.30	5.56	1.04- 9.77	Accept.
172-HEXACHLOROBENZENE	004	0.618	0.806	0.323- 1.14	Accept.
241-METOLACHLOR	006	021.7	19.4	7.87- 29.5	Accept.
242-METRIBUZIN	006	014.9	14.1	D.L. - 22.4	Accept.
243-PROMETON	006	023.0	18.8	6.48- 28.3	Accept.
256-ALDRIN	004	0.433	0.567	0.186-0.725	Accept.
257-BUTACHLOR	006	022.3	20.5	5.93- 31.3	Accept.
258-DIELDRIN	004	0.554	0.530	0.358-0.708	Accept.
259-PROPACHLOR	004	01.16	1.20	0.566- 1.86	Accept.

CARBAMATES IN MICROGRAMS PER LITER:

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
098-ALDICARB	001	036.4	34.3	24.3- 44.4	Accept.
099-ALDICARB SULFONE	001	034.1	32.[illegible]	20.7- 40.1	Accept.
100-ALDICARB SULFOXIDE	001	027.6	25.9	20.3- 33	Accept.
101-CARBOFURAN	001	042.4	48.9	26.9- 70.9	Accept.
114-OXAMYL (VYDATE)	001	044.0	46.4	36.3- 54.9	Accept.

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: CT

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
245-METHOMYL	001	060.0	60.7	49.4- 68.4	Accept.
HERBICIDES IN MICROGRAMS PER LITER:					
015-2,4-D	001	013.0	14.9	7.45- 22.4	Accept.
016-2,4,5-TP (SILVEX)	001	09.53	11.8	5.9- 17.7	Accept.
102-PENTACHLOROPHENOL	001	05.07	6.59	3.3- 9.89	Accept.
115-DALAPON	002	047.1	56.4	D.L. - 94.8	Accept.
116-DINOSEB	002	014.2	18.6	0.652- 29.6	Accept.
117-PICLORAM	002	017.9	23.3	D.L. - 34.8	Accept.
247-DICAMBA	002	031.5	38.4	2.98- 58.7	Accept.
POLYCHLORINATED BIPHENYLS IN MICROGRAMS PER LITER:					
118-DECACHLOROBIPHENYL	001	0.305	0.527	D.L. - 1.05	Accept.
PAH'S IN MICROGRAMS PER LITER:					
122-BENZO(A)PYRENE	001	0.754	0.937	0.115- 1.31	Accept.
ADIPATE/PHTHALATES IN MICROGRAMS PER LITER:					
134-DI (2-ETHYLHEXYL)ADIPATE	001	026.7	34.3	11.4- 52.3	Accept.
136-DI (2-ETHYLHEXYL)PHTHAL.	001	016.6	21.3	6.98- 34.5	Accept.
MISCELLANEOUS SOC'S IN MICROGRAMS PER LITER:					
137-DIQUAT	001	003.43	8.41	2.05- 22.4	Accept.
138-ENDOTHALL	001	098.6	179	12- 312	Accept.
139-GLYPHOSATE	001	0729.	780	630- 903	Accept.
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
017-CHLOROFORM	001	024.1	22.3	17.8- 26.8	Accept.
018-BROMOFORM	001	018.9	18.6	14.9- 22.3	Accept.

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: NT

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
019-BROMODICHLOROMETHANE	001	012.2	12.7	10.2- 15.2	Accept.
020-CHLORODIBROMOMETHANE	001	015.3	14.2	11.4- 17	Accept.
021-TOTAL TRIHALOMETHANE	001	070.5	67.8	54.2- 81.4	Accept.
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
032-VINYL CHLORIDE	001	015.5	14.8	8.88- 20.7	Accept.
034-1,1-DICHLOROETHYLENE	001	018.3	16.5	13.2- 19.8	Accept.
035-1,2-DICHLOROETHANE	001	015.9	13.2	10.6- 15.8	Not Accept.
036-1,1,1-TRICHLOROETHANE	001	011.9	10.3	8.24- 12.4	Accept.
037-CARBON TETRACHLORIDE	001	014.5	12.7	10.2- 15.2	Accept.
038-TRICHLOROETHYLENE	001	08.20	8.70	5.22- 12.2	Accept.
039-BENZENE	001	013.0	12.5	10- 15	Accept.
040-TETRACHLOROETHYLENE	002	010.1	9.60	5.76- 13.4	Accept.
041-1,4-DICHLOROBENZENE	001	06.65	7.31	4.39- 10.2	Accept.
042-T 1,2 DICHLOROETHYLENE	002	015.0	14.8	11.8- 17.8	Accept.
043-C 1,2 DICHLOROETHYLENE	002	011.4	9.72	5.83- 13.6	Accept.
044-1,2 DICHLOROPROPANE	002	015.4	14.2	11.4- 17	Accept.
045-1,2DIBROMO3CHLOROPROPANE	004	0.274	0.286	0.172- 0.4	Accept.
046-ETHYLENE DIBROMIDE (EDB)	004	0.151	0.138	0.0828-0.193	Accept.
047-TOLUENE	002	05.74	5.70	3.42- 7.98	Accept.
048-ETHYLBENZENE	002	09.40	9.19	5.51- 12.9	Accept.
049-CHLOROBENZENE	002	08.42	8.31	4.99- 11.6	Accept.
053-STYRENE	002	07.60	7.40	4.44- 10.4	Accept.
054-1,2 DICHLOROBENZENE	002	014.3	14.5	11.6- 17.4	Accept.

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: 07

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
055-DICHLOROMETHANE	001	09.48	8.41	5.05- 11.8	Accept.
056-1,1-DICHLOROETHANE	003	014.8	13.6	11.2- 16.4	Accept.
061-1,1,2-TRICHLOROETHANE	001	011.8	10.7	8.56- 12.8	Accept.
063-1,1,1,2TETRACHLOROETHANE	003	017.0	15.3	12.8- 18	Accept.
064-1,2,3-TRICHLOROPROPANE	003	08.32	8.29	5.53- 11	Accept.
076-1,2,4-TRICHLOROBENZENE	002	014.7	14.3	11.4- 17.2	Accept.
077-1,2,3-TRICHLOROBENZENE	003	015.7	16.7	10.6- 21.2	Accept.
081-HEXACHLOROBUTADIENE	003	011.1	9.50	4.19- 14.4	Accept.
090-TOTAL XYLENES	002	015.3	12.9	10.3- 15.5	Accept.
152-C 1,3 DICHLOROPROPENE	003	010.9	12.3	8.22- 14.3	Accept.
153-T 1,3 DICHLOROPROPENE	003	016.4	17.5	11- 20.5	Accept.
ORGANIC DISINFECTION BY-PRODUCTS IN MICROGRAMS PER LITER:					
157-DIBROMOACETIC ACID	001	0.918	8.50	D.L. - 13.8	Accept.
158-DICHLOROACETIC ACID	001	02.82	22.7	6.83- 30.3	Not Accept.
160-MONOBROMOACETIC ACID	001	02.74	14.4	1.26- 21.4	Accept.
161-MONOCHLOROACETIC ACID	001	01.80	12.8	3.43- 21	Not Accept.
162-TRICHLOROACETIC ACID	001	03.77	32.3	5.47- 47.9	Not Accept.
250-BROMOCHLOROACETIC ACID	001	02.36	19.8	3.19- 30.8	Not Accept.
INORGANIC DISINFECTION BY-PRODUCTS IN MICROGRAMS PER LITER:					
193-BROMATE	002	05.68	4.56	D.L. - 29	Accept.
194-CHLORATE	001	092.1	82.1	62.1- 100	Accept.
195-CHLORITE	001	0165.	140	86.6- 213	Accept.
260-BROMIDE	002	0157.	140	113- 169	Accept.

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Performance Evaluation Report
USEPA Water Supply Study WS037

Participant ID: PA00009 Type: OTHER Requesting Office: UT

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
MISCELLANEOUS ANALYTES:					
022-RESIDUAL FREE CHLORINE(MILLIGRAMS PER LITER)	001	02.64	2.20	2.03- 3.07	Accept.
023-TURBIDITY(NTU'S)	001	01.40	1.54	1.26- 1.98	Accept.
024-TOTAL FILTERABLE RESIDUE(MILLIGRAMS PER LITER)	001	0254.	264	188- 434	Accept.
025-CALCIUM HARDNESS(MG. CACO3/L)	001	0147.	144	137- 158	Accept.
026-PH-UNITS	001	08.94	9.13	8.88- 9.31	Accept.
027-ALKALINITY(MG. CACO3/L)	001	028.6	27.4	25.7- 31.5	Accept.
029-SODIUM(MILLIGRAMS PER LITER)	001	012.9	12.6	11.4- 13.7	Accept.
145-SULFATE(MILLIGRAMS PER LITER)	001	0263.	280	253- 316	Accept.
146-TOTAL CYANIDE(MILLIGRAMS PER LITER)	001	0.337	0.380	0.285-0.475	Accept.
263-TOC	001	03.46	2.80	2.49- 3.24	Not Accept.

********** END OF DATA FOR PA00009 **********
NOTE: FOR LIMITS AND TRUE VALUES, ASSUME THREE SIGNIFICANT DIGITS.
********** END OF REPORT FOR PA00009 **********

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* Based on gravimetric calculations, or a reference value when necessary.

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Participant ID: PA00009 — Type: OTHER — Requesting Office: NJ

TRACE METALS IN MICROGRAMS/LITER

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
001-ALUMINUM					
01	330	321	261- 382	276- 367	Accept.
02	1370	1500	1270- 1700	1330- 1640	Accept.
002-ARSENIC					
01	192	193	167- 231	175- 223	Accept.
02	569	571	492- 676	515- 653	Accept.
003-BERYLLIUM					
01	170	190	165- 209	170- 204	Accept.
02	526	541	480- 597	495- 583	Accept.
004-CADMIUM					
01	50.4	52.6	44.5- 60.7	46.5- 58.7	Accept.
02	388	401	345- 450	359- 440	Accept.
005-COBALT					
01	27.7	29.1	22.9- 32.6	24.1- 31.4	Accept.
02	603	624	557- 686	574- 670	Accept.
006-CHROMIUM					
01	15.9	17.0	13- 20.5	13.9- 19.5	Accept.
02	850	880	767- 985	794- 958	Accept.
007-COPPER					
01	83.2	86.7	75.5- 96.9	78.2- 94.2	Accept.
02	354	370	334- 409	344- 399	Accept.
008-IRON					
01	41.0	30.4	18.8- 42.6	21.8- 39.6	Ck. for Err.
02	457	464	441- 519	451- 509	Accept.
009-MERCURY					
01	3.36	3.10	2.03- 4.07	2.29- 3.81	Accept.
02	12.9	11.6	8.65- 14.7	9.41- 13.9	Accept.
010-MANGANESE					
01	385	401	369- 441	378- 432	Accept.
02	865	891	833- 960	850- 951	Accept.
011-NICKEL					
01	481	496	453- 560	466- 547	Accept.
02	601	611	557- 690	574- 680	Accept.
012-LEAD					
01	282	297	259- 334	269- 325	Accept.
02	385	399	356- 446	367- 435	Accept.
013-SELENIUM					
01	447	522	402- 615	429- 588	Accept.
02	890	979	750- 1150	800- 1100	Accept.
014-VANADIUM					
01	202	211	186- 234	192- 228	Accept.
02	786	811	724- 888	745- 867	Accept.
015-ZINC					
01	71.9	71.9	62.7- 84.9	65.5- 82.2	Accept.
02	1730	1800	1610- 2030	1660- 1980	Accept.

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USEPA Water Pollution Study WP035

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Participant ID: PA00009   Type: OTHER   Requesting Office: NJ

	Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
016-ANTIMONY						
	03	349	370	240- 450	266- 423	Accept.
	04	551	570	369- 692	410- 651	Accept.
017-SILVER						
	03	176	180	153- 207	160- 200	Accept.
	04	337	340	298- 391	310- 380	Accept.
018-THALLIUM						
	03	80.0	83.3	63.4- 99.1	67.9- 94.6	Accept.
	04	354	365	301- 425	317- 410	Accept.
074-MOLYBDENUM						
	03	126	130	106- 151	112- 146	Accept.
	04	309	310	257- 358	270- 345	Accept.
075-STRONTIUM						
	03	3.5	3.55	2.56- 4.49	2.81- 4.23	Accept.
	04	94.0	96.0	79.8- 110	83.9- 105	Accept.
076-TITANIUM						
	03	115	115	96.8- 130	101- 126	Accept.
	04	272	270	230- 302	239- 293	Accept.

MINERALS IN MILLIGRAMS/LITER (EXCEPT AS NOTED)

	Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
019-PH-UNITS						
	03	4.34	4.30	4.22- 4.4	4.25- 4.38	Accept.
	04	5.57	5.50	5.46- 5.62	5.48- 5.6	Accept.
020-SPEC. COND.(UMHOS/CM AT 25 C)						
	01	907.	916	830- 983	849- 960	Accept.
	02	581.	586	536- 627	547- 616	Accept.
021-TDS AT 180 C						
	01	545.	553	326- 762	380- 708	Accept.
	02	314.	311	226- 394	248- 377	Accept.
022-TOTAL HARDNESS(AS CACO3)						
	01	309.	330	302- 358	309- 351	Accept.
	02	97.2	101	90.8- 110	93.2- 108	Accept.
023-CALCIUM						
	01	105	104	92.4- 120	96.2- 116	Accept
	02	6.63	6.39	5.53- 7.54	5.79- 7.29	Accept.
024-MAGNESIUM						
	01	16.6	17.0	15.2- 19.3	15.7- 18.7	Accept.
	02	20.7	20.6	18- 23.6	18.7- 22.5	Accept.
025-SODIUM						
	01	14.9	14.7	13.1- 16.2	13.5- 15.8	Accept.
	02	52.5	54.3	49.3- 58.9	50.5- 57.7	Accept.
026-POTASSIUM						
	01	21.4	21.0	18.0- 23.7	19.4- 23.1	Accept.
	02	39.2	38.3	33.3- 41.7	34.3- 40.7	Accept.
027-TOTAL ALKALINITY(AS CACO3)						
	01	21.0	20.0	17.4- 25.1	18.3- 24.1	Accept.
	02	66.9	72.0	64.8- 79.6	66.5- 76.1	Accept.

Performance Evaluation Report
USEPA Water Pollution Study WP035

Participant ID: PA00009 Type: OTHER Requesting Office: PA

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
028-CHLORIDE					
01	236.	241	220- 259	225- 254	Accept.
02	68.1	72.7	65.1- 79.8	67- 77.9	Accept.
029-FLUORIDE					
01	3.77	3.50	3.09- 3.9	3.19- 3.71	Ck. for Err.
02	1.39	1.35	1.16- 1.53	1.21- 1.48	Accept.
030-SULFATE					
01	16.9	18.0	13.8- 22.1	14.8- 21.1	Accept.
02	83.3	86.4	72- 97	75.1- 93.9	Accept.
NUTRIENTS IN MILLIGRAMS/LITER					
031-AMMONIA-NITROGEN					
01	19.4	19.0	15- 22.3	15.9- 21.5	Accept.
02	1.62	1.60	1.15- 2.08	1.26- 1.97	Accept.
032-NITRATE-NITROGEN					
01	9.25	8.11	6.76- 9.69	7.11- 9.38	Accept.
02	.386	0.390	0.28-0.495	0.305-0.469	Accept.
033-ORTHOPHOSPHATE					
01	.059	.0560	0.0333-0.076	0.0390-0.071	Accept.
02	2.88	2.90	2.43- 3.19	2.52- 3.1	Accept.
034-KJELDAHL-NITROGEN					
03	.632	0.589	0.115- 1.12	0.235-0.995	Accept.
04	9.38	7.90	5.73- 9.64	6.2- 9.17	Ck. for Err.
035-TOTAL PHOSPHORUS					
03	.599	0.570	0.479-0.705	0.498-0.677	Accept.
04	6.16	6.08	5.16- 7.2	5.41- 6.96	Accept.
DEMANDS IN MILLIGRAMS/LITER					
036-COD					
01	213.	236	189- 259	198- 250	Accept.
02	89.4	101	71.2- 120	77.3- 114	Accept.
037-TOC					
01	91.2	93.1	78.5- 108	82.4- 105	Accept.
02	39.2	40.1	31.6- 47.4	33.6- 45.3	Accept.
038-5-DAY BOD					
01	152.	141	60.1- 210	83.3- 199	Accept.
02	58.7	62.5	29.5- 95.5	37.7- 87.3	Accept.
102-CARBONACEOUS BOD					
01	167.	117	34.3- 199	55.6- 178	Accept.
02	65.4	51.6	20- 83.2	28.2- 75	Accept.
PCB'S IN MICROGRAMS/LITER					
042-PCB-AROCLOR 1232					
01	2.74	2.76	0.709- 4.3	1.17- 3.84	Accept.
044-PCB-AROCLOR 1248					
02	4.34	4.26	1.77- 6.04	2.3- 5.5	Accept.

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Participant ID: PA00009              Type: OTHER        Requesting Office: NJ
------------------------------------------------------------------------------
          Sample  Reported  True     Acceptance        Warning     Performance
          Number   Value   Value*      Limits          Limits      Evaluation
------------------------------------------------------------------------------

   PCB'S IN OIL IN MILLIGRAMS/KILOGRAM
099-PCB IN OIL- 1016/1242
            01      31.1    42.3     6.80- 58.9     13.5- 52.3      Accept.
101-PCB IN OIL- 1260
            02      14.0    12.7     3.17- 20.4     5.37- 18.2      Accept.

   PESTICIDES IN MICROGRAMS/LITER
047-ALDRIN
            01      3.01    3.11     0.522- 5.23    1.17- 4.60      Accept.
            02      0.144   0.243    0.065-0.322    0.0977-0.289    Accept.
048-DIELDRIN
            01      4.39    4.51     2.62- 6.22     3.00- 5.76      Accept.
            02      1.63    1.62     0.858- 2.19    1.03- 2.02      Accept.
049-DDD
            01      6.10    5.67     3.18- 9.33     3.92- 8.55      Accept.
            02      1.87    1.94     1.21- 2.60     1.39- 2.46      Accept.
050-DDE
            01      3.60    3.76     2.14-  5.1     2.51- 4.72      Accept.
            02      1.35    1.42     0.72- 1.85     0.863- 1.71     Accept.
051-DDT
            01      6.61    6.46     3.79- 9.20     4.49- 8.59      Accept.
            02      1.63    1.76     0.865- 2.33    1.05- 2.14      Accept.
052-HEPTACHLOR
            01      2.41    2.95     0.694- 4.14    1.13- 3.71      Accept.
            02      0.232   0.270    0.0899-0.374   0.126-0.338     Accept.
053-CHLORDANE
            03      12.2    12.3     4.69- 17.2     6.27- 15.6      Accept.
            04      1.31    1.36     0.695- 1.81    0.835- 1.67     Accept.
070-HEPTACHLOR EPOXIDE
            01      1.90    2.20     1.13- 2.53     1.31- 2.35      Accept.
            02      0.230   0.200    0.153- 0.37    0.19-0.342      Accept.

   VOLATILE HALOCARBONS IN MICROGRAMS/LITER
054-1,2 DICHLOROETHANE
            01      65.9    56.3     39- 79.4       44.1- 74.4      Accept.
            02      13.4    12.7     8.5- 17.5      9.63- 16.4      Accept.
055-CHLOROFORM
            01      70.6    60.0     47.6- 83.2     52.1- 78.7      Accept.
            02      13.4    14.2     11- 18.4       11.9- 17.4      Accept.
056-1,1,1 TRICHLOROETHANE
            01      63.1    63.7     41- 85.7       46.6- 80.1      Accept.
            02      17.1    16.2     10.4- 22.2     11.9- 20.7      Accept.
057-TRICHLOROETHENE
            01      78.6    72.3     45.7-   93     51.6- 87.1      Accept.
            02      16.3    16.1     10.7- 20.6     11.9- 19.4      Accept.
058-CARBONTETRACHLORIDE
            01      29.7    29.0     16.5-   45     20- 41.4        Accept.
            02      10.4    9.36     5.61- 13.7     6.62- 12.7      Accept.
```

Performance Evaluation Report
USEPA Water Pollution Study WP035

Page: 5
Date: 16APR96

Participant ID: PA00009 Type: OTHER Requesting Office: NJ

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
059-TETRACHLOROETHENE					
01	70.9	73.6	46.5- 96.3	52.7- 90.1	Accept.
02	10.9	10.4	6.04- 14.5	7.1- 13.4	Accept.
060-BROMODICHLOROMETHANE					
01	60.2	55.6	37- 73.1	41.6- 68.6	Accept.
02	14.3	14.6	10.2- 18.4	11.2- 17.3	Accept.
061-DIBROMOCHLOROMETHANE					
01	51.0	48.5	33.1- 63.4	37- 59.6	Accept.
02	13.7	14.6	9.59- 18.9	10.7- 17.7	Accept.
062-BROMOFORM					
01	80.6	69.0	50.4- 95.3	56- 89.7	Accept.
02	13.1	12.6	8.42- 17.3	9.53- 16.2	Accept.
063-METHYLENE CHLORIDE					
01	52.9	46.7	30.3- 60.1	34.6- 59.9	Accept.
02	10.6	10.3	6.63- 14.7	7.65- 13.7	Accept.
064-CHLOROBENZENE					
01	76.9	69.1	46.5- 89	51.8- 83.7	Accept.
02	17.9	17.7	11.7- 24.2	13.2- 22.6	Accept.

VOLATILE AROMATICS IN MICROGRAMS/LITER

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
065-BENZENE					
01	56.9	55.9	40.7- 69.9	44.4- 66.2	Accept.
02	9.25	9.30	6.56- 12.3	7.28- 11.6	Accept.
066-ETHYLBENZENE					
01	57.4	56.4	38.7- 73.3	43- 69	Accept.
02	10.4	10.4	7.18- 13.6	7.99- 12.8	Accept.
067-TOLUENE					
01	44.6	44.7	30.9- 57.6	34.3- 54.2	Accept.
02	7.49	7.60	5.29- 9.97	5.80- 9.38	Accept.
094-1,2-DICHLOROBENZENE					
01	49.3	52.0	40.7- 66.5	44- 63.2	Accept.
02	11.9	11.7	7.82- 16.6	8.92- 15.5	Accept.
095-1,4-DICHLOROBENZENE					
01	47.8	48.3	33.3- 62.2	37- 58.5	Accept.
02	13.1	13.4	9.37- 17.6	10.4- 16.6	Accept.
096-1,3-DICHLOROBENZENE					
01	37.1	42.7	30.4- 53.1	36.7- 50.7	Accept.
02	11.1	12.6	8.8- 16.6	9.79- 15.6	Accept.

MISCELLANEOUS PARAMETERS

Sample Number	Reported Value	True Value*	Acceptance Limits	Warning Limits	Performance Evaluation
071-TOTAL CYANIDE(IN MG/L)					
01	.022	.0301	0.0138-0.046	0.0179-0.042	Accept.
02	.406	0.410	0.297-0.522	0.325-0.493	Accept.
072-NON-FILTERABLE RESIDUE(IN MG/L)					
01	60.6	44.0	61.9- 90.1	66.4- 93.6	Ck. for Err.
02	46.9	56.0	42.7- 60.1	44.9- 57.9	Accept.
073-OIL AND GREASE(IN MG/L)					
01	51.4	46.0	29.5- 50.1	32.6- 51	Ck. for Err.
02	21.5	18.9	12- 23.2	13.4- 21.8	Accept.

```
                      Performance Evaluation Report                Page: 6
                    USEPA Water Pollution Study WP035           Date: 16APR96

Participant ID: PA00009            Type: OTHER       Requesting Office: NJ
------------------------------------------------------------------------------
           Sample  Reported  True      Acceptance      Warning     Performance
           Number    Value   Value*      Limits         Limits      Evaluation
------------------------------------------------------------------------------
C97-TOTAL PHENOLICS(IN MG/L)
             01       1.05   2.71    1.47- 3.96     1.79- 3.64      Accept.
             02       .811   1.19    0.519- 1.87    0.692-  1.7     Accept.
C98-TOTAL RESIDUAL CHLORINE(IN MG/L)
             01       3.30   2.90    2.58-  3.6     2.69- 3.46      Accept.
             02       .320   0.430   0.295-0.624    0.338-0.581     Ck. for Err.

********** END OF DATA FOR PA00009 **********
NOTE:  FOR LIMITS AND TRUE VALUES, ASSUME THREE SIGNIFICANT DIGITS.
********** END OF REPORT FOR PA00009 **********

------------------------------------------------------------------------------
* Based on gravimetric calculations, or a reference value when necessary.
```

13. Preventive Maintenance

In order to ensure timely production of data, Lancaster Laboratories schedules routine preventive maintenance of instruments based on manufacturer's recommendations. Maintenance of the laboratory instruments is the responsibility of the technical group using the equipment in conjunction with our in-house Equipment Maintenance Group. A schedule of routinely performed instrument maintenance tasks is attached as Table 13-1. All preventive maintenance, as well as maintenance performed as corrective action, is recorded in instrument logs.

Critical spare parts are kept in supply at the laboratory by the Equipment Maintenance Group. Most items not kept in stock at the laboratory are available through overnight delivery from the manufacturer. In addition, Lancaster Labs maintains multiple numbers of most of the critical instruments used in our laboratory operations. A recent equipment inventory may be found in the *Qualification Manual*. Because we are a large laboratory with redundant capacity, the problems of instrument downtime are minimized.

Table 13-1

Preventive Maintenance Schedule

Instrument	Preventive Maintenance	Frequency
GC/MS	Change septum	Weekly or AN*
	Check fans	Monthly
	Check cool flow	Monthly
	Clean source	Bimonthly or AN
	Change oil in vacuum pump	Semiannually
	Change oil in turbo pump	Semiannually
GC Volatiles	Check propanol level	Semiweekly or AN
	Check all flows	Prior to calib. or AN
	Conductivity detector maintenance:	AN
	Clean cell	AN
	Change reaction tube	AN
	Change Teflon line	AN
	Change resin	AN
	Replace trap	AN
	Column maintenance	AN
	Change PID lamp	AN
	Precalibration instrument settings check	Prior to each calibration
GC	Septum change	Each run
	Column maintenance	AN
	Clean detector	AN
	Vacuum filters	Semiannually
	Leak check ECDs	Semiannually
Flame AA and Hydride Generation AA	Rinse burner head, chamber and trap	AN: Min. Weekly
	Clean nebulizer	Weekly
	Inspect tubing and O-rings	Monthly
	Replace lamp	AN
GFAA	Rinse workhead assembly	Weekly
	Clean windows	Weekly
	Replace probe tubing	AN
	Check rinse bottle & drain	Daily
Cold Vapor AA	Change drying tube	Daily
	Replace pump tubing	AN: Min. weekly
	Lubricate pump head	Weekly
	Lubricate autosampler	Weekly
	Inspect optical cell and windows	Monthly
	Clean	AN
ICP	Clean torch	AN
	Clean nebulizer & spray chamber	AN
	Replace pump winding	Check Daily
	Lubricate autosampler	Check Daily
	Check mirror	Daily
	Checking tubing to torch	Daily
	Check fan filters, clean if needed	Weekly
	Check cool flow, clean if needed	Weekly
	Check water filter, replace if needed	Quarterly
Autoanalyzer	Clean sample probe	AN
	Clean proportioning pump	Weekly
	Inspect pump tubing, replace if worn	AN
	Clean wash receptacles	Monthly
	Inspect condition of distillation head	Monthly

Table 13-1

Preventive Maintenance Schedule

Instrument	Preventive Maintenance	Frequency
Infrared Spectrometer (FTIR)	Check on-demand diagnostics	Quarterly
	Check wavenumber with polystyrene film	Quarterly
	Change dessicant	Quarterly
HPLC	Pump lubrication	Annually
	Check pump seals	Annually
	Check valves cleaned or rebuilt	AN
	Detector maintenance:	AN
	Bulb replacement and adjustment	
	Flow cell cleaning	
	Routine column maintenance	AN
	Replace Teflon lines	AN
	Autosampler septa replacement	AN
	In-line filter sonication/cleaning	AN
	System pasivation	AN
	PCRS pump lubrication	AN
Total Organic Carbon Analyzer	Check IR zero	AN
	Check for leaks	AN
	Check acid pump calib.	Bimonthly
	Check persulfate pump calibration	Bimonthly
	Inspect 6-port rotary valve	AN
	Inspect sample pump head	AN
	Wash molecular sieve	AN
	Check sample loop calibration	Monthly
	Clean gas permeation tube	AN
	Inspect digestion vessel O-rings	AN
	Check activated carbon scrubber	AN
	Dust back and clean circuit boards	AN
	Check IR cell	AN
Total Organic Halogen Analyzer	Polish counter electrode	Daily
	Polish sensor electrode	Biweekly
	Clean loaders and pistons	Biweekly
	Replace agar bridge	Monthly

* AN means as needed. Any of these items may be performed more frequently if response during operation indicates this is necessary.

14. Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness

Precision - Precision refers to the reproducibility of a method when it is repeated on a second aliquot of the same sample. The degree of agreement is expressed as the relative percent difference (RPD). The RPD will be calculated according to the following equation:

$$RPD = \frac{D_2 - D_1}{(D_1 + D_2)/2} \times 100$$

Where:

D_1 = First sample value

D_2 = Second sample value (Duplicate)

Duplicates will be run on at least 5% of the samples. Acceptance criteria shall be based on statistical evaluation of past lab data. (See Section No. 11.) All quality control sample results are entered into the computer and compared with acceptance limits. In addition, there is a monthly review of values on the computer QC system. Data obtained from quality control samples is entered onto our computer system which charts the data and calculates a mean and standard deviation on a monthly basis. The Quality Assurance Department then reviews this data for trends which may indicate analytical problems. The control charts are graphical methods for monitoring precision and bias over time.

Accuracy - Accuracy refers to the agreement between the amount of a compound measured by the test method and the amount actually present. Accuracy is usually expressed as a percent recovery (R). Recoveries will be calculated according to the following equations:

$$\textit{Surrogate Recovery} = \frac{Qd}{Qa} \times 100$$

Where:

Qd = Quantity determined by analysis

Qa = Quantity added to sample

$$\textit{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where:

SSR = Spiked sample results

SR = Sample results

SA = Spike added

$$\textit{Laboratory Control Sample Recovery} = \frac{LCS\ Found}{LCS\ True} \times 100$$

Surrogate standards are added to each sample analyzed for organics. Spikes and laboratory control samples will be run on at least 5% of the samples (each batch or SDG, ≤20 samples). Refer to Section 11 for acceptance criteria for accuracy. The computer is programmed to compare the individual values with the acceptance limits and inform the analyst if the results meet specification. If the results are not within the acceptance criteria, corrective action suitable to the situation will be taken. This may include, but is not limited to, checking calculations and instrument performance, reanalysis of the associated samples, examining other QC analyzed with the same batch of samples, and qualifying results with documentation of any QC problems in the case narrative.

Commercial quality control materials are run at least quarterly to ensure accuracy of the analytical procedure. Repetitive analysis of a reference material will also yield precision data. Accuracy information determined from reference materials is valuable because variables specific to sample matrix are eliminated.

The QC program is capable of charting data for surrogates, spikes, control materials, and reference materials. The Quality Assurance Department reviews these charts for any indication of possible problems (i.e., shift in the mean and standard deviation).

Completeness - Completeness is the percentage of valid data acquired from a measurement system compared to the amount of valid measurements that were planned to be collected. The objective is analysis of all samples submitted intact, and to ensure that sufficient sample weight/volume is available should the initial analysis not meet acceptance criteria. The laboratory's sample management system will assign a unique identification number to the sample which tracks and controls movement of samples from the time of receipt until disposal. All data generated will be recorded referencing the corresponding sample identification number. The completeness of an analysis can be documented by including in the data deliverables sufficient information to allow the data user to assess the quality of the results. This information will include, but is not limited to, summaries of QC data and sample results, chromatograms, spectra, and instrument tune and calibration data. Additional information will be stored in the laboratory's archives, both hard copy and magnetic tape.

$$Completeness = \frac{\text{Number of valid measurements}}{\text{Total measurements needed}} \times 100$$

Method Detection Limit - It is important to ascertain the limit of quantitation that can be achieved by a given method, particularly when the method is commonly used to determine trace levels of analyte. The Environmental Protection Agency has set forth one method for determining method detection limits (MDLs) from which limits of quantitation (LOQs) can be extrapolated.

MDL is defined as follows for all measurements:

Where:

$$MDL = t_{(n-1,1-a=0.99)} \times s$$

MDL = Method detection limit

s = Standard deviation of the replicate analyses

$t_{(n-1,1-a=0.99)}$ = Students' t-value for a one-sided 99% confidence level and a standard deviation estimate with n-1 degrees of freedom

Definitions:

<u>Method detection limit (MDL)</u> - The method detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.

<u>Limit of quantitation (LOQ)</u> - The limit of quantitation is defined as the level above which quantitative results may be obtained with a specified degree of confidence. The EPA recommends setting quantitation limits at a value of 5× to 10× the MDL.

A list of MDLs and LOQs determined for each sample matrix type will be kept on file in the QA department. MDLs will be verified on an annual basis.

15. Corrective Action

Whenever any of the data generated falls outside of the established acceptance criteria outlined for instrument tune and calibration (Section 8) and internal QC (Section 11), the cause of this irregularity must be investigated, corrected, and documented. The documentation will be used to prevent a recurrence of the problem and to inform management of the situation.

If the results are not within acceptance criteria, the appropriate corrective action will be initiated. This may include, but is not limited to, checking calculation and instrument performance, reanalysis of the associated samples, examining other QC analyzed with the same batch of samples, and qualifying results with a comment stating the observed deviation.

A standard operating procedure is in place which outlines the procedures to be followed when quality control data for an analysis falls outside of previously established acceptance limits. All QC data must be entered onto the computerized QC system promptly after its generation and daily "out-of-spec" data is reported via this system. Any data outside the acceptance criteria will be reviewed by the Quality Assurance Department. Where appropriate, the Quality Assurance Department will place outliers in one of three categories:

A. Marginal Outlier - Data that are outside the 95% confidence interval but within the 99% confidence interval. This category may also be used for QC samples subject to matrix interferences or sample inhomogeneity.

B. Outlier - Data outside the 99% confidence interval and/or observable trends such as a shift in mean and standard deviation.

C. Extreme Outlier - Such data would indicate the system is out of control and no results should be reported to clients; an example would be more than one reference or control falling outside the 99% confidence interval.

The daily out-of-spec reports are then distributed to group leaders or their QC coordinator who will check all supporting data and document their findings and any corrective action taken. Documentation of QC data will be filed in the departmental QC notebook. In the case of outliers or extreme outliers, the Quality

Assurance Department may issue a formal request for investigation and corrective action (see sample form that follows). The Quality Assurance Department is responsible for initiating the corrective actions, insuring that the actions are taken in a timely manner, and that the desired results are produced. The QA Department will circulate all completed Investigation and Corrective Action forms to the appropriate manager.

The Quality Assurance Department is also responsible for conducting periodic audits which ensure compliance with laboratory SOPs and assist in identifying and correcting any deficiencies. These audits may entail observation as procedures are carried out or a review of records to demonstrate traceability and compliance with all documented record keeping procedures. The QA Department will then issue a written report which summarizes the audit. The technical centers must respond in writing to the audit report within 30 days of report receipt. The response will address the corrective action that needs to be taken along with an expected completion date. Audit results and the corresponding response are communicated to laboratory personnel and management. Follow-up audits verify that proper corrective action has been taken for the identified discrepancy.

Lancaster Laboratories
2425 New Holland Pike • Lancaster, PA 17601-5994

No. ____________________

Investigation and Corrective Action Report

Part I Description of problem

1. Date
2. LLI sample number(s) involved
3. Nature of problem (e.g., QA outlier, procedural deviation, client complaint, etc.)

4. ________________ Check if investigation must be complete before reporting further data to clients

Initiated by: ______________________________

Part II (Attach separate sheet if needed)

1. Steps taken to investigate problem.

2. Explanation of probable cause of problem.

3. Steps taken to prevent future occurrence.

4. Besides the sample(s) listed above, would data sent to any clients be affected by this problem? If yes, explain.

5. Signed: ____________________________________ Date: ____________________

Return by: ____________________________________

2064 Rev. 09/01/94

16. Quality Assurance Reports to Management

Reports of quality status from the Quality Assurance Department to management are made frequently and in various forms. All results from internal or external performance evaluation samples are circulated to management. A report of each audit performed is prepared and copied to management. Monthly summaries of data obtained from analysis of quality control check samples are generated via the computerized sample management system. These summaries include mean and standard deviation to aid in assessment of data accuracy and precision. Forms summarizing problems which require investigation and corrective action are completed by group leaders and circulated to management. Through these channels, laboratory management is kept apprised of QA/QC activities.

Any problems or unusual observations that occur during the analysis of samples for a specific project will be listed on the laboratory report and/or in the case narrative delivered with the data package. The items often discussed in this manner include samples with surrogate recovery outside of the acceptance criteria and samples with matrix problems requiring dilution and causing increased detection limits. Where applicable, any corrective action attempted or performed to address the problem will also be presented.

The laboratory will contact the client for direction regarding major problems such as samples listed on the chain of custody but missing from the shipping container, samples which arrive broken or are accidentally broken in the laboratory, and samples with severe matrix problems. The client will be contacted if it is necessary to change any item in the original project plan.

Data Package Content

- Title Page
- Sample Reference
- Table of Contents
- Chain of Custody
- Laboratory Chronicle
- Methodology/Reference Summary
- Laboratory Analysis Reports
- Per Parameter:
  - Case Narrative
  - Quality Control Summary
    - Tune[1]
    - Surrogate Recovery
    - Method Blank
    - Matrix Spike/Matrix Spike Duplicate
    - Duplicate[2]
    - Standard Addition[2]
    - Serial Dilution[2]
    - Laboratory Control Sample Recovery (if applicable)
    - Interference Check[2]
    - Internal Standard[1]
  - Sample Data
    - Sample Result Summary and LOQs
    - Sample Chromatograms
    - Quantitation Reports
    - Mass Spectra[1]
    - Library Searches[1] (if applicable)
    - Confirmatory Chromatogram[3]
    - Confirmatory Quantitation Report[3]
- Standards Data
  - Initial Calibration Summary Forms
  - Initial Calibration Data
  - Continuing Calibration Summary Forms
  - Continuing Calibration Data
  - Chromatograms and Quantitation Reports of Standards
  - Calibration Data for Confirmation Columns[3]
  - Calibration Curve (When quantitating against init. calib.)
  - ICAP Interference Table[2]

Raw QC Data
  - BFB/DFTPP Spectra and Mass Listing[1]
  - Method Blank Chromatograms, Quantitation Reports, Mass Spectra[1] (GC/MS)
  - Matrix Spike/Matrix Spike Duplicate Chromatograms and Quant.
  - Duplicate Data Printouts[2]
  - Standard Addition Data[2]
  - Serial Dilution Data[2]
  - Laboratory Control Sample (if applicable)
  - Copy of Instrument Run Log

Extraction/Digestion Logs

Gel Permeation Chromatography (GPC), if applicable
  - All Peaks Identified
  - % Resolution Calculations

[1] GC/MS only
[2] Inorganics only
[3] GC only (if applicable)

*Amount of documentation is dependent upon client request.

Analysis Repor

Lancaster Laboratories
Where quality is a science.

LLI Sample No. WW 2300873
Collected:

Submitted: 4/25/95 Reported: 6/14/95
Discard: 6/22/95

Volatile Halocarbons - 1
EPA WP 034

Account No: 00649
Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994

P.O.
Rel.

CAT NO.	ANALYSIS NAME	AS RECEIVED RESULTS	LIMIT OF QUANTITATION	UNITS
	Purgeable Halocarbons			
0711	Chloromethane	< 5.	5.	ug/l
0712	Bromomethane	< 5.	5.	ug/l
1590	Dichlorodifluoromethane	< 2.	2.	ug/l
0714	Vinyl chloride	< 1.	1.	ug/l
0715	Chloroethane	< 1.	1.	ug/l
0716	Methylene chloride	54.	1.	ug/l
1589	Trichlorofluoromethane	< 1.	1.	ug/l
0717	1,1-Dichloroethene	< 1.	1.	ug/l
0718	1,1-Dichloroethane	< 1.	1.	ug/l
0719	1,2-Dichloroethene (cis/trans)	< 1.	1.	ug/l
0720	Chloroform	57.	1.	ug/l
0721	1,2-Dichloroethane	64.	1.	ug/l
0722	1,1,1-Trichloroethane	50.	1.	ug/l
0723	Carbon tetrachloride	66.	1.	ug/l
0724	Dichlorobromomethane	62.	1.	ug/l
0725	1,2-Dichloropropane	< 1.	1.	ug/l
0726	trans-1,3-Dichloropropene	< 1.	1.	ug/l
0727	Trichloroethene	54.	1.	ug/l
0728	Dibromochloromethane	49.	1.	ug/l
0729	1,1,2-Trichloroethane	< 1.	1.	ug/l
0730	cis-1,3-Dichloropropene	< 1.	1.	ug/l
0713	2-Chloroethylvinyl ether	< 10.	10.	ug/l
0731	Bromoform	50.	2.	ug/l
0732	1,1,2,2-Tetrachloroethane	< 2.	2.	ug/l
0733	Tetrachloroethene	53.	1.	ug/l
0705	Chlorobenzene	54.	1.	ug/l

Under the analytical conditions of EPA methods 601 and 8010B, the cis and trans isomers of 1,2-dichloroethene coelute and cannot be distinguished from one another. The result reported above represents the total for both isomers.

Questions? Contact your Client Services Representative
Kimberly A. Zeeman at (717) 656-2300

Respectfully Submitted
Judy A. Colello, B.S.
Group Leader

See reverse side for explanation of symbols and abbreviations

LLI Sample No. WW 2300869
Collected:

Submitted: 4/25/95 Reported: 6/14/95
Discard: 6/22/95

Pesticides - 1
EPA WP 034

Account No: 00649
Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994

P.O.
Rel.

CAT NO.	ANALYSIS NAME	AS RECEIVED RESULTS	LIMIT OF QUANTITATION	UNITS
	PPL Pesticides in Water			
1600	Alpha BHC	< 0.1	0.1	ug/l
1601	Beta BHC	< 0.1	0.1	ug/l
1602	Gamma BHC - Lindane	< 0.1	0.1	ug/l
1603	Delta BHC	< 0.1	0.1	ug/l
1604	Heptachlor	2.0	0.1	ug/l
1605	Aldrin	1.5	0.1	ug/l
1606	Heptachlor Epoxide	1.9	0.1	ug/l
1607	DDE	2.6	0.1	ug/l
1608	DDD	3.9	0.1	ug/l
1609	DDT	2.9	0.1	ug/l
1610	Dieldrin	4.7	0.1	ug/l
1611	Endrin	< 0.1	0.1	ug/l
1860	Methoxychlor	< 0.5	0.5	ug/l
1612	Chlordane	< 3.	3.	ug/l
1613	Toxaphene	< 40.	40.	ug/l
1616	Endosulfan I	< 0.1	0.1	ug/l
1615	Endosulfan II	< 0.1	0.1	ug/l
1617	Endosulfan Sulfate	< 0.3	0.3	ug/l
1618	Endrin Aldehyde	< 1.	1.	ug/l
1619	PCB-1016	< 10.	10.	ug/l
1620	PCB-1221	< 10.	10.	ug/l
1621	PCB-1232	< 10.	10.	ug/l
1622	PCB-1242	< 10.	10.	ug/l
1623	PCB-1248	< 10.	10.	ug/l
1624	PCB-1254	< 10.	10.	ug/l
1626	PCB-1260	< 10.	10.	ug/l

Questions? Contact your Client Services Representative
Kimberly A. Zeeman at (717) 656-2300

Respectfully Submitted
Jenifer E. Hess, B.S.
Group Leader Pesticides/PCBs

LLI Sample No. WW 2300851
Collected:

Submitted: 4/25/95 Reported: 6/14/95
Discard: 6/22/95

Account No: 00649
Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994

P.O.
Rel.

Trace Metals - 1
EPA WP 034

CAT NO.	ANALYSIS NAME	AS RECEIVED RESULTS	LIMIT OF QUANTITATION	UNITS
1743	Aluminum	0.96	0.20	mg/l
1747	Beryllium	0.012	0.010	mg/l
1749	Cadmium	0.013	0.010	mg/l
1751	Chromium	0.095	0.030	mg/l
1752	Cobalt	0.129	0.050	mg/l
1753	Copper	0.049	0.025	mg/l
1754	Iron	0.65	0.10	mg/l
1755	Lead	0.19	0.10	mg/l
1758	Manganese	0.292	0.010	mg/l
1761	Nickel	0.083	0.050	mg/l
1771	Vanadium	5.21	0.015	mg/l
1772	Zinc	0.446	0.020	mg/l
0243	Aluminum	1.02	0.20	mg/l
0245	Arsenic	0.118	0.0020	mg/l
0247	Beryllium	0.013	0.010	mg/l
0249	Cadmium	0.014	0.010	mg/l
0251	Chromium	0.090	0.030	mg/l
0253	Copper	0.050	0.025	mg/l
0254	Iron	0.59	0.10	mg/l
0255	Lead	0.191	0.050	mg/l
0258	Manganese	0.267	0.010	mg/l
0259	Mercury	0.00143	0.00020	mg/l
0261	Nickel	0.081	0.050	mg/l
0264	Selenium	0.194	0.0020	mg/l
0272	Zinc	0.454	0.025	mg/l

1 COPY TO Susan Shorter

Questions? Contact your Client Services Representative
Kimberly A. Zeeman at (717) 656-2300
03:31:03 D 0001 36 0 0 463245
044 15.00 00040800 ASR000

Respectfully Submitted
Ramona V. Layman, Group Leader
ICP Metals/Leachates

MEMBER ACIL

Lancaster Laboratories
Where quality is a science.

LLI Sample No. WW 2300863
Collected:

Submitted: 4/25/95 Reported: 6/14/95
Discard: 6/22/95

Demand - 1
EPA WP 034

Account No: 00649
Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994

P.O.
Rel.

CAT NO.	ANALYSIS NAME	AS RECEIVED RESULTS	LIMIT OF QUANTITATION	UNITS
0273	Total Organic Carbon	19.	1.	mg/l
	The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".			
0235	Biochemical Oxygen Demand	29.	2.	mg/l
1364	Carbonaceous BOD	31.	2.	mg/l
1553	Chemical Oxygen Demand	45.	7.	mg/l

1 COPY TO Susan Shorter

Questions? Contact your Client Services Representative
Kimberly A. Zeeman at (717) 656-2300
03:32:57 D 0001 36 0 0 463245
044 0.00 00012600 ASR000

Respectfully Submitted
Ramona V. Layman, Group Leader
ICP Metals/Leachates

5A

VOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION - BROMOFLUOROBENZENE (BFB)

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Lab File ID: >JULT1 BFB Injection Date: 06/21/95

Instrument ID: HP03047 BFB Injection Time: 00:40

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	19.7
75	30.0 - 60.0% of mass 95	49.1
95	Base peak, 100% relative abundance	100.
96	5.0 - 9.0% of mass 95	5.7
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	70.6
175	5.0 - 9.0% of mass 174	4.9 (6.9)1
176	Greater than 95.0%, but less than 101.0% of mass 174	68.8 (97.5)1
177	5.0 - 9.0% of mass 176	3.7 (5.4)2

1-Value is % mass 174 2-Value is % mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD300	300 PPB IC	>JULI1	06/21/95	00:59
02	VSTD050	050 PPB IC	>JULI3	06/21/95	02:06
03	VSTD020	020 PPB IC	>JULI4	06/21/95	02:40
04	VSTD004	004 PPB IC	>JULI5	06/21/95	03:15
05	VSTD100	100 PPB IC	>JULI7	06/21/95	06:19
06	VBLKJ94	VBLKJ94	>JULB3	06/21/95	08:57
07	EXBLKB	2328390	>JUL01	06/21/95	09:44
08	28152	2328152	>JUL02	06/21/95	10:29
09	28152MS	2328152	>JUL03	06/21/95	11:04
10	EXBLKC	2330209	>JUL04	06/21/95	11:39
11	6CYZH	2328898	>JUL05	06/21/95	12:14
12					
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22					

FORM V VOA

1/87 Rev.

Lancaster Laboratories
Where quality is a science.

2A

Lab Name: LANCASTER LABS SDG No:

	EPA SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT
01	62295	101	97	93		
02	04-06	99	98	94		
03						
04	LAB QC					
05	VBLKJ06	103	99	93		
06						
07						
08						
09						
10						
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19						
20						
21						
22						
23						
24						
25						

				QC LIMITS
S1	(DCA)	=	1,2-Dichloroethane-d4	76 - 114
S2	(TOL)	=	Toluene-d8	88 - 110
S3	(BFB)	=	4-Bromofluorobenzene	86 - 115

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

page 1 of 1

FORM II VOA-2

1/87 rev.
Modified

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Lab File ID: >JUQB1 Lab Sample ID: VBLKJ99

Date Analyzed: 06/26/95 Time Analyzed: 08:48

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: HP03047

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	EWTB3	2332787	>JUQ01	09:42
02	LEW-3	2332786	>JUQ02	10:25
03	DC-2-	2332785	>JUQ03	11:07
04	UT001	2332790	>JUQ04	11:59
05	GMMW1	2333870	>JUQ05	12:41
06	GMMW1MS	2333870	>JUQ06	13:40
07	GMMW1MSD	2333870	>JUQ07	14:15
08	GMMW2	2333871	>JUQ08	14:50
09	GMMW4	2333872	>JUQ09	15:25
10	GMMW5	2333873	>JUQ10	16:00
11				
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COMMENTS: ____________________

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKJ99

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Matrix: (soil/water) WATER Lab Sample ID: VBLKJ99

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: >JUQB1

Level: (low/med) LOW Date Received: _____.

% Moisture: not dec. _____ Date Analyzed: 06/26/95

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	---------Dichlorodifluoromethane	5	U
74-87-3	---------Chloromethane	5	U
75-01-4	---------Vinyl Chloride	5	U
74-83-9	---------Bromomethane	5	U
75-00-3	---------Chloroethane	5	U
75-69-4	---------Trichlorofluoromethane	5	U
60-29-7	---------Ethyl Ether	5	U
107-02-8	--------Acrolein	100	U
75-35-4	---------1,1-Dichloroethene	5	U
76-13-1	---------Freon 113	7	J
67-64-1	---------Acetone	20	U
74-88-4	---------Methyl Iodide	5	U
75-15-0	---------Carbon Disulfide	5	U
107-05-1	--------Allyl Chloride	5	U
75-09-2	---------Methylene Chloride	5	U
75-65-0	---------t-Butyl Alcohol	100	U
107-13-1	--------Acrylonitrile	50	U
1634-04-4	-------Methyl t-Butyl Ether	5	U
156-60-5	--------trans-1,2-Dichloroethene	5	U
75-34-3	---------1,1-Dichloroethane	5	U
156-59-2	--------cis-1,2-Dichloroethene	5	U
107-12-0	--------Propionitrile	100	U
141-78-6	--------Ethyl Acetate	5	U
126-98-7	--------Methacrylonitrile	50	U
109-99-9	--------Tetrahydrofuran	5	U
67-66-3	---------Chloroform	5	U
110-82-7	--------Cyclohexane	5	U
107-06-2	--------1,2-Dichloroethane	5	U
108-05-4	--------Vinyl Acetate	10	U
78-93-3	---------2-Butanone	10	U
71-55-6	---------1,1,1-Trichloroethane	5	U
56-23-5	---------Carbon Tetrachloride	5	U
78-83-1	---------Isobutyl Alcohol	250	U
71-43-2	---------Benzene	5	U
79-01-6	---------Trichloroethene	5	U

FORM I VOA

1/87 Rev.

EPA SAMPLE NO.

VBLKJ99

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Matrix: (soil/water) WATER

Lab Sample ID: VBLKJ99

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: >JUQB1

Level: (low/med) LOW

Date Received: _____.

% Moisture: not dec. _____

Date Analyzed: 06/26/95

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
78-87-5	1,2-Dichloropropane	5	U
80-62-6	Methyl Methacrylate	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	250	U
109-60-4	n-Propyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
79-46-9	2-Nitropropane	10	U
110-75-8	2-Chloroethyl Vinyl Ether	10	U
10061-01-5	cis-1,3-Dichloropropene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
79-00-5	1,1,2-Trichloroethane	5	U
124-48-1	Dibromochloromethane	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-Butene	50	U
108-10-1	4-Methyl-2-Pentanone	10	U
108-88-3	Toluene	5	U
97-63-2	Ethyl Methacrylate	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	10	U
106-93-4	1,2-Dibromoethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
123-92-2	Isoamyl Acetate	5	U
1330-20-7	Xylene (total)	5	U
100-42-5	Styrene	5	U
98-82-8	Cumene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
76-01-7	Pentachloroethane	5	U
541-73-1	1,3-Dichlorobenzene	5	U
106-46-7	1,4-Dichlorobenzene	5	U
95-50-1	1,2-Dichlorobenzene	5	U
96-12-8	1,2-Dibromo-3-Chloropropane	5	U

Lancaster Laboratories, Inc.
GC/MS Volatiles Matrix Spike/Spike Duplicate Recoveries

Unspiked: ^JU005	Matrix spike: ^JU006	Spike Duplicate: ^JU007
GMMW1 2333870	GMMW1MS 2333870	GMMW1MSD 2333870
Method: 1508	Matrix/Level: WL	Batch: J951771AA
Instrument: HP03047	Dilution Factor: 1.0	

COMPOUND NAME	SPIKE LEVEL	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
Dichlorodifluoromethane	20.00	0.00	18.84	19.92	94	100	-6	24-157	YES
Chloromethane	20.00	0.00	20.27	20.45	101	102	-1	1-273	YES
Vinyl Chloride	20.00	0.00	22.13	21.66	111	108	3	1-251	YES
Bromomethane	20.00	0.00	21.95	22.66	110	113	-3	1-242	YES
Chloroethane	20.00	0.00	22.52	22.22	113	111	2	14-230	YES
Trichlorofluoromethane	20.00	0.00	17.28	18.16	86	91	-6	17-181	YES
Ethyl Ether	20.00	0.00	19.96	20.88	100	104	-4	67-123	YES
Acrolein	150.00	0.00	129.60	119.77	86	80	7	22-169	YES
1,1-Dichloroethene	20.00	0.00	26.38	27.07	132	135	-2	1-234	YES
Freon 113	20.00	3.03	24.88	26.04	109	115	-5	72-174	YES
Acetone	150.00	21.19	137.78	133.39	78	75	4	19-150	YES
Methyl Iodide	20.00	0.00	22.66	23.01	113	115	-2	45-130	YES
Carbon Disulfide	150.00	0.00	179.79	182.59	120	122	-2	29-183	YES
Allyl Chloride	20.00	0.00	23.97	24.34	120	122	-2	55-142	YES
Methylene Chloride	20.00	5.10	23.97	23.72	94	93	1	1-221	YES
t-Butyl Alcohol	200.00	0.00	178.87	192.71	89	96	-8	25-195	YES
Acrylonitrile	150.00	0.00	135.09	140.29	90	94	-4	51-138	YES
Methyl t-Butyl Ether	20.00	0.00	18.58	20.50	93	102	-9	80-123	YES
trans-1,2-Dichloroethene	20.00	0.00	24.33	24.93	122	125	-2	54-156	YES
1,1-Dichloroethane	20.00	4.57	28.27	29.94	118	127	-7	59-155	YES
cis-1,2-Dichloroethene	20.00	0.00	22.64	22.70	113	114	-1	54-156	YES
Propionitrile	150.00	0.00	122.65	133.30	82	89	-8	56-139	YES
Ethyl Acetate	80.00	0.00	69.23	75.41	86	94	-9	69-147	YES
Methacrylonitrile	150.00	0.00	135.11	143.43	90	96	-6	69-128	YES
Tetrahydrofuran	20.00	0.00	19.55	20.18	98	101	-3	30-200	YES
Chloroform	20.00	0.00	23.77	24.97	119	125	-5	51-138	YES
Cyclohexane	20.00	0.00	23.79	24.66	119	123	-3	30-200	YES
1,2-Dichloroethane	20.00	0.00	22.28	23.63	111	118	-6	49-155	YES
Vinyl Acetate	100.00	0.00	89.38	85.97	89	86	3	19-190	YES
2-Butanone	150.00	7.21	135.81	142.99	86	90	-4	22-167	YES
1,1,1-Trichloroethane	20.00	0.00	24.49	25.45	122	127	-4	52-162	YES
Carbon Tetrachloride	20.00	0.00	25.45	27.23	127	136	-7	70-140	YES
Isobutyl Alcohol	500.00	0.00	374.01	407.06	75	81	-8	1-234	YES
Benzene	20.00	0.00	22.75	22.65	114	113	1	37-151	YES
Trichloroethene	20.00	0.00	22.67	22.92	113	114	-1	71-157	YES

N/C = Could not calculate

Ent. by ________

Lab Chronicle: ________

Ver. by ________

* %RPD for this compound exceeds method specified limit.

Lancaster Laboratories, Inc.

GC/MS Volatiles Matrix Spike/Spike Duplicate Recoveries

Unspiked: ^JU005
GMMW1 2333870
Method: 1508
Instrument: HP03047

Matrix spike: ^JU006
GMMW1MS 2333870
Matrix/Level: WL
Dilution Factor: 1.0

Spike Duplicate: ^JU007
GMMW1MSD 2333870
Batch: J951771AA

COMPOUND NAME	SPIKE LEVEL	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
1,2-Dichloropropane	20.00	0.00	22.82	23.40	114	117	-2	1-210	YES
Methyl Methacrylate	20.00	0.00	18.24	18.58	91	93	-2	66-131	YES
Dibromomethane	20.00	0.00	19.52	20.66	98	103	-5	76-136	YES
1,4-Dioxane	500.00	0.00	363.11	407.32	73	81	-10	3-164	YES
n-Propyl Acetate	20.00	0.00	16.51	18.29	82	91	-10	30-200	YES
Bromodichloromethane	20.00	0.00	23.20	23.61	116	118	-2	35-155	YES
2-Nitropropane	20.00	0.00	19.62	19.34	98	97	1	54-106	YES
2-Chloroethyl Vinyl Ether	20.00	0.00	0.00	0.00	0	0	N/C	1-305	NO
cis-1,3-Dichloropropene	20.00	0.00	21.33	21.61	107	108	-1	1-227	YES
trans-1,3-Dichloropropene	7.60	0.00	7.81	7.91	103	104	-1	17-183	YES
1,1,2-Trichloroethane	20.00	0.00	20.73	21.51	104	108	-4	52-150	YES
Dibromochloromethane	20.00	0.00	20.73	21.57	104	108	-4	53-149	YES
Bromoform	20.00	0.00	18.91	19.54	94	98	-4	45-169	YES
trans-1,4-Dichloro-2-Buten	150.00	0.00	137.87	146.43	92	98	-6	56-141	YES
4-Methyl-2-Pentanone	100.00	0.00	81.54	88.86	82	89	-8	50-124	YES
Toluene	20.00	0.00	24.10	23.04	120	115	4	47-150	YES
Ethyl Methacrylate	20.00	0.00	18.52	18.76	93	94	-1	68-270	YES
Tetrachloroethene	20.00	1.67	25.38	26.06	118	122	-3	64-148	YES
2-Hexanone	100.00	0.00	81.79	87.59	82	88	-7	52-140	YES
1,2-Dibromoethane	20.00	0.00	19.14	19.13	96	96	0	45-135	YES
Chlorobenzene	20.00	0.00	22.78	22.86	114	114	0	37-160	YES
1,1,1,2-Tetrachloroethane	20.00	0.00	21.00	21.78	105	109	-4	23-149	YES
Ethylbenzene	20.00	0.00	22.73	22.63	114	113	1	37-162	YES
Isoamyl Acetate	20.00	0.00	17.59	17.97	88	90	-2	30-200	YES
Xylene (total)	60.00	0.00	68.82	68.72	115	114	1	61-165	YES
Styrene	20.00	0.00	22.75	22.79	114	114	0	74-136	YES
Cumene	20.00	0.00	21.34	22.60	107	113	-5	30-200	YES
1,1,2,2-Tetrachloroethane	20.00	0.00	19.21	18.91	96	94	2	46-157	YES
1,2,3-Trichloropropane	20.00	0.00	17.75	18.23	89	91	-2	72-125	YES
Pentachloroethane	20.00	0.00	18.69	19.80	93	99	-6	56-132	YES
1,3-Dichlorobenzene	20.00	0.00	19.92	21.26	100	106	-6	59-156	YES
1,4-Dichlorobenzene	20.00	0.00	20.04	21.06	100	105	-5	18-190	YES
1,2-Dichlorobenzene	20.00	0.00	19.29	19.81	96	99	-3	18-190	YES
1,2-Dibromo-3-Chloropropan	150.00	0.00	136.04	145.85	91	97	-6	40-154	YES

N/C = Could not calculate

Lab Chronicle: ____________________ Ent. by ________.

____________________ Ver. by ________.

* %RPD for this compound exceeds method specified limit.

8A

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: ______ SDG No.: _____.

Lab File ID (Standard): >JUQS1 Date Analyzed: 06/26/95

Instrument ID: HP03047 Time Analyzed: 08:00

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

		IS1(BCM) AREA #	RT	IS2(DFB) AREA #	RT	IS3(CBZ) AREA #	RT
	12 HOUR STD	39650	8.97	156921	10.58	108098	14.83
	UPPER LIMIT	79300		313842		216196	
	LOWER LIMIT	19825		78461		54049	
	EPA SAMPLE NO.						
01	VBLKJ99	38149	8.98	150683	10.58	106014	14.83
02	EWTB3	39232	8.97	152211	10.58	106885	14.82
03	LEW-3	36143	8.98	143157	10.58	100632	14.84
04	DC-2-	35620	8.96	142973	10.58	100658	14.84
05	UT001	38087	8.96	150241	10.57	102969	14.83
06	GMMW1	35450	8.97	141034	10.57	99517	14.83
07	GMMW1MS	40327	8.95	155841	10.57	105529	14.82
08	GMMW1MSD	36491	8.97	145197	10.59	100050	14.84
09	GMMW2	34949	8.97	137587	10.58	97706	14.84
10	GMMW4	35770	8.95	138086	10.57	98689	14.82
11	GMMW5	34076	8.98	136630	10.59	96776	14.83
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

UPPER LIMIT = + 100% of internal standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk.

FORM VIII VOA 1/87 Rev.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS   Contract: ____.

Lab Code: LANCAS   Case No.: ____.   SAS No. ____.   SDG No.: ____.

Instrument ID: HP03047   Calibration Date(s): 06/21/95   06/21/95

Calibration Times: 0059   0619

Matrix:(soil/water) WATER   Level:(low/med) LOW   Column:(pack/cap) CAP

Min $\overline{\text{RRF}}$ for SPCC(#) = 0.300 (0.10 for Bromoform) Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF 4= >JUL15   RRF 20= >JUL14
RRF 50= >JUL13   RRF100= >JUL17   RRF300= >JUL11

COMPOUND	RRF 4	RRF 20	RRF 50	RRF100	RRF300	$\overline{\text{RRF}}$	% RSD	CAL. METHOD
Dichlorodifluoromethane	2.667	2.191	2.394	2.595	2.538	2.477	7.6	AVG
Chloromethane	# .701	.644	.680	.787	.774	.717	8.6	AVG #
Vinyl Chloride	* .819	.709	.772	.912	.874	.817	9.8	AVG *
Bromomethane	1.427	1.234	1.307	1.444	1.395	1.361	6.5	AVG
Chloroethane	.523	.500	.546	.645	.594	.562	10.4	AVG
Trichlorofluoromethane	2.157	2.118	2.355	2.376	2.092	2.220	6.1	AVG
n-Pentane	1.245	1.043	1.179	1.261	1.216	1.189	7.4	AVG
Ethyl Ether	.627	.622	.632	.683	.656	.644	3.9	AVG
Furfuran	.976	.938	1.002	1.105	1.054	1.015	6.5	AVG
Acrolein	.082	.098	.103	.114	.104	.100	11.7	AVG
1,1-Dichloroethene	* .892	.928	1.009	1.083	1.036	.990	7.9	AVG *
Freon 113	2.865	1.976	2.220	2.655	2.648	2.473	14.7	AVG
Acetone	.338	.234	.244	.279	.244	.268	16.1	1STDEG
Methyl Iodide	3.595	3.184	3.411	4.122	4.187	3.700	11.9	AVG
Carbon Disulfide	2.422	2.094	2.281	2.823	2.913	2.506	14.0	AVG
2-Propanol	.036	.042	.044	.044	.046	.042	9.3	AVG
Allyl Chloride	1.257	1.179	1.289	1.383	1.324	1.286	5.9	AVG
Methylene Chloride	1.097	.970	1.014	1.041	.954	1.015	5.6	AVG
t-Butyl Alcohol	.089	.088	.092	.092	.104	.093	6.9	AVG
Acrylonitrile	.168	.187	.195	.201	.195	.189	6.7	AVG
Methyl t-Butyl Ether	2.450	2.261	2.230	2.185	2.023	2.230	6.9	AVG
trans-1,2-Dichloroethene	1.030	1.001	1.108	1.166	1.124	1.086	6.3	AVG
n-Hexane	.970	.854	.983	.988	.983	.956	6.0	AVG
1,1-Dichloroethane	# 1.732	1.740	1.912	1.899	1.859	1.828	4.7	AVG #
1-Propanol	.000	.002	.003	.003	.004	.003	53.1	1STDEG -
cis-1,2-Dichloroethene	1.052	1.077	1.129	1.168	1.054	1.096	4.6	AVG
Propionitrile	.060	.063	.066	.064	.070	.065	5.5	AVG
Ethyl Acetate	1.167	1.081	1.073	1.036	1.053	1.082	4.7	AVG
Methacrylonitrile	.233	.221	.239	.229	.254	.235	5.2	AVG
Tetrahydrofuran	.100	.191	.211	.194	.201	.179	25.2	1STDEG
Chloroform	* 2.631	2.596	2.758	2.703	2.698	2.677	2.4	AVG *
Cyclohexane	1.206	1.006	1.131	1.125	1.107	1.115	6.4	AVG
1,2-Dichloroethane	1.860	1.839	1.953	1.847	1.908	1.881	2.6	AVG
Vinyl Acetate	.036	.049	.055	.064	.064	.053	22.5	1STDEG

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS Contract: ____.

Lab Code: LANCAS Case No.: ____. SAS No. ____. SDG No.: ____.

Instrument ID: HP03047 Calibration Date(s): 06/21/95 06/21/95

Calibration Times: 0059 0619

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min $\overline{RRF}$ for SPCC(#) = 0.300 (0.10 for Bromoform) Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF 4= >JUL15 RRF 20= >JUL14
RRF 50= >JUL13 RRF100= >JUL17 RRF300= >JUL11

COMPOUND	RRF 4	RRF 20	RRF 50	RRF100	RRF300	$\overline{RRF}$	% RSD	CAL. METHOD
2-Butanone	.091	.083	.093	.093	.091	.090	4.5	AVG
1,1,1-Trichloroethane	.597	.586	.650	.628	.563	.605	5.7	AVG
Carbon Tetrachloride	.621	.593	.672	.631	.616	.627	4.6	AVG
Isobutyl Alcohol	.006	.006	.007	.006	.007	.006	5.9	AVG
Benzene	.631	.576	.604	.632	.577	.604	4.6	AVG
n-Heptane	.171	.142	.179	.175	.170	.167	8.8	AVG
n-Butanol	.004	.004	.005	.005	.005	.007	28.7	2NDDEG
Trichloroethene	.366	.356	.388	.395	.358	.372	4.8	AVG
1,2-Dichloropropane	* .249	.248	.253	.246	.239	.247	2.1	AVG *
Methyl Methacrylate	.167	.171	.175	.169	.169	.170	1.8	AVG
Dibromomethane	.426	.373	.385	.361	.367	.382	6.7	AVG
1,4-Dioxane	.002	.003	.003	.003	.003	.003	6.1	AVG
n-Propyl Acetate	.479	.416	.435	.412	.424	.433	6.3	AVG
Bromodichloromethane	.655	.673	.714	.694	.711	.689	3.7	AVG
2-Nitropropane	.084	.085	.087	.081	.085	.084	2.7	AVG
2-Chloroethyl Vinyl Ether	.162	.163	.175	.172	.177	.170	4.1	AVG
cis-1,3-Dichloropropene	.438	.445	.464	.466	.441	.451	2.9	AVG
trans-1,3-Dichloropropene	.447	.449	.482	.478	.451	.462	3.7	AVG
1,1,2-Trichloroethane	.287	.281	.295	.282	.279	.285	2.2	AVG
Dibromochloromethane	.672	.720	.757	.711	.719	.716	4.2	AVG
Bromoform	# .508	.546	.573	.550	.554	.546	4.3	AVG #
trans-1,4-Dichloro-2-Butene	.111	.113	.123	.114	.129	.118	6.7	AVG
4-Methyl-2-Pentanone	.356	.370	.397	.396	.391	.382	4.8	AVG
Toluene	* 1.033	.965	1.051	1.106	1.023	1.036	4.9	AVG *
Ethyl Methacrylate	.488	.498	.532	.528	.538	.517	4.3	AVG
Tetrachloroethene	.464	.434	.500	.522	.468	.482	5.9	AVG
2-Hexanone	.232	.254	.271	.273	.270	.260	6.6	AVG
1,2-Dibromoethane	.727	.701	.750	.776	.757	.742	3.9	AVG
Chlorobenzene	# .876	.854	.921	.932	.897	.896	3.6	AVG #
1,1,1,2-Tetrachloroethane	.610	.568	.609	.609	.612	.602	3.1	AVG
Ethylbenzene	* .373	.346	.386	.399	.357	.372	5.7	AVG *
m+p-Xylene	.478	.458	.509	.512	.491	.490	4.5	AVG
Isoamyl Acetate	.370	.358	.383	.389	.397	.379	4.1	AVG
o-Xylene	.426	.438	.475	.482	.438	.452	5.5	AVG

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS Contract: ____.

Lab Code: LANCAS Case No.: ____. SAS No. ____. SDG No.: ____.

Instrument ID: HP03047 Calibration Date(s): 06/21/95 06/21/95

Calibration Times: 0059 0619

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min $\overline{RRF}$ for SPCC(#) = 0.300 (0.10 for Bromoform) Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF 4= >JUL15 RRF 20= >JUL14
RRF 50= >JUL13 RRF100= >JUL17 RRF300= >JUL11

COMPOUND	RRF 4	RRF 20	RRF 50	RRF100	RRF300	$\overline{RRF}$	% RSD	CAL. METHOD
Styrene	.769	.782	.849	.851	.838	.818	4.8	AVG
Cumene	1.464	1.237	1.384	1.436	1.433	1.391	6.5	AVG
Cyclohexanone	.011	.011	.012	.012	.011	.011	4.6	AVG
1,1,2,2-Tetrachloroethane #	.648	.650	.685	.674	.630	.657	3.3	AVG #
1,2,3-Trichloropropane	.218	.207	.218	.219	.213	.215	2.3	AVG
Pentachloroethane	.424	.409	.451	.432	.432	.430	3.6	AVG
1,3-Dichlorobenzene	.853	.746	.813	.833	.809	.811	5.0	AVG
1,4-Dichlorobenzene	.932	.845	.896	.917	.873	.893	3.9	AVG
Benzyl Chloride	.839	.804	.903	.957	.939	.888	7.3	AVG
1,3-Diethylbenzene	.990	.812	.916	.899	.834	.890	7.9	AVG
1,4-Diethylbenzene	.785	.670	.742	.727	.657	.716	7.4	AVG
1,2-Dichlorobenzene	.884	.773	.812	.820	.799	.818	5.0	AVG
1,2-Diethylbenzene	.969	.803	.873	.831	.768	.849	9.1	AVG
1,2-Dibromo-3-Chloropropane	.185	.195	.207	.190	.168	.189	7.5	AVG
1,2-Dichloroethane-d4	2.123	1.724	1.858	1.692	1.813	1.842	9.3	AVG
Toluene-d8	1.212	1.083	1.164	1.129	1.197	1.157	4.5	AVG
4-Bromofluorobenzene	1.140	.936	.982	.914	.971	.989	9.0	AVG

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03047 Calibration Date: 06/26/95 Time: 0800

Lab File ID: >JUQS1 Init. Calib. Date(s): 06/21/95 06/21/95

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min RRF50 for SPCC(#)= 0.300 (0.10 for Bromoform) Max %Drift for CCC(*)= 20.0%

COMPOUND	RRF	RRF 50	ACTUAL CONC.	TRUE CONC.	% DRIFT
Dichlorodifluoromethane	2.477	2.750	55.50	50.0	-11.0
Chloromethane	# .717	.741	51.65	50.0	-3.3#
Vinyl Chloride	* .817	.903	55.25	50.0	-10.5*
Bromomethane	1.361	1.429	52.47	50.0	-4.9
Chloroethane	.562	.619	55.15	50.0	-10.3
Trichlorofluoromethane	2.220	2.195	49.45	50.0	1.1
Ethyl Ether	.644	.668	51.86	50.0	-3.7
Acrolein	.100	.090	449.58	500.0	10.1
1,1-Dichloroethene	* .990	1.103	55.75	50.0	-11.5*
Freon 113	2.473	2.872	116.16	100.0	-16.2
Acetone	.268	.220	84.53	100.0	15.5
Methyl Iodide	3.700	3.982	53.81	50.0	-7.6
Carbon Disulfide	2.506	2.519	50.25	50.0	-.5
Allyl Chloride	1.286	1.345	52.29	50.0	-4.6
Methylene Chloride	1.015	1.039	51.17	50.0	-2.3
t-Butyl Alcohol	.093	.068	182.73	250.0	26.9
Acrylonitrile	.189	.166	438.71	500.0	12.3
Methyl t-Butyl Ether	2.230	2.051	45.98	50.0	8.0
trans-1,2-Dichloroethene	1.086	1.145	52.70	50.0	-5.4
1,1-Dichloroethane	# 1.828	1.946	53.22	50.0	-6.4#
cis-1,2-Dichloroethene	1.096	1.154	52.62	50.0	-5.2
Propionitrile	.065	.054	207.94	250.0	16.8
Ethyl Acetate	1.082	.887	40.98	50.0	18.0
Methacrylonitrile	.235	.207	110.31	125.0	11.8
Tetrahydrofuran	.179	.144	36.79	50.0	26.4
Chloroform	* 2.677	2.908	54.30	50.0	-8.6*
Cyclohexane	1.115	1.141	51.18	50.0	-2.4
1,2-Dichloroethane	1.881	1.885	50.09	50.0	-.2
Vinyl Acetate	.053	.050	42.15	50.0	15.7
2-Butanone	.090	.068	75.50	100.0	24.5
1,1,1-Trichloroethane	.605	.643	53.20	50.0	-6.4
Carbon Tetrachloride	.627	.691	55.15	50.0	-10.3
Isobutyl Alcohol	.006	.004	454.21	625.0	27.3
Benzene	.604	.617	51.08	50.0	-2.2

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03047 Calibration Date: 06/26/95 Time: 0800

Lab File ID: >JUQS1 Init. Calib. Date(s): 06/21/95 06/21/95

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min RRF50 for SPCC(#)= 0.300 (0.10 for Bromoform) Max %Drift for CCC(*)= 20.0%

COMPOUND	RRF	RRF 50	ACTUAL CONC.	TRUE CONC.	% DRIFT
Trichloroethene	.372	.383	51.39	50.0	-2.8
1,2-Dichloropropane	* .247	.247	49.99	50.0	.0*
Methyl Methacrylate	.170	.153	45.03	50.0	9.9
Dibromomethane	.382	.370	48.43	50.0	3.1
1,4-Dioxane	.003	.002	400.94	625.0	35.8
n-Propyl Acetate	.433	.354	40.85	50.0	18.3
Bromodichloromethane	.689	.734	53.22	50.0	-6.4
2-Nitropropane	.084	.070	82.75	100.0	17.3
2-Chloroethyl Vinyl Ether	.170	.156	91.83	100.0	8.2
cis-1,3-Dichloropropene	.451	.450	49.87	50.0	.3
trans-1,3-Dichloropropene	.462	.446	18.35	19.0	3.4
1,1,2-Trichloroethane	.285	.273	47.98	50.0	4.0
Dibromochloromethane	.716	.719	50.23	50.0	-.5
Bromoform	# .546	.518	47.41	50.0	5.2#
trans-1,4-Dichloro-2-Butene	.118	.104	110.18	125.0	11.9
4-Methyl-2-Pentanone	.382	.322	84.16	100.0	15.8
Toluene	* 1.036	1.034	49.90	50.0	.2*
Ethyl Methacrylate	.517	.467	45.22	50.0	9.6
Tetrachloroethene	.482	.502	52.07	50.0	-4.1
2-Hexanone	.260	.211	81.27	100.0	18.7
1,2-Dibromoethane	.742	.684	46.07	50.0	7.9
Chlorobenzene	# .896	.914	51.01	50.0	-2.0#
1,1,1,2-Tetrachloroethane	.602	.643	53.41	50.0	-6.8
Ethylbenzene	* .372	.385	51.71	50.0	-3.4*
m+p-Xylene	.490	.501	102.39	100.0	-2.4
Isoamyl Acetate	.379	.344	45.32	50.0	9.4
o-Xylene	.452	.463	51.20	50.0	-2.4
Styrene	.818	.834	51.00	50.0	-2.0
Cumene	1.391	1.391	50.02	50.0	-.0
1,1,2,2-Tetrachloroethane	# .657	.576	43.83	50.0	12.3#
1,2,3-Trichloropropane	.215	.189	44.01	50.0	12.0
Pentachloroethane	.430	.461	53.61	50.0	-7.2
1,3-Dichlorobenzene	.811	.798	49.23	50.0	1.5
1,4-Dichlorobenzene	.893	.888	49.74	50.0	.5

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03047 Calibration Date: 06/26/95 Time: 0800

Lab File ID: >JUQS1 Init. Calib. Date(s): 06/21/95 06/21/95

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min RRF50 for SPCC(#)= 0.300 (0.10 for Bromoform) Max %Drift for CCC(*)= 20.0%

COMPOUND	$\overline{RRF}$	RRF 50	ACTUAL CONC.	TRUE CONC.	% DRIFT
1,2-Dichlorobenzene	.818	.792	48.42	50.0	3.2
1,2-Dibromo-3-Chloropropane	.189	.160	42.47	50.0	15.1
1,2-Dichloroethane-d4	1.842	1.806	49.02	50.0	2.0
Toluene-d8	1.157	1.128	48.77	50.0	2.5
4-Bromofluorobenzene	.989	.934	47.23	50.0	5.5

5B

SEMIVOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: LANCASTER LABS   Contract: _____.

Lab Code: LANCAS   Case No.: _____.   SAS No.: _____.   SDG No.: _____.

Lab File ID: >Z730Z   DFTPP Injection Date: 07/05/95

Instrument ID: HP02550   DFTPP Injection Time: 15:40

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 80.0% of mass 198	58.0
68	Less than 2.0% of mass 69	0.0 (0.0)1
69	Mass 69 relative abundance	66.2
70	Less than 2.0% of mass 69	0.0 (0.0)1
127	25.0 - 75.0% of mass 198	44.0
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 to 9.0% of mass 198	6.6
275	10.0 - 30.0% of mass 198	19.9
365	Greater than 0.75% of mass 198	1.87
441	Present, but less than mass 443	8.8
442	40.0 - 110.0% of mass 198	59.9
443	15.0 - 24.0% of mass 442	11.4 (19.0)2

1-Value is % mass 69   2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	CLP1815	>Z7301	07/05/95	16:08
02	0303BMSD	2337099	>C7301	07/05/95	18:14
03	0400B	2337092	>C7302	07/05/95	19:07
04	0303BMS	2337098	>C7304	07/05/95	21:44
05	0405B	2337094	>C7305	07/05/95	22:45
06					
07					
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11					
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22					

FORM V SV   3/90

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

	EPA SAMPLE NO.	S1 (NBZ) #	S2 (FBP) #	S3 (TPH) #	S4 (PHL) #	S5 (2FP) #	S6 (TBP) #	OTHER	TOT OUT
01	SBLKWA1714	75	78	77	38	54	89		0
02	171WALCS	86	85	88	43	61	108		0
03	171WALCSD	91	85	92	42	60	103		0
04	171WAUS	88	86	73	43	62	103		0
05	171WAMS	93	88	92	44	64	106		0
06	171WAMSD	85	83	94	41	58	106		0
07	SEDFB	81	83	80	37	56	81		0
08	SDFB2	79	81	76	37	58	78		0
09	NVBRM	59	80	70	39	59	90		0
10	2HP6-	80	85	74	38	59	77		0
11									
12									
13									
14									
15									
16									
17									
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21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

		QC LIMITS
S1 (NBZ)	= Nitrobenzene-d5	(35-114)
S2 (FBP)	= 2-Fluorobiphenyl	(43-116)
S3 (TPH)	= Terphenyl-d14	(33-141)
S4 (PHL)	= Phenol-d6	(10-94)
S5 (2FP)	= 2-Fluorophenol	(21-100)
S6 (TBP)	= 2,4,6-Tribromophenol	(10-123)

\# Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Lab File ID: >D3750 Lab Sample ID: SBLKWA171

Date Extracted: 06/20/95 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 06/21/95 Time Analyzed: 13:00

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: HP03301

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	171WALCS	171WALCS	>D3751	06/21/95
02	171WALCSD	171WALCSD	>D3752	06/21/95
03	171WAUS	171WAUS	>D3753	06/21/95
04	171WAMS	171WAMS	>D3754	06/21/95
05	171WAMSD	171WAMSD	>D3755	06/21/95
06	SEDFB	2329395	>D3801	06/22/95
07	SDFB2	2330033	>D3802	06/22/95
08	NVBRM	2325395	>D3803	06/22/95
09	2HP6-	2330176	>D3804	06/22/95

COMMENTS: ______________________________

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKWA1714

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Matrix: (soil/water) WATER Lab Sample ID: SBLKWA171

Sample wt/vol: 1000 (g/mL) ML Lab File ID: >D3750

Level: (low/med) LOW Date Received:

% Moisture: not dec. _____. dec. _____. Date Extracted: 06/20/95

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 06/21/95

GPC Cleanup: (Y/N) N pH: _____. Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
110-86-1--------	Pyridine	10	U
62-75-9---------	N-Nitrosodimethylamine	10	U
108-95-2--------	Phenol	10	U
111-44-4--------	bis(2-Chloroethyl)ether	10	U
95-57-8---------	2-Chlorophenol	10	U
541-73-1--------	1,3-Dichlorobenzene	10	U
106-46-7--------	1,4-Dichlorobenzene	10	U
95-50-1---------	1,2-Dichlorobenzene	10	U
95-48-7---------	2-Methylphenol	10	U
108-60-1--------	bis(2-Chloroisopropyl)ether	10	U
65794-96-9------	3 or 4-Methylphenol	10	U
621-64-7--------	N-Nitroso-di-n-propylamine	10	U
67-72-1---------	Hexachloroethane	10	U
98-95-3---------	Nitrobenzene	10	U
78-59-1---------	Isophorone	10	U
88-75-5---------	2-Nitrophenol	10	U
105-67-9--------	2,4-Dimethylphenol	10	U
111-91-1--------	bis(2-Chloroethoxy)methane	10	U
120-83-2--------	2,4-Dichlorophenol	10	U
120-82-1--------	1,2,4-Trichlorobenzene	10	U
91-20-3---------	Naphthalene	10	U
87-68-3---------	Hexachlorobutadiene	10	U
59-50-7---------	4-Chloro-3-methylphenol	10	U
77-47-4---------	Hexachlorocyclopentadiene	10	U
88-06-2---------	2,4,6-Trichlorophenol	10	U
95-95-4---------	2,4,5-Trichlorophenol	10	U
91-58-7---------	2-Chloronaphthalene	10	U
131-11-3--------	Dimethylphthalate	10	U
606-20-2--------	2,6-Dinitrotoluene	10	U
208-96-8--------	Acenaphthylene	10	U
83-32-9---------	Acenaphthene	10	U
51-28-5---------	2,4-Dinitrophenol	25	U
100-02-7--------	4-Nitrophenol	25	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKWA1714

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Matrix: (soil/water) WATER Lab Sample ID: SBLKWA171

Sample wt/vol: 1000 (g/mL) ML Lab File ID: >D3750

Level: (low/med) LOW Date Received:

% Moisture: not dec. _____. dec. _____. Date Extracted: 06/20/95

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 06/21/95

GPC Cleanup: (Y/N) N pH: _____. Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
86-30-6	N-Nitrosodiphenylamine (1)	10	U
122-66-7	1,2-Diphenylhydrazine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	25	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
92-87-5	Benzidine	50	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo(a)anthracene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
218-01-9	Chrysene	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from Diphenylamine

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

ab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No: _____. SDG No.: _____.

Matrix Spike - EPA Sample No.: SW-04

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
Phenol	75.00	0.00	53.16	71	12-110
2-Chlorophenol	75.00	0.00	52.35	70	27-123
1,4-Dichlorobenzene	50.00	0.00	32.87	66	36- 97
N-Nitroso-di-n-prop.(1)	50.00	0.00	32.76	66	41-116
1,2,4-Trichlorobenzene	50.00	0.00	33.89	68	39- 98
4-Chloro-3-methylphenol	75.00	0.00	46.96	63	23- 97
Acenaphthene	50.00	0.00	35.00	70	46-118
4-Nitrophenol	75.00	0.00	55.06	73	10- 80
2,4-Dinitrotoluene	50.00	0.00	37.31	75	24- 96
Pentachlorophenol	75.00	0.00	63.71	85	9-103
Pyrene	50.00	0.00	39.72	79	26-127

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	75.00	49.33	66	7	42	12-110
2-Chlorophenol	75.00	48.42	65	7	40	27-123
1,4-Dichlorobenzene	50.00	29.99	60	10	28	36- 97
N-Nitroso-di-n-prop.(1)	50.00	30.13	60	10	38	41-116
1,2,4-Trichlorobenzene	50.00	31.40	63	8	28	39- 98
4-Chloro-3-methylphenol	75.00	44.71	60	5	42	23- 97
Acenaphthene	50.00	32.25	65	7	31	46-118
4-Nitrophenol	75.00	58.37	78	7	50	10- 80
2,4-Dinitrotoluene	50.00	35.96	72	4	38	24- 96
Pentachlorophenol	75.00	64.38	86	1	50	9-103
Pyrene	50.00	39.34	79	0	31	26-127

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 11 outside limits
Spike Recovery: 0 out of 22 outside limits

COMMENTS: ________________________________

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS   Lab Code: LANCAS   Instrument: HP03301

SW846 METHOD 8270   SPIKE LEVEL: 100 UG/ML   AMT USED: 1000.

SAMPLE SPIKE LEVEL: 100.UG/L   % MOISTURE 0. DILUTION: 1

US SAMPLE: 171WAUS 171WAUS   MS SAMPLE: 171WAMS 171WAMS   MSD SAMPLE: 171WAMSD 171WAMSD

COMPOUND NAME	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
N-Nitrosodimethylamine	0.00	71.19	63.55	71	64	11.00	35.0-100.8	YES
Phenol	0.00	50.36	47.69	50	48	5.00	5.0-112.0	YES
bis(2-Chloroethyl)ether	0.00	91.95	85.37	92	85	7.00	12.0-158.0	YES
2-Chlorophenol	0.00	93.27	87.54	93	88	6.00	23.0-134.0	YES
1,3-Dichlorobenzene	0.00	87.92	79.61	88	80	10.00	1.0-172.0	YES
1,4-Dichlorobenzene	0.00	89.59	81.76	90	82	9.00	20.0-124.0	YES
1,2-Dichlorobenzene	0.00	92.62	84.48	93	84	9.00	32.0-129.0	YES
bis(2-Chloroisopropyl)ether	0.00	98.40	92.17	98	92	7.00	36.0-166.0	YES
N-Nitroso-di-n-propylamine	0.00	110.79	104.31	111	104	6.00	1.0-230.0	YES
Hexachloroethane	0.00	80.42	73.16	80	73	9.00	40.0-113.0	YES
Nitrobenzene	0.00	100.44	93.63	100	94	7.00	35.0-180.0	YES
Isophorone	0.00	91.13	86.68	91	87	5.00	21.0-196.0	YES
2-Nitrophenol	0.00	97.51	94.45	98	94	3.00	29.0-182.0	YES
2,4-Dimethylphenol	0.00	84.53	77.29	84	77	9.00	32.0-119.0	YES
bis(2-Chloroethoxy)methane	0.00	89.50	84.21	89	84	6.00	33.0-184.0	YES
2,4-Dichlorophenol	0.00	95.88	91.26	96	91	5.00	39.0-135.0	YES
1,2,4-Trichlorobenzene	0.00	89.02	82.33	89	82	8.00	44.0-142.0	YES
Naphthalene	0.00	90.10	83.34	90	83	8.00	21.0-133.0	YES
Hexachlorobutadiene	0.00	82.27	73.61	82	74	11.00	24.0-116.0	YES
4-Chloro-3-methylphenol	0.00	97.77	95.61	98	96	2.00	22.0-147.0	YES
Hexachlorocyclopentadiene	0.00	138.52	88.83	69	44	44.00	1.0-100.0	YES
2,4,6-Trichlorophenol	0.00	97.75	92.93	98	93	5.00	37.0-144.0	YES
2-Chloronaphthalene	0.00	89.52	85.35	90	85	5.00	60.0-118.0	YES
Dimethylphthalate	0.00	90.86	87.84	91	88	3.00	1.0-112.0	YES
2,6-Dinitrotoluene	0.00	86.36	84.61	86	85	2.00	50.0-158.0	YES
Acenaphthylene	0.00	90.55	85.28	90	85	6.00	33.0-145.0	YES
Acenaphthene	0.00	89.05	85.24	89	85	4.00	47.0-145.0	YES
2,4-Dinitrophenol	0.00	94.45	92.15	94	92	2.00	1.0-191.0	YES
4-Nitrophenol	0.00	47.71	46.64	48	47	2.00	1.0-132.0	YES
2,4-Dinitrotoluene	0.00	103.67	102.08	104	102	2.00	39.0-139.0	YES
1-Naphthylamine	0.00	41.80	36.84	42	37	13.00	1.0-100.0	YES
2-Naphthylamine	0.00	55.40	44.65	55	45	22.00	1.0-100.0	YES
Diethylphthalate	0.00	95.85	93.03	96	93	3.00	1.0-114.0	YES
4-Chlorophenyl-phenylether	0.00	92.22	88.60	92	88	4.00	25.0-158.0	YES
Fluorene	0.00	90.96	87.93	91	88	3.00	59.0-121.0	YES
4,6-Dinitro-2-methylphenol	0.00	88.46	86.50	88	86	2.00	1.0-181.0	YES
N-Nitrosodiphenylamine	0.00	86.53	83.21	86	83	4.00	37.8-147.0	YES
1,2-Diphenylhydrazine	0.00	86.10	82.37	86	82	4.00	25.7-124.9	YES
4-Bromophenyl-phenylether	0.00	92.83	88.97	93	89	4.00	53.0-127.0	YES

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS Lab Code: LANCAS Instrument: HP03301

SW846 METHOD 8270 SPIKE LEVEL: 100 UG/ML AMT USED: 1000.

SAMPLE SPIKE LEVEL: 100.UG/L % MOISTURE 0. DILUTION: 1

US SAMPLE: 171WAUS 171WAUS MS SAMPLE: 171WAMS 171WAMS MSD SAMPLE: 171WAMSD 171WAMSD

COMPOUND NAME	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
Hexachlorobenzene	0.00	93.90	90.89	94	91	3.00	1.0-152.0	YES
Pentachlorophenol	0.00	71.04	78.11	71	78	-9.00	14.0-176.0	YES
Phenanthrene	0.00	89.59	85.11	90	85	5.00	54.0-120.0	YES
Anthracene	0.00	88.13	84.06	88	84	5.00	27.0-133.0	YES
Di-n-butylphthalate	0.00	97.28	90.78	97	91	7.00	1.0-118.0	YES
Fluoranthene	0.00	97.82	92.76	98	93	5.00	26.0-137.0	YES
Benzidine	0.00	409.22	309.00	82	62	28.00	1.0-155.0	YES
Pyrene	0.00	86.40	89.91	86	90	-4.00	52.0-115.0	YES
Butylbenzylphthalate	0.00	94.76	93.22	95	93	2.00	1.0-152.0	YES
3,3'-Dichlorobenzidine	0.00	95.40	87.15	95	87	9.00	1.0-262.0	YES
Benzo(a)anthracene	0.00	89.52	86.79	90	87	3.00	33.0-143.0	YES
bis(2-Ethylhexyl)phthalate	0.00	94.36	92.14	94	92	2.00	8.0-158.0	YES
Chrysene	0.00	91.49	90.70	91	91	1.00	17.0-168.0	YES
Di-n-octylphthalate	0.00	90.04	93.87	90	94	-4.00	4.0-146.0	YES
Benzo(b)fluoranthene	0.00	88.77	89.34	89	89	-1.00	24.0-159.0	YES
Benzo(k)fluoranthene	0.00	90.41	89.11	90	89	1.00	11.0-163.0	YES
Benzo(a)pyrene	0.00	89.68	86.37	90	86	4.00	17.0-163.0	YES
Indeno(1,2,3-cd)pyrene	0.00	88.00	81.41	88	81	8.00	1.0-171.0	YES
Dibenz(a,h)anthracene	0.00	86.73	81.84	87	82	6.00	1.0-227.0	YES
Benzo(g,h,i)perylene	0.00	86.02	79.43	86	79	8.00	1.0-219.0	YES

COMMENTS:

WATER SEMIVOLATILE QUALITY CONTROL REFERENCE SAMPLE RECOVERY

LAB NAME: LANCASTER LABS LAB CODE: LANCAS INSTRUMENT: HP03301

SW846 METHOD 8270 SPIKE LEVEL: 100 UG/L

LCS SAMPLE NO: 171WALCS 171WALCS

COMPOUND NAME	EXTRACT CONC UG/L	QCREF REC %	RANGE LOWER-UPPER	IN SPEC
N-Nitrosodimethylamine	68.92	69	35.0- 100.8	YES
Phenol	48.72	49	5.0- 112.0	YES
bis(2-Chloroethyl)ether	94.39	94	12.0- 158.0	YES
2-Chlorophenol	92.50	92	23.0- 134.0	YES
1,3-Dichlorobenzene	85.86	86	1.0- 172.0	YES
1,4-Dichlorobenzene	88.26	88	20.0- 124.0	YES
1,2-Dichlorobenzene	91.46	91	32.0- 129.0	YES
bis(2-Chloroisopropyl)ether	101.78	102	36.0- 166.0	YES
N-Nitroso-di-n-propylamine	110.79	111	1.0- 230.0	YES
Hexachloroethane	74.98	75	40.0- 113.0	YES
Nitrobenzene	99.22	99	35.0- 180.0	YES
Isophorone	92.80	93	21.0- 196.0	YES
2-Nitrophenol	91.79	92	29.0- 182.0	YES
2,4-Dimethylphenol	80.92	81	32.0- 119.0	YES
bis(2-Chloroethoxy)methane	90.28	90	33.0- 184.0	YES
2,4-Dichlorophenol	93.31	93	39.0- 135.0	YES
1,2,4-Trichlorobenzene	84.99	85	44.0- 142.0	YES
Naphthalene	88.58	88	21.0- 133.0	YES
Hexachlorobutadiene	71.61	72	24.0- 116.0	YES
4-Chloro-3-methylphenol	96.46	96	22.0- 147.0	YES
Hexachlorocyclopentadiene	115.53	58	1.0- 100.0	YES
2,4,6-Trichlorophenol	93.96	94	37.0- 144.0	YES
2-Chloronaphthalene	88.09	88	60.0- 118.0	YES
Dimethylphthalate	86.59	86	1.0- 112.0	YES
2,6-Dinitrotoluene	87.41	87	50.0- 158.0	YES
Acenaphthylene	87.90	88	33.0- 145.0	YES
Acenaphthene	87.91	88	47.0- 145.0	YES
2,4-Dinitrophenol	99.86	100	1.0- 191.0	YES
4-Nitrophenol	47.64	48	1.0- 132.0	YES
2,4-Dinitrotoluene	104.96	105	39.0- 139.0	YES
1-Naphthylamine	40.76	41	1.0- 100.0	YES
2-Naphthylamine	52.41	52	1.0- 100.0	YES
Diethylphthalate	96.64	97	1.0- 114.0	YES
4-Chlorophenyl-phenylether	91.82	92	25.0- 158.0	YES
Fluorene	91.73	92	59.0- 121.0	YES
4,6-Dinitro-2-methylphenol	88.46	88	1.0- 181.0	YES
N-Nitrosodiphenylamine	82.97	83	37.8- 147.0	YES
1,2-Diphenylhydrazine	87.54	88	25.7- 124.9	YES
4-Bromophenyl-phenylether	92.08	92	53.0- 127.0	YES

WATER SEMIVOLATILE QUALITY CONTROL REFERENCE SAMPLE RECOVERY

LAB NAME: LANCASTER LABS

LAB CODE: LANCAS

INSTRUMENT: HP03301

SW846 METHOD 8270

SPIKE LEVEL: 100 UG/L

LCS SAMPLE NO: 171WALCS 171WALCS

COMPOUND NAME	EXTRACT CONC UG/L	QCREF REC %	RANGE LOWER-UPPER	IN SPEC
Hexachlorobenzene	94.46	94	1.0- 152.0	YES
Pentachlorophenol	79.44	79	14.0- 176.0	YES
Phenanthrene	88.96	89	54.0- 120.0	YES
Anthracene	89.44	89	27.0- 133.0	YES
Di-n-butylphthalate	98.70	99	1.0- 118.0	YES
Fluoranthene	101.20	101	26.0- 137.0	YES
Benzidine	319.00	64	1.0- 155.0	YES
Pyrene	85.98	86	52.0- 115.0	YES
Butylbenzylphthalate	94.12	94	1.0- 152.0	YES
3,3'-Dichlorobenzidine	91.48	91	1.0- 262.0	YES
Benzo(a)anthracene	91.01	91	33.0- 143.0	YES
bis(2-Ethylhexyl)phthalate	95.20	95	8.0- 158.0	YES
Chrysene	92.76	93	17.0- 168.0	YES
Di-n-octylphthalate	95.22	95	4.0- 146.0	YES
Benzo(b)fluoranthene	92.11	92	24.0- 159.0	YES
Benzo(k)fluoranthene	92.30	92	11.0- 163.0	YES
Benzo(a)pyrene	86.47	86	17.0- 163.0	YES
Indeno(1,2,3-cd)pyrene	87.25	87	1.0- 171.0	YES
Dibenz(a,h)anthracene	87.06	87	1.0- 227.0	YES
Benzo(g,h,i)perylene	84.92	85	1.0- 219.0	YES

COMMENTS:

WATER SEMIVOLATILE LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS	Lab Code: LANCAS	Instrument: HP03301
SW846 METHOD 8270	SPIKE LEVEL: 100 UG/ML	AMT USED: 1000.
SAMPLE SPIKE LEVEL: 100.UG/L	% MOISTURE 0. DILUTION: 1	
LCS SAMPLE: 171WALCS 171WALCS	LCSD SAMPLE: 171WALCSD 171WALCSD	

COMPOUND NAME	LCS CONC UG/L	LCSD CONC UG/L	LCS REC %	LCSD REC %	RANGE LOWER-UPPER	IN SPEC	RPD %	RPD MAX	RPD IN SPEC
N-Nitrosodimethylamine	68.92	67.34	69	67	35.0-100.8	YES	2.00	30.0	YES
Phenol	48.72	48.17	49	48	5.0-112.0	YES	1.00	30.0	YES
bis(2-Chloroethyl)ether	94.39	92.54	94	92	12.0-158.0	YES	2.00	30.0	YES
2-Chlorophenol	92.50	92.00	92	92	23.0-134.0	YES	1.00	30.0	YES
1,3-Dichlorobenzene	85.86	83.63	86	84	1.0-172.0	YES	3.00	30.0	YES
1,4-Dichlorobenzene	88.26	85.65	88	86	20.0-124.0	YES	3.00	30.0	YES
1,2-Dichlorobenzene	91.46	90.83	91	91	32.0-129.0	YES	1.00	30.0	YES
bis(2-Chloroisopropyl)ether	101.78	103.45	102	103	36.0-166.0	YES	-2.00	30.0	YES
N-Nitroso-di-n-propylamine	110.79	113.39	111	113	1.0-230.0	YES	-2.00	30.0	YES
Hexachloroethane	74.98	77.08	75	77	40.0-113.0	YES	-3.00	30.0	YES
Nitrobenzene	99.22	103.20	99	103	35.0-180.0	YES	-4.00	30.0	YES
Isophorone	92.80	95.98	93	96	21.0-196.0	YES	-3.00	30.0	YES
2-Nitrophenol	91.79	97.94	92	98	29.0-182.0	YES	-6.00	30.0	YES
2,4-Dimethylphenol	80.92	83.22	81	83	32.0-119.0	YES	-3.00	30.0	YES
bis(2-Chloroethoxy)methane	90.28	91.85	90	92	33.0-184.0	YES	-2.00	30.0	YES
2,4-Dichlorophenol	93.31	95.20	93	95	39.0-135.0	YES	-2.00	30.0	YES
1,2,4-Trichlorobenzene	84.99	85.32	85	86	44.0-142.0	YES	-1.00	30.0	YES
Naphthalene	88.58	89.05	88	89	21.0-133.0	YES	-1.00	30.0	YES
Hexachlorobutadiene	71.61	73.95	72	74	24.0-116.0	YES	-3.00	30.0	YES
4-Chloro-3-methylphenol	96.46	97.65	96	98	22.0-147.0	YES	-1.00	30.0	YES
Hexachlorocyclopentadiene	115.53	117.21	58	59	1.0-100.0	YES	-1.00	30.0	YES
2,4,6-Trichlorophenol	93.96	95.71	94	96	37.0-144.0	YES	-2.00	30.0	YES
2-Chloronaphthalene	88.09	87.54	88	88	60.0-118.0	YES	1.00	30.0	YES
Dimethylphthalate	86.59	82.05	86	82	1.0-112.0	YES	5.00	30.0	YES
2,6-Dinitrotoluene	87.41	88.29	87	88	50.0-158.0	YES	-1.00	30.0	YES
Acenaphthylene	87.90	88.61	88	89	33.0-145.0	YES	-1.00	30.0	YES
Acenaphthene	87.91	89.00	88	89	47.0-145.0	YES	-1.00	30.0	YES
2,4-Dinitrophenol	99.86	99.50	100	99	1.0-191.0	YES	0.00	30.0	YES
4-Nitrophenol	47.64	47.72	48	48	1.0-132.0	YES	0.00	30.0	YES
2,4-Dinitrotoluene	104.96	104.01	105	104	39.0-139.0	YES	1.00	30.0	YES
1-Naphthylamine	40.76	40.49	41	40	1.0-100.0	YES	1.00	30.0	YES
2-Naphthylamine	52.41	52.32	52	52	1.0-100.0	YES	0.00	30.0	YES
Diethylphthalate	96.64	94.19	97	94	1.0-114.0	YES	3.00	30.0	YES
4-Chlorophenyl-phenylether	91.82	89.00	92	89	25.0-158.0	YES	3.00	30.0	YES
Fluorene	91.73	89.46	92	89	59.0-121.0	YES	3.00	30.0	YES
4,6-Dinitro-2-methylphenol	88.46	91.66	88	92	1.0-181.0	YES	-4.00	30.0	YES
N-Nitrosodiphenylamine	82.97	85.90	83	86	37.8-147.0	YES	-3.00	30.0	YES
1,2-Diphenylhydrazine	87.54	91.10	88	91	25.7-124.9	YES	-4.00	30.0	YES
4-Bromophenyl-phenylether	92.08	93.00	92	93	53.0-127.0	YES	-1.00	30.0	YES

WATER SEMIVOLATILE LABORATORY CONTROL/LABORATORY CONTROL DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS Lab Code: LANCAS Instrument: HP03301

SW846 METHOD 8270 SPIKE LEVEL: 100 UG/ML AMT USED: 1000.

SAMPLE SPIKE LEVEL: 100.UG/L % MOISTURE 0. DILUTION: 1

LCS SAMPLE: 171WALCS 171WALCS LCSD SAMPLE: 171WALCSD 171WALCSD

COMPOUND NAME	LCS CONC UG/L	LCSD CONC UG/L	LCS REC %	LCSD REC %	RANGE LOWER-UPPER	IN SPEC	RPD %	RPD MAX	RPD IN SPEC
Hexachlorobenzene	94.46	94.31	94	94	1.0-152.0	YES	0.00	30.0	YES
Pentachlorophenol	79.44	75.58	79	76	14.0-176.0	YES	5.00	30.0	YES
Phenanthrene	88.96	89.45	89	89	54.0-120.0	YES	-1.00	30.0	YES
Anthracene	89.44	88.62	89	89	27.0-133.0	YES	1.00	30.0	YES
Di-n-butylphthalate	98.70	95.42	99	95	1.0-118.0	YES	3.00	30.0	YES
Fluoranthene	101.20	95.34	101	95	26.0-137.0	YES	6.00	30.0	YES
Benzidine	319.00	361.12	64	72	1.0-155.0	YES	-12.00	30.0	YES
Pyrene	85.98	89.75	86	90	52.0-115.0	YES	-4.00	30.0	YES
Butylbenzylphthalate	94.12	93.46	94	93	1.0-152.0	YES	1.00	30.0	YES
3,3'-Dichlorobenzidine	91.48	92.89	91	93	1.0-262.0	YES	-2.00	30.0	YES
Benzo(a)anthracene	91.01	89.61	91	90	33.0-143.0	YES	2.00	30.0	YES
bis(2-Ethylhexyl)phthalate	95.20	95.00	95	95	8.0-158.0	YES	0.00	30.0	YES
Chrysene	92.76	90.72	93	91	17.0-168.0	YES	2.00	30.0	YES
Di-n-octylphthalate	95.22	96.92	95	97	4.0-146.0	YES	-2.00	30.0	YES
Benzo(b)fluoranthene	92.11	91.07	92	91	24.0-159.0	YES	1.00	30.0	YES
Benzo(k)fluoranthene	92.30	92.67	92	93	11.0-163.0	YES	0.00	30.0	YES
Benzo(a)pyrene	86.47	86.77	86	87	17.0-163.0	YES	0.00	30.0	YES
Indeno(1,2,3-cd)pyrene	87.25	88.82	87	89	1.0-171.0	YES	-2.00	30.0	YES
Dibenz(a,h)anthracene	87.06	88.33	87	88	1.0-227.0	YES	-1.00	30.0	YES
Benzo(g,h,i)perylene	84.92	86.97	85	87	1.0-219.0	YES	-2.00	30.0	YES

COMMENTS:

8B
SEMIVOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Lab File ID (Standard): >Z7301 Date Analyzed: 07/05/95

Instrument ID: HP02550 Time Analyzed: 16:08

		IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	41975	11.65	146677	15.00	76661	19.81
	UPPER LIMIT	83950	12.15	293354	15.50	153322	20.31
	LOWER LIMIT	20988	11.15	73339	14.50	38331	19.31
	EPA SAMPLE NO.						
01	0303BMSD	43212	11.66	147781	15.01	77687	19.81
02	0400B	44648	11.67	148989	15.01	77461	19.81
03	0303BMS	41859	11.67	147450	15.01	79313	19.81
04	0405B	40183	11.66	137070	15.01	73874	19.81
05							
06							
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22							

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag internal standard area values with an asterisk.
* Values outside of QC limits.

8C

SEMIVOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Lab File ID (Standard): >Z7301 Date Analyzed: 07/05/95

Instrument ID: HP02550 Time Analyzed: 16:08

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
	12 HOUR STD	113834	23.91	104503	30.73	48838	35.61
	UPPER LIMIT	227668	24.41	209006	31.23	97676	36.11
	LOWER LIMIT	56917	23.41	52252	30.23	24419	35.11
	EPA SAMPLE NO.						
01	0303BMSD	119527	23.93	68256	30.71	28576	35.62
02	0400B	120999	23.92	72241	30.71	27091	35.61
03	0303BMS	122200	23.93	71578	30.72	26418	35.62
04	0405B	109187	23.93	56771	30.72	25260	35.63
05							
06							
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19							
20							
21							
22							

IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12
AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag internal standard area values with an asterisk.
* Values outside of QC limits.

FORM VIII SV-2 3/90

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03189 Calibration Date(s): 06/27/95 06/28/95

Min $\overline{RRF}$ for SPCC(#) = 0.050 Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF5 = >V6255 RRF50 = >V6253
RRF80 = >V6254 RRF120= >V6252 RRF160= >V6251

COMPOUND	RRF5	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD	CAL. METHOD
Pyridine	2.209	2.342	2.408	2.388	2.237	2.317	3.9	AVG
N-Nitrosodimethylamine	1.364	1.415	1.410	1.407	1.337	1.387	2.5	AVG
2-Picoline	1.926	2.008	2.036	2.130	2.058	2.032	3.7	AVG
Phenol *	2.829	2.495	2.447	2.372	2.184	2.465	9.5	AVG *
Aniline	3.094	2.723	2.510	2.507	2.377	2.642	10.7	AVG
bis(2-Chloroethyl)ether	1.993	1.711	1.645	1.508	1.364	1.644	14.4	AVG
2-Chlorophenol	2.142	2.017	1.983	1.899	1.722	1.953	8.0	AVG
1,3-Dichlorobenzene	2.598	2.319	2.291	2.140	1.982	2.266	10.1	AVG
1,4-Dichlorobenzene *	2.597	2.332	2.315	2.141	1.987	2.274	10.1	AVG *
Benzyl alcohol	1.026	1.024	1.034	1.011	.964	1.012	2.7	AVG
1,2-Dichlorobenzene	2.410	2.017	1.933	1.749	1.546	1.931	16.7	2NDDEG
2-Methylphenol	1.710	1.633	1.661	1.621	1.546	1.634	3.7	AVG
2,2'-oxybis(1-Chloropropane)	4.554	4.381	4.436	4.318	3.919	4.322	5.6	AVG
bis(2-Chloroisopropyl)ether	4.554	4.381	4.436	4.318	3.919	4.322	5.6	AVG
4-Methylphenol	2.047	1.659	1.515	1.329	1.176	1.545	21.7	2NDDEG
3 or 4-Methylphenol	2.047	1.659	1.515	1.329	1.176	1.545	21.7	2NDDEG
Acetophenone	6.825	5.536	5.590	5.364	4.908	5.645	12.6	AVG
N-Nitroso-di-n-propylamine #	1.652	1.502	1.466	1.243	.922	1.357	20.9	2NDDEG #
o-Toluidine	4.277	3.462	3.154	3.247	2.841	3.396	15.9	2NDDEG
Hexachloroethane	.982	.991	1.008	.971	.878	.966	5.3	AVG
Nitrobenzene	.629	.672	.677	.677	.637	.658	3.6	AVG
Isophorone	1.110	1.151	1.177	1.205	1.177	1.164	3.1	AVG
2-Nitrophenol *	.251	.336	.335	.347	.327	.319	12.2	AVG *
2,4-Dimethylphenol	.594	.599	.603	.455	.581	.566	11.1	AVG
Benzoic acid	.313	.367	.418	.454	.455	.401	15.2	2NDDEG
bis(2-Chloroethoxy)methane	.703	.669	.671	.685	.657	.677	2.6	AVG
2,4-Dichlorophenol *	.488	.501	.494	.489	.466	.488	2.7	AVG *
1,2,4-Trichlorobenzene	.582	.575	.561	.553	.509	.556	5.2	AVG
Naphthalene	1.631	1.540	1.540	1.457	1.320	1.498	7.8	AVG
4-Chloroaniline	.703	.692	.704	.688	.644	.686	3.6	AVG
Hexachlorobutadiene *	.378	.376	.377	.380	.328	.368	6.1	AVG *
4-Chloro-3-methylphenol *	.454	.517	.536	.516	.470	.499	7.0	AVG *
2-Methylnaphthalene	1.056	.971	.979	.916	.842	.953	8.3	AVG
Hexachlorocyclopentadiene #	.473	.717	.808	.896	.877	.754	22.8	2NDDEG #
2,4,6-Trichlorophenol *	.646	.710	.764	.805	.814	.748	9.4	AVG *
2,4,5-Trichlorophenol	.688	.768	.806	.832	.800	.779	7.2	AVG
2-Chloronaphthalene	2.025	1.878	1.968	1.986	1.928	1.957	2.9	AVG
2-Nitroaniline	.587	.810	.886	.918	.917	.824	16.9	2NDDEG

6C

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS Contract: ____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03189 Calibration Date(s): 06/27/95 06/28/95

Min $\overline{RRF}$ for SPCC(#) = 0.050 Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF5 = >V6255 RRF50 = >V6253
RRF80 = >V6254 RRF120= >V6252 RRF160= >V6251

COMPOUND	RRF5	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD	CAL. METHOD
Dimethylphthalate	2.261	2.254	2.330	2.273	2.270	2.278	1.3	AVG
2,6-Dinitrotoluene	.349	.519	.539	.518	.501	.485	15.9	2NDDEG
Acenaphthylene	3.176	3.027	3.096	3.021	2.837	3.032	4.1	AVG
3-Nitroaniline	.430	.579	.588	.575	.580	.550	12.2	AVG
Acenaphthene *	2.043	1.911	1.934	1.941	1.836	1.933	3.8	AVG *
2,4-Dinitrophenol #	.200	.255	.319	.342	.350	.293	21.9	2NDDEG #
4-Nitrophenol #	.247	.330	.356	.329	.305	.313	13.1	AVG #
Dibenzofuran	2.965	2.634	2.573	2.472	2.302	2.589	9.5	AVG
2,4-Dinitrotoluene	.639	.727	.764	.724	.728	.717	6.5	AVG
1-Naphthylamine	2.389	2.081	2.245	2.219	2.082	2.203	5.8	AVG
2-Naphthylamine	1.992	1.750	1.926	1.933	1.867	1.893	4.8	AVG
Diethylphthalate	2.257	2.214	2.285	2.202	2.121	2.216	2.8	AVG
4-Chlorophenyl-phenylether	1.116	1.055	1.095	1.046	1.015	1.065	3.8	AVG
Fluorene	2.127	2.066	2.034	1.971	1.854	2.011	5.2	AVG
4-Nitroaniline	.340	.523	.559	.551	.558	.506	18.6	1STDEG
4,6-Dinitro-2-methylphenol	.164	.228	.243	.230	.214	.216	14.3	AVG
N-Nitrosodiphenylamine (1) *	.913	.878	.901	.884	.826	.880	3.8	AVG *
1,2-Diphenylhydrazine	1.615	1.564	1.623	1.628	1.530	1.592	2.7	AVG
4-Bromophenyl-phenylether	.427	.431	.461	.448	.405	.434	4.9	AVG
Hexachlorobenzene	.622	.598	.606	.596	.536	.592	5.5	AVG
Pentachlorophenol *	.285	.301	.333	.340	.321	.316	7.1	2NDDEG *
Phenanthrene	2.084	1.809	1.839	1.727	1.550	1.802	10.7	AVG
Anthracene	1.974	1.888	1.843	1.768	1.630	1.821	7.1	AVG
Carbazole	1.611	1.704	1.696	1.598	1.453	1.612	6.3	AVG
Di-n-butylphthalate	1.789	2.216	2.170	2.113	1.865	2.031	9.4	AVG
Fluoranthene *	1.773	1.992	1.869	1.749	1.467	1.770	11.0	AVG *
Benzidine	1.272	1.031	1.100	1.092	1.058	1.111	8.5	AVG
Pyrene	2.420	2.464	3.044	3.047	2.917	2.779	11.2	AVG
Butylbenzylphthalate	.725	1.077	1.132	1.102	1.085	1.024	16.5	1STDEG
3,3'-Dichlorobenzidine	.527	.638	.732	.774	.820	.698	16.7	1STDEG
Benzo(a)anthracene	1.751	1.797	1.845	1.953	1.956	1.861	4.9	AVG
bis(2-Ethylhexyl)phthalate	1.073	1.442	1.470	1.452	1.445	1.376	12.4	AVG
Chrysene	1.782	1.738	1.798	1.880	1.888	1.817	3.6	AVG
Di-n-octylphthalate *	2.921	3.449	3.004	3.320	3.296	3.198	7.0	2NDDEG *
7,12-Dimethylbenz[a]anthrace	1.302	1.273	1.261	1.359	1.288	1.297	3.0	AVG
Benzo(b)fluoranthene	2.863	2.440	2.659	2.620	2.739	2.664	5.9	AVG
Benzo(k)fluoranthene	2.657	2.473	2.469	2.609	2.304	2.502	5.5	AVG

(1) Cannot be separated from Diphenylamine

6C Cont.

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS   Contract: _____.

Lab Code: LANCAS   Case No.: _____.SAS No.: _____.   SDG No.: _____.

Instrument ID: HP03189   Calibration Date(s): 06/27/95   06/28/95

Min $\overline{RRF}$ for SPCC(#) = 0.050   Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF5 = >V6255   RRF50 = >V6253

RRF80 = >V6254   RRF120= >V6252   RRF160= >V6251

COMPOUND	RRF5	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD	CAL. METHOD
Benzo(a)pyrene__________ *	2.221	2.245	2.371	2.380	2.215	2.286	3.6	AVG *
Indeno(1,2,3-cd)pyrene______	1.379	1.900	1.747	1.782	1.630	1.687	11.7	AVG
Dibenz(a,h)anthracene_______	1.399	1.881	1.686	1.749	1.631	1.669	10.6	AVG
Benzo(g,h,i)perylene_______	1.290	1.854	1.643	1.669	1.530	1.597	13.0	AVG
2-Fluorophenol_____________	1.820	1.850	1.874	1.832	1.734	1.822	2.9	AVG
Phenol-d5_________________	2.400	2.227	2.123	2.048	1.895	2.139	8.9	AVG
Phenol-d6_________________	2.400	2.227	2.123	2.048	1.895	2.139	8.9	AVG
Nitrobenzene-d5____________	.572	.634	.655	.672	.638	.634	6.0	AVG
2-Fluorobiphenyl___________	2.316	2.138	2.205	2.181	2.162	2.200	3.2	AVG
2,4,6-Tribromophenol________	.435	.518	.586	.553	.524	.523	10.8	AVG
Terphenyl-d14______________	1.380	1.658	1.996	1.897	1.808	1.748	13.7	AVG

FORM VI SV-1   1/87 Rev.

4,6-Dinitro-2-methylphenol and 4-Nitrophenol are at 10 ng/uL in the 5 standard.

2,4-Dinitrophenol and 2 or 4-Chloronitrobenzene levels are 40 and 100 ng/uL respectively in the 5 standard.

Benzoic acid and Pentachlorophenol are at 20 ng/uL in the 5 standard.

Benzidine levels in the 5,50,80,120,160 standards are 95,200,320,480 and 640 ng/uL respectively.

Initial Calibration Data
HSL Compounds

Case No:

Instrument ID: HP03189

Contractor: LANCASTER LABS

Calibration Date: 06/28/95

Contract No:

Minimum $\overline{RF}$ for SPCC is 0.05   Maximum % RSD for CCC is 30.0%

Laboratory ID:	>V6255	>V6253	>V6254	>V6252	>V6251							
Compound	RF 5.00	RF 50.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CORR1	CORR2	CCC	SPCC
Pyridine	1.38088	1.46399	1.50487	1.49281	1.39794	.259	1.44810	3.862	.998279	.999317		
2-Picoline	1.20375	1.25487	1.27265	1.33115	1.28612	.463	1.26971	3.657	.999470	.999473		
N-Nitrosodimethylamine	.85223	.88437	.88145	.87966	.83543	.256	.86663	2.505	.999003	.999694		
3-Chloropropionitrile	-	-	-	-	-	-	-	-	-	-		
Methyl methanesulfonate	-	-	-	-	-	-	-	-	-	-		
Phenol	1.76798	1.55918	1.52924	1.48261	1.36499	.912	1.54080	9.537	.996933	.999390	*	
Aniline	1.93389	1.70183	1.56847	1.56675	1.48548	.907	1.65128	10.659	.998645	.999650		
bis(2-Chloroethyl)ether	1.24564	1.06949	1.02811	.94230	.85281	.934	1.02767	14.361	.992803	.999484		
2-Chlorophenol	1.33872	1.26047	1.23940	1.18673	1.07652	.939	1.22037	7.966	.995277	.999092		
1,3-Dichlorobenzene	1.62398	1.44936	1.43212	1.33748	1.23856	.982	1.41630	10.127	.995980	.999667		
1,4-Dichlorobenzene	1.62289	1.45768	1.44714	1.33786	1.24186	1.005	1.42148	10.059	.995689	.999672	*	
Benzyl alcohol	.64116	.63989	.64618	.63211	.60274	1.049	.63242	2.742	.998922	.999794		
1,2-Dichlorobenzene	1.50654	1.26080	1.20831	1.09342	.96645	1.047	1.20710	16.743	.989268	.998784		
2-Methylphenol	1.06906	1.02068	1.03824	1.01341	.96625	1.089	1.02153	3.682	.998915	.999754		
2,2'-oxybis(1-Chloropropane)	2.84608	2.73835	2.77272	2.69897	2.44925	1.093	2.70107	5.583	.995947	.998684		
bis(2-Chloroisopropyl)ether	2.84608	2.73835	2.77272	2.69897	2.44925	1.093	2.70107	5.583	.995947	.998684		
4-Methylphenol	1.27931	1.03681	.94716	.83044	.73515	1.135	.96577	21.670	.985430	.999485		
3 or 4-Methylphenol	1.27931	1.03681	.94716	.83044	.73515	1.135	.96577	21.670	.985430	.999485		
N-Methylaniline	-	-	-	-	-	-	-	-	-	-		
Acetophenone	4.26555	3.45993	3.49401	3.35231	3.06730	1.127	3.52782	12.620	.996392	.999046		
N-Nitroso-di-n-propylamine	1.03265	.93870	.91620	.77714	.57599	1.132	.84813	20.925	.940946	.961451		**
o-Toluidine	2.67333	2.16375	1.97112	2.02910	1.77576	1.136	2.12261	15.924	.993679	.996437		
Hexachloroethane	.61351	.61966	.62997	.60694	.54893	1.147	.60380	5.271	.995270	.998633		
2-Fluorophenol	1.13750	1.15613	1.17156	1.14477	1.08383	.636	1.13876	2.923	.998591	.999696		
Phenol-d5	1.50024	1.39209	1.32710	1.28028	1.18458	.908	1.33686	8.869	.996816	.999674		
Phenol-d6	1.50024	1.39209	1.32710	1.28028	1.18458	.908	1.33686	8.869	.996816	.999674		
Nitrobenzene	.39301	.41991	.42313	.42316	.39824	.849	.41149	3.562	.998634	.999481		
N,N-Dimethylaniline	-	-	-	-	-	-	-	-	-	-		

RF - Response Factor (Subscript is amount in ng/ul)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CORRn - Coefficient of Correlation (nth degree)

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

RE 6/28/95

Initial Calibration Data
HSL Compounds

Case No:

Instrument ID: HP03189

Contractor: LANCASTER LABS

Calibration Date: 06/28/95

Contract No:

Minimum $\overline{RF}$ for SPCC is 0.05   Maximum % RSD for CCC is 30.0%

Laboratory ID:	>V6255	>V6253	>V6254	>V6252	>V6251							
Compound	RF 5.00	RF 50.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CORR1	CORR2	CCC	SPCC
Isophorone	.69355	.71911	.73588	.75335	.73587	.904	.72755	3.098	.999757	.999765		
2-Nitrophenol	.15673	.20999	.20927	.21659	.20464	.918	.19944	12.161	.998905	.999289	*	
2,4-Dimethylphenol	.37144	.37436	.37659	.28416	.36312	.937	.35394	11.115	.979572	.982405		
Benzoic acid	.19591	.22950	.26096	.28403	.28418	.973	.25092	15.160	.999208	.999308		
bis(2-Chloroethoxy)methane	.43929	.41809	.41920	.42831	.41085	.959	.42315	2.588	.999465	.999608		
1-Methyl-2-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
2,4-Dichlorophenol	.30512	.31282	.30862	.30573	.29118	.973	.30469	2.672	.999009	.999810	*	
1,2,4-Trichlorobenzene	.36356	.35911	.35050	.34562	.31790	.990	.34734	5.153	.997118	.999248		
1,3-Dimethyl-2-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
Napthalene	1.01932	.96255	.96279	.91047	.82497	1.005	.93602	7.804	.994744	.998998		
1-Methyl-3-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
4-Chloroaniline	.43967	.43258	.44031	.43007	.40257	1.023	.42904	3.601	.998054	.999471		
Hexachlorobutadiene	.23605	.23527	.23559	.23738	.20494	1.038	.22985	6.067	.992078	.995408	*	
1-Methyl-4-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
2 or 4-Choloronitrobenzene	-	-	-	-	-	-	-	-	-	-		
2-Tertbutylphenol	-	-	-	-	-	-	-	-	-	-		
1,4-Dimethyl-2-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
4-Chloro-3-methylphenol	.28401	.32316	.33489	.32269	.29348	1.140	.31165	6.972	.995592	.998662	*	
3 or 4-Tertbutylphenol	-	-	-	-	-	-	-	-	-	-		
2-Methylnaphthalene	.65989	.60717	.61176	.57262	.52622	1.164	.59553	8.341	.995542	.999353		
Nitrobenzene-d5	.35737	.39655	.40945	.41992	.39875	.845	.39641	5.986	.999063	.999292		
Hexachlorocyclopentadiene	.29573	.44824	.50519	.56009	.54839	.858	.47153	22.824	.997953	.998449		**
2,4,6-Trichlorophenol	.40358	.44376	.47732	.50322	.50866	.879	.46731	9.399	.999136	.999692	*	
2,4,5-Trichlorophenol	.42992	.48022	.50371	.52018	.49977	.884	.48676	7.152	.999308	.999354		
2-Chloronaphthalene	1.26531	1.17375	1.23027	1.24134	1.20491	.910	1.22312	2.871	.999578	.999626		
1,2-Dichloro-4-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
1,2-Dichloro-3-nitrobenzene	-	-	-	-	-	-	-	-	-	-		
2,6-Ditertbutylphenol	-	-	-	-	-	-	-	-	-	-		

(Conc=20.

RF - Response Factor (Subscript is amount in ng/ul)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CORRn - Coefficient of Correlation (nth degree)

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

Initial Calibration Data
HSL Compounds

Case No: ______________________ Instrument ID: HP03189

Contractor: LANCASTER LABS Calibration Date: 06/28/95

Contract No: ______________________

Minimum $\overline{RF}$ *for SPCC is 0.05* Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: >V6255 RF 5.00	>V6253 RF 50.00	>V6254 RF 80.00	>V6252 RF 120.00	>V6251 RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CORR1	CORR2	CCC	SPCC	
2-Nitroaniline	.36685	.50597	.55398	.57376	.57317	.930	.51475	16.932	.999486	.999623			
1,4-Naphthoquinone	-	-	-	-	-	-	-	-	-	-			
Dimethylphthalate	1.41281	1.40877	1.45645	1.42087	1.41882	.966	1.42355	1.335	.999865	.999901			
3,4-Dichloro-nitrobenzene	-	-	-	-	-	-	-	-	-	-			
Acenaphthylene	1.98511	1.89204	1.93526	1.88824	1.77331	.976	1.89479	4.139	.998229	.999494			
2,4-Ditertbutylphenol	-	-	-	-	-	-	-	-	-	-			
2,6-Dinitrotoluene	.21818	.32428	.33713	.32363	.31307	.974	.30326	15.933	.998817	.999823			
3-Nitroaniline	.26895	.36198	.36733	.35939	.36245	.999	.34402	12.226	.999889	.999920			
3,4-Dichloroaniline	-	-	-	-	-	-	-	-	-	-			
Acenaphthene	1.27673	1.19417	1.20874	1.21317	1.14745	1.006	1.20805	3.840	.998950	.999486	*		
BHT	-	-	-	-	-	-	-	-	-	-			
2,4-Dinitrophenol	.12489	.15954	.19965	.21350	.21893	1.017	.18330	21.865	.999458	.999958		**	(Conc=40.
4-Nitrophenol	.15438	.20623	.22222	.20557	.19043	1.033	.19577	13.140	.994540	.998997		**	(Conc=10.
3,5-Ditertbutylphenol	-	-	-	-	-	-	-	-	-	-			
Dibenzofuran	1.85327	1.64651	1.60817	1.54503	1.43890	1.035	1.61838	9.455	.997369	.999712			
2,4-Dinitrotoluene	.39948	.45413	.47774	.45246	.45529	1.039	.44782	6.461	.999474	.999619			
1-Naphthylamine	1.49330	1.30071	1.40330	1.38668	1.30136	1.049	1.37707	5.838	.998181	.998845			
2-Naphthylamine	1.24483	1.09370	1.20360	1.20807	1.16657	1.062	1.18335	4.840	.999073	.999124			
Diethylphthalate	1.41047	1.38369	1.42813	1.37648	1.32566	1.085	1.38489	2.821	.999016	.999784			
4-Chlorophenyl-phenylether	.69726	.65907	.68413	.65391	.63413	1.096	.66570	3.767	.999086	.999766			
Fluorene	1.32926	1.29133	1.27131	1.23203	1.15895	1.091	1.25658	5.164	.998082	.999787			
4-Nitroaniline	.21247	.32706	.34919	.34412	.34904	1.100	.31638	18.582	.999836	.999840			
2-Fluorobiphenyl	1.44779	1.33640	1.37809	1.36288	1.35114	.895	1.37526	3.151	.999903	.999920			
2,4,6-Tribromophenol	.27188	.32388	.36653	.34569	.32748	1.130	.32709	10.766	.997152	.998619			
4,6-Dinitro-2-methylphenol	.10236	.14261	.15181	.14347	.13361	.889	.13477	14.267	.995876	.999298			(Conc=10.
N-Nitrosodiphenylamine	.57071	.54875	.56285	.55248	.51625	.898	.55021	3.791	.998071	.999336	*		
1,2-Diphenylhydrazine	1.00912	.97774	1.01429	1.01739	.95595	.902	.99490	2.704	.998583	.999198			
1-Nitronaphthalene	-	-	-	-	-	-	-	-	-	-			

RF - Response Factor (Subscript is amount in ng/ul)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CORRn - Coefficient of Correlation (nth degree)

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Initial Calibration Data
HSL Compounds

Case No:

Instrument ID: HP03189

Contractor: LANCASTER LABS

Calibration Date: 06/28/95

Contract No:

Minimum $\overline{RF}$ for SPCC is 0.05 Maximum % RSD for CCC is 30.0%

Laboratory ID:	>V6255	>V6253	>V6254	>V6252	>V6251								
Compound	RF 5.00	RF 50.00	RF 80.00	RF 120.00	RF 160.00	$\overline{RRT}$	$\overline{RF}$	% RSD	CORR1	CORR2	CCC	SPCC	
4-Methyl-3-nitrobenzoic acid	-	-	-	-	-	-	-	-	-	-			
4-Bromophenyl-phenylether	.26716	.26914	.28797	.28002	.25326	.946	.27151	4.875	.995471	.997912			
Hexachlorobenzene	.38890	.37360	.37881	.37219	.33499	.949	.36970	5.540	.995545	.998231			
Pentachlorophenol	.17835	.18836	.20794	.21264	.20060	.977	.19758	7.150	.998091	.998821	*		(Conc=20.
Phenanthrene	1.30231	1.13074	1.14906	1.07919	.96863	1.003	1.12599	10.749	.993780	.998476			
Anthracene	1.23366	1.17976	1.15214	1.10502	1.01880	1.010	1.13787	7.139	.996521	.999554			
Carbazole	1.00677	1.06470	1.06005	.99880	.90799	1.035	1.00766	6.279	.994617	.999200			
Di-n-butylphthalate	1.11785	1.38509	1.35616	1.32072	1.16592	1.091	1.26915	9.424	.992858	.997819			
Diphenyl sulfone	-	-	-	-	-	-	-	-	-	-			
Fluoranthene	1.10814	1.24518	1.16830	1.09288	.91712	1.161	1.10632	10.987	.982971	.994920	*		
Benzidine	.79530	.64462	.68744	.68233	.66132	.878	.69420	8.506	.998910	.998932			(Conc=95.
Pyrene	1.51267	1.54018	1.90263	1.90440	1.82332	.881	1.73664	11.224	.997316	.997391			
Butylbenzylphthalate	.45305	.67294	.70737	.68846	.67829	.954	.64002	16.459	.999558	.999854			
3,3'-Dichlorobenzidine	.32924	.39869	.45773	.48361	.51241	1.001	.43634	16.749	.997334	.999560			
Benzo(a)anthracene	1.09443	1.12340	1.15327	1.22088	1.22224	.999	1.16284	4.945	.999403	.999756			
Chrysene	1.11392	1.08629	1.12381	1.17478	1.17991	1.003	1.13574	3.560	.999513	.999833			
bis(2-Ethylhexyl)phthalate	.67037	.90094	.91858	.90758	.90337	1.014	.86017	12.360	.999907	.999982			
Terphenyl-d14	.86274	1.03648	1.24725	1.18543	1.12976	.902	1.09233	13.725	.996937	.997799			
Di-n-octylphthalate	1.82533	2.15541	1.87757	2.07480	2.05971	.952	1.99856	7.023	.998195	.998346	*		
7,12-Dimethylbenz[a]anthracene	.81365	.79566	.78786	.84968	.80496	.973	.81036	2.964	.998711	.998713			
Benzo(b)fluoranthene	1.78963	1.52473	1.66213	1.63769	1.71180	.972	1.66520	5.865	.998972	.999625			
Benzo(k)fluoranthene	1.66053	1.54548	1.54306	1.63048	1.44016	.975	1.56394	5.524	.995044	.996068			
Benzo(a)pyrene	1.38819	1.40317	1.48194	1.48731	1.38459	.996	1.42904	3.587	.998038	.998808	*		
Indeno(1,2,3-cd)pyrene	.86170	1.18761	1.09197	1.11352	1.01853	1.087	1.05466	11.716	.996458	.998741			
Dibenz(a,h)anthracene	.87427	1.17539	1.05383	1.09305	1.01953	1.091	1.04321	10.628	.997517	.998805			
Benzo(g,h,i)perylene	.80602	1.15883	1.02677	1.04306	.95595	1.113	.99813	13.000	.995775	.998692			

RF - Response Factor (Subscript is amount in ng/ul)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/RT Istd)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CORRn - Coefficient of Correlation (nth degree)

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

7B

SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: ______.

Lab Code: LANCAS Case No.: ______. SAS No.: ______. SDG No.: ______.

Instrument ID: HP03189 Calibration Date: 06/28/95 Time: 13:03

Lab File ID: >V6303 Init. Calib. Date(s): 06/27/95 06/28/95

Min RRF50 for SPCC(#) = 0.050 Max %Drift for CCC(*) = 20.

COMPOUND	RRF	RRF80	ACTUAL CONC	TRUE CONC	% DRIFT
Pyridine	2.317	1.488	82.20	80.0	-2.8
N-Nitrosodimethylamine	1.387	.878	81.02	80.0	-1.3
2-Picoline	2.032	1.292	81.41	80.0	-1.8
Phenol *	2.465	1.514	78.60	80.0	1.8*
Aniline	2.642	1.580	76.53	80.0	4.3
bis(2-Chloroethyl)ether	1.644	.969	75.43	80.0	5.7
2-Chlorophenol	1.953	1.238	81.18	80.0	-1.5
1,3-Dichlorobenzene	2.266	1.408	79.53	80.0	.6
1,4-Dichlorobenzene *	2.274	1.404	78.99	80.0	1.3*
Benzyl alcohol	1.012	.635	80.30	80.0	-.4
1,2-Dichlorobenzene	1.931	1.153	76.10	80.0	4.9
2-Methylphenol	1.634	1.039	81.38	80.0	-1.7
2,2'-oxybis(1-Chloropropane)	4.322	2.682	79.45	80.0	.7
bis(2-Chloroisopropyl)ether	4.322	2.682	79.45	80.0	.7
4-Methylphenol	1.545	.885	73.51	80.0	8.1
3 or 4-Methylphenol	1.545	.885	73.51	80.0	8.1
Acetophenone	5.645	3.435	77.89	80.0	2.6
N-Nitroso-di-n-propylamine #	1.357	.872	83.41	80.0	-4.3#
o-Toluidine	3.396	1.872	71.74	80.0	10.3
Hexachloroethane	.966	.606	80.33	80.0	-.4
Nitrobenzene	.658	.427	83.11	80.0	-3.9
Isophorone	1.164	.729	80.17	80.0	-.2
2-Nitrophenol *	.319	.221	88.47	80.0	-10.6*
2,4-Dimethylphenol	.566	.380	86.00	80.0	-7.5
Benzoic acid	.401	.269	81.38	80.0	-1.7
bis(2-Chloroethoxy)methane	.677	.423	79.94	80.0	.1
2,4-Dichlorophenol *	.488	.311	81.53	80.0	-1.9*
1,2,4-Trichlorobenzene	.556	.357	82.19	80.0	-2.7
Naphthalene	1.498	.938	80.19	80.0	-.2
4-Chloroaniline	.686	.439	81.83	80.0	-2.3
Hexachlorobutadiene *	.368	.237	82.48	80.0	-3.1*
4-Chloro-3-methylphenol *	.499	.330	84.71	80.0	-5.9*
2-Methylnaphthalene	.953	.610	81.98	80.0	-2.5
Hexachlorocyclopentadiene #	.754	.534	83.13	80.0	-3.9#
2,4,6-Trichlorophenol *	.748	.475	81.27	80.0	-1.6*
2,4,5-Trichlorophenol	.779	.535	87.97	80.0	-10.0
2-Chloronaphthalene	1.957	1.206	78.91	80.0	1.4
2-Nitroaniline	.824	.564	81.85	80.0	-2.3

7C
SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03189 Calibration Date: 06/28/95 Time: 13:03

Lab File ID: >V6303 Init. Calib. Date(s): 06/27/95 06/28/95

Min RRF50 for SPCC(#) = 0.050 Max %Drift for CCC(*) = 20.0%

COMPOUND	RRF	RRF80	ACTUAL CONC	TRUE CONC	% DRIFT
Dimethylphthalate	2.278	1.441	81.01	80.0	-1.3
1,3-Dinitrobenzene	0.000	0.000	0.00	80.0	100.0
2,6-Dinitrotoluene	.485	.341	82.33	80.0	-2.9
Acenaphthylene	3.032	1.924	81.21	80.0	-1.5
3-Nitroaniline	.550	.360	83.65	80.0	-4.6
Acenaphthene *	1.933	1.213	80.30	80.0	-.4*
2,4-Dinitrophenol #	.293	.193	78.49	80.0	1.9#
4-Nitrophenol #	.313	.204	83.41	80.0	-4.3#
Dibenzofuran	2.589	1.637	80.93	80.0	-1.2
2,4-Dinitrotoluene	.717	.455	81.37	80.0	-1.7
1-Naphthylamine	2.203	1.373	79.79	80.0	.3
2-Naphthylamine	1.893	1.201	81.17	80.0	-1.5
Diethylphthalate	2.216	1.348	77.87	80.0	2.7
4-Chlorophenyl-phenylether	1.065	.672	80.73	80.0	-.9
Fluorene	2.011	1.256	79.99	80.0	.0
4-Nitroaniline	.506	.319	74.55	80.0	6.8
4,6-Dinitro-2-methylphenol	.216	.143	85.12	80.0	-6.4
N-Nitrosodiphenylamine (1) *	.880	.575	83.66	80.0	-4.6*
1,2-Diphenylhydrazine	1.592	1.032	82.99	80.0	-3.7
4-Bromophenyl-phenylether	.434	.293	86.30	80.0	-7.9
Hexachlorobenzene	.592	.380	82.25	80.0	-2.8
Pentachlorophenol *	.316	.201	77.16	80.0	3.6*
Phenanthrene	1.802	1.116	79.31	80.0	.9
Anthracene	1.821	1.136	79.86	80.0	.2
Carbazole	1.612	.925	73.44	80.0	8.2
Di-n-butylphthalate	2.031	1.136	71.63	80.0	10.5
Fluoranthene *	1.770	.972	70.30	80.0	12.1*
Benzidine	1.111	.615	283.70	320.0	11.3
Pyrene	2.779	1.520	70.02	80.0	12.5
Butylbenzylphthalate	1.024	.617	72.24	80.0	9.7
3,3'-Dichlorobenzidine	.698	.476	79.95	80.0	.1
Benzo(a)anthracene	1.861	1.148	78.96	80.0	1.3
bis(2-Ethylhexyl)phthalate	1.376	.822	76.45	80.0	4.4
Chrysene	1.817	1.134	79.85	80.0	.2
Di-n-octylphthalate *	3.198	2.097	83.38	80.0	-4.2*
7,12-Dimethylbenz[a]anthrace	1.297	.882	87.11	80.0	-8.9
Benzo(b)fluoranthene	2.664	1.754	84.28	80.0	-5.3
Benzo(k)fluoranthene	2.502	1.558	79.71	80.0	.4

(1) Cannot be separated from Diphenylamine

7C cont
SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: LANCASTER LABS Contract: _____.

Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.

Instrument ID: HP03189 Calibration Date: 06/28/95 Time: 13:03

Lab File ID: >V6303 Init. Calib. Date(s): 06/27/95 06/28/95

Min RRF50 for SPCC(#) = 0.050 Max %Drift for CCC(*) = 20.0

COMPOUND	RRF	RRF80	ACTUAL CONC	TRUE CONC	% DRIFT
Benzo(a)pyrene	* 2.286	1.529	85.57	80.0	-7.0*
Indeno(1,2,3-cd)pyrene	1.687	1.088	82.51	80.0	-3.1
Dibenz(a,h)anthracene	1.669	1.074	82.38	80.0	-3.0
Benzo(g,h,i)perylene	1.597	1.022	81.89	80.0	-2.4
2-Fluorophenol	1.822	1.151	80.89	80.0	-1.1
Phenol-d5	2.139	1.296	77.58	80.0	3.0
Phenol-d6	2.139	1.296	77.58	80.0	3.0
Nitrobenzene-d5	.634	.421	84.95	80.0	-6.2
2-Fluorobiphenyl	2.200	1.367	79.51	80.0	.6
2,4,6-Tribromophenol	.523	.341	83.36	80.0	-4.2
Terphenyl-d14	1.748	.973	71.24	80.0	11.0

(1) Cannot be separated from Diphenylamine

FORM VII SV-2 1/87 Rev.

Benzidine level in the 50 standard is 200 ng/uL.

Quality Control Summary

Surrogate Recovery
Pesticides

Matrix: WATER

LLI Sample No.	Sample Code	S1 (DCB)	S2 (TCX)	S3 (OXY)	S4 (DCAA)	OTHER
BLK6/9	BLK6/9	86	57 *			
LCS6/9	LCS6/9	100	71			
LCSD6/9	LCSD6/9	55 *	77			
BLK6/12	BLK6/12	83	95			
2326074	WPMW2	60	74			

		QC REC Limits Low	QC REC Limits High
S1 (DCB)	Decachlorobiphenyl	60	120
S2 (TCX)	Tetrachlorometaxylene	60	120
S3 (OXY)	Oxychlordane		
S4 (DCAA)	2,4-Dichlorophenylacetic Acid		
S5 OTHER			

* = Surrogate Recovery is outside specifications.
\# = No established limits
D = Surrogates diluted out I = Interferences present

Comments:

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Quality Control Summary

Method Blank
Pesticides

Matrix..: WATER

Sample Information		Blank Contamination Information					
LLI Sample No.	Sample Code	CAS Number	Compound	Analysis Date	Blank Result	Units	LOQ
BLK6/9	BLK6/9	319-84-6	alpha-BHC	06/14/95	ND	ug/l	0.01
LCS6/9	LCS6/9	319-85-7	beta-BHC	06/14/95	ND	ug/l	0.01
LCSD6/9	LCSD6/9	319-86-8	delta-BHC	06/14/95	ND	ug/l	0.01
		58-89-9	gamma-BHC (Lindane)	06/14/95	ND	ug/l	0.01
		76-44-8	Heptachlor	06/14/95	ND	ug/l	0.01
		309-00-2	Aldrin	06/14/95	ND	ug/l	0.01
		1024-57-3	Heptachlor epoxide	06/14/95	ND	ug/l	0.01
		959-98-8	Endosulfan I	06/14/95	ND	ug/l	0.01
		60-57-1	Dieldrin	06/14/95	ND	ug/l	0.01
		72-55-9	4,4'-DDE	06/14/95	ND	ug/l	0.01
		72-20-8	Endrin	06/14/95	ND	ug/l	0.01
		33213-65-9	Endosulfan II	06/14/95	ND	ug/l	0.01
		72-54-8	4,4'-DDD	06/14/95	ND	ug/l	0.01
		1031-07-8	Endosulfan sulfate	06/14/95	ND	ug/l	0.03
		50-29-3	4,4'-DDT	06/14/95	ND	ug/l	0.01
		72-43-5	Methoxychlor	06/14/95	ND	ug/l	0.05
		53494-70-5	Endrin ketone	06/14/95	ND	ug/l	0.1
		5103-71-9	alpha-Chlordane	06/14/95	ND	ug/l	0.01
		5103-74-2	gamma-Chlordane	06/14/95	ND	ug/l	0.01
		8001-35-2	Toxaphene	06/14/95	ND	ug/l	4
		12674-11-2	PCB-1016	06/14/95	ND	ug/l	1
		11104-28-2	PCB-1221	06/14/95	ND	ug/l	1
		11141-16-5	PCB-1232	06/14/95	ND	ug/l	1
		53469-21-9	PCB-1242	06/14/95	ND	ug/l	1
		12672-29-6	PCB-1248	06/14/95	ND	ug/l	1
		11097-69-1	PCB-1254	06/14/95	ND	ug/l	1
		11096-82-5	PCB-1260	06/14/95	ND	ug/l	1
		7421-39-4	Endrin aldehyde	06/14/95	ND	ug/l	0.1
		12789-03-6	Technical Chlordane	06/14/95	ND	ug/l	0.3

COMMENTS:

Abbreviation Key
--- = Analysis not requested
ND = None detected
J = Estimated value below LOQ
LOQ = Limit of Quantitation
* = Outside Specifications

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Quality Control Summary

Matrix Spike/Matrix Spike Duplicate
Pesticides

Unspiked Sample #....:2331041BKGD
Spiked Sample #......:2331041MS
Spiked Dup Sample #..:2331041MSD

Matrix: water

This MS/MSD applies to the following samples	Compound	Spike Added (ug/l)	Sample Conc (ug/l)	MS Conc (ug/l)	MSD Conc (ug/l)	MS % REC	MSD % REC	QC Limits REC	RPD	QC Limits RPD
1322BLK6/22	alpha-BHC	0.200	ND	0.207	0.194	103	97	80 -132	6	30
2331034	beta-BHC	0.200	ND	0.204	0.200	102	100	74 -120	2	30
2331035	delta-BHC	0.200	ND	0.166	0.173	83	86	76 -126	4	30
2331038	gamma-BHC (Lindane)	0.200	ND	0.201	0.195	101	98	66 -120	3	30
2331039	Heptachlor	0.200	ND	0.190	0.186	95	93	60 -120	2	30
2331040	Aldrin	0.200	ND	0.142	0.141	71	70	58 -120	1	30
2331041BKGD	Heptachlor epoxide	0.200	ND	0.194	0.186	97	93	64 -120	4	30
2331041MS	Endosulfan I	0.200	ND	0.199	0.193	100	97	66 -120	3	30
2331041MSD	Dieldrin	0.200	ND	0.203	0.195	102	98	83 -120	4	30
	4,4'-DDE	0.200	ND	0.206	0.201	103	101	74 -120	2	30
	Endrin	0.200	ND	0.239	0.240	119	120	76 -120	0	30
	Endosulfan II	0.200	ND	0.212	0.212	106	106	67 -120	0	30
	4,4'-DDD	0.200	ND	0.227	0.228	114	114	75 -126	0	30
	Endosulfan sulfate	0.200	ND	0.213	0.210	106	105	74 -120	1	30
	4,4'-DDT	0.200	ND	0.204	0.204	102	102	71 -120	0	30
	Methoxychlor	0.200	ND	0.216	0.231	108	116	63 -120	7	30
	Endrin aldehyde	0.200	ND	0.209	0.208	104	104	68 -120	0	30
	Kepone	10.090	ND	2.937	3.053	29	30	22 -120	4	30

ABBREVIATION KEY

MS = Matrix Spike
MSD = Matrix Spike Duplicate
ND = None Detected
RPD = Relative Percent Difference
--- = Analysis not requested
= No established limits
* = Outside specifications
D = Detection Limit

COMMENTS:

Quality Control Summary

Lab Control Spike/Lab Control Spike Duplicate
Pesticides

Unspiked Sample #....:BLK6/9
Spiked Sample #......:LCS6/9
Spiked Dup Sample #..:LCSD6/9

Matrix: WATER

This LCS/LCSD applies to the following samples	Compound	Spike Added (ug/l)	BKGD Conc (ug/l)	LCS Conc (ug/l)	LCSD Conc (ug/l)	LCS % REC	LCSD % REC	QC Limits REC	RPD	QC Limits RPD
BLK6/9	alpha-BHC	0.205	ND	0.169	0.183	82	89	80 -132	8	30
LCS6/9	gamma-BHC	0.202	ND	0.169	0.175	84	87	66 -120	3	30
LCSD6/9	beta-BHC	0.192	ND	0.179	0.190	93	99	74 -120	6	30
BLK6/12	Heptachlor	0.182	ND	0.153	0.158	84	87	60 -120	3	30
2326074	delta-BHC	0.186	ND	0.166	0.178	89	96	76 -126	7	30
	Aldrin	0.192	ND	0.154	0.159	80	83	58 -120	3	30
	Heptachlor epoxide	0.196	ND	0.169	0.164	86	84	64 -120	3	30
	Endosulfan I	0.200	ND	0.190	0.196	95	98	66 -120	3	30
	4,4'-DDE	0.211	ND	0.180	0.186	85	88	74 -120	3	30
	Dieldrin	0.202	ND	0.176	0.181	87	90	83 -120	3	30
	Endrin	0.232	ND	0.219	0.228	94	98	76 -120	4	30
	4,4'-DDD	0.233	ND	0.199	0.201	85	86	75 -126	1	30
	Endosulfan II	0.199	ND	0.184	0.192	92	96	67 -120	4	30
	4,4'-DDT	0.201	ND	0.192	0.191	96	95	71 -120	1	30
	Endrin aldehyde	0.224	ND	0.185	0.200	83	89	68 -120	8	30
	Endosulfan sulfate	0.215	ND	0.194	0.209	90	97	74 -120	7	30
	Methoxychlor	0.242	ND	0.203	0.219	84	90	63 -120	8	30

ABBREVIATION KEY

LCS = Lab Control Spike   LCSD = Lab Control Spike Duplicate
ND = None Detected   --- = Analysis not requested
RPD = Relative Percent Difference
# = No established limits   * = Outside Specifications

COMMENTS:

Lancaster Laboratories
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Initial Calibration Summary for Calibration file C:\CP\DATA1\1C11165.CAL
Last Update 06-16-1995 11:05:48

COMPOUND	FROM RT	MID POINT	TO RT	AVERAGE RESPONSE FACTOR	%RSD
TCX	11.24	11.29	11.34	2913523	7.86%
alpha-BHC	14.81	14.86	14.91	5611629	11.44%
gamma-BHC	16.88	16.93	16.98	4706381	4.33%
beta-BHC	17.21	17.26	17.31	1960863	8.80%
Heptachlor	18.76	18.81	18.86	3744529	3.43%
delta-BHC	19.12	19.17	19.22	4897620	1.69%
Aldrin	20.50	20.55	20.60	3787456	4.39%
Hept.epox exo	23.32	23.39	23.46	3346413	4.08%
g. Chlordane	24.19	24.26	24.33	3369553	5.88%
a. Chlordane	25.02	25.09	25.16	3223094	5.53%
Endosulfan I	25.13	25.20	25.27	2957528	5.32%
4,4'-DDE	26.29	26.36	26.43	3215387	4.74%
Dieldrin	26.68	26.75	26.82	2979424	2.16%
Endrin	28.48	28.55	28.62	2301405	7.84%
4,4'-DDD	29.03	29.10	29.17	2272551	6.00%
Endosulfan II	29.35	29.42	29.49	2419656	3.16%
4,4'-DDT	30.63	30.70	30.77	2195278	25.05%
Endrin aldehyde	31.05	31.12	31.19	1510423	3.23%
Endo. sulfate	31.81	31.88	31.95	1696058	2.57%
Methoxychlor	36.53	36.61	36.69	657429	33.82%
Endrin Ketone	37.31	37.38	37.45	1483419	2.62%
DCB	52.14	52.21	52.28	694011	12.57%

4,4'-DDT Breakdown= 2.4 % Endrin Breakdown= 2 % Total Breakdown= 4.4 % Data File 2

Analyst: Date: 6/16/95

Chromperfect Version Lanc

Lancaster Laboratories
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Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 1  TCX  Min RT= 11.24 Ret Time= 11.29 Max RT= 11.34 Window= .05

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0  .
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt    Source       Date Updated
 ----- --------- -------- ----------- ---------------
  1     0.00200      6474  32372.0E+02 1C11165.03A  06-15-1995 08:45
  2     0.00800     24294  30367.7E+02 1C11165.04A  06-15-1995 08:46
  3     0.01600     46155  28846.9E+02 1C11165.05A  06-15-1995 08:46
  4     0.04000    109220  27305.1E+02 1C11165.06A  06-15-1995 08:46
  5     0.08000    214275  26784.4E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9856729  Ave error=6.1071%
 Height = 00.e00 +29.135e05*X^1
 Average CF (EPA method 8000) = 2913522.75  with %RSD = 7.856%
```

Lancaster Laboratories
Where quality is a science.

Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml

 2  alpha-BHC  Min RT= 14.81 Ret Time= 14.86 Max RT= 14.91 Window= .05

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt    Source        Date Updated
 ----- --------- -------- ----------- ---------------
  1     0.00100    6723  67227.1E+02 1C11165.03A  06-15-1995 08:45
  2     0.00400   22213  55533.5E+02 1C11165.04A  06-15-1995 08:46
  3     0.00800   43389  54236.9E+02 1C11165.05A  06-15-1995 08:46
  4     0.02000  103789  51894.3E+02 1C11165.06A  06-15-1995 08:46
  5     0.04000  206759  51689.7E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9854131  Ave error=7.5483%
 Height = 00.e00 +56.116e05*X^1
 Average CF (EPA method 8000) = 5611628.5  with %RSD = 11.436%
```

Lancaster Laboratories
Where quality is a science.

Initial Calibration Report - Single Component

Run Number: 1C11165

```
al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume =  1    Area reject =  1500
eference peak area reject =  1500    Sample units = ug/ml


 3  gamma-BHC  Min RT= 16.88 Ret Time= 16.93 Max RT= 16.98 Window= .05

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .1  Low Alarm amount = 0
omponent constant =  0
uantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt   Source         Date Updated
 -----  ---------  -------- ----------- ----------------
  1     0.00100      4989   49892.2E+02 1C11165.03A   06-15-1995 08:45
  2     0.00400     19246   48116.0E+02 1C11165.04A   06-15-1995 08:46
  3     0.00800     37537   46920.9E+02 1C11165.05A   06-15-1995 08:46
  4     0.02000     91366   45683.1E+02 1C11165.06A   06-15-1995 08:46
  5     0.04000    178827   44706.8E+02 Manual        06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9951826  Ave error=3.2910%
 Height = 00.e00 +47.064e05*X^1
 Average CF (EPA method 8000) = 4706381.0  with %RSD = 4.327%
```

Lancaster Laboratories
Where quality is a science.

Initial Calibration Report - Single Component

```
                                            Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 4  beta-BHC  Min RT= 17.21 Ret Time= 17.26 Max RT= 17.31 Window= .05

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt    Source        Date Updated
 ----- --------- -------- ----------- ---------------
  1     0.00100     2232  22322.8E+02 1C11165.03A   06-15-1995 08:45
  2     0.00400     7954  19885.3E+02 1C11165.04A   06-15-1995 08:46
  3     0.00800    15645  19555.6E+02 1C11165.05A   06-15-1995 08:46
  4     0.02000    36841  18420.7E+02 1C11165.06A   06-15-1995 08:46
  5     0.04000    71435  17858.8E+02 Manual        06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9827707  Ave error=6.0137%
 Height = 00.e00 +19.609e05*X^1
 Average CF (EPA method 8000) = 1960863.375  with %RSD = 8.803%
```

Lancaster Laboratories
Where quality is a science.

nitial Calibration Report - Single Component

```
                                                   Run Number: 1C11165

al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume =  1   Area reject =  1500
eference peak area reject =  1500    Sample units = ug/ml


5  Heptachlor  Min RT= 18.76 Ret Time= 18.81 Max RT= 18.86 Window= .05

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .1  Low Alarm amount = 0
omponent constant =  0
uantitation will be by peak height.
LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source        Date Updated
-----  --------- --------  ----------- ---------------
  1      0.00100     3894   38937.2E+02 1C11165.03A  06-15-1995 08:45
  2      0.00400    15372   38430.9E+02 1C11165.04A  06-15-1995 08:46
  3      0.00800    30047   37558.4E+02 1C11165.05A  06-15-1995 08:46
  4      0.02000    72532   36266.2E+02 1C11165.06A  06-15-1995 08:46
  5      0.04000   144135   36033.8E+02 Manual       06-15-1995 08:55

Fit type = Average CF with equal weighting
Coef of determination= .997115  Ave error=2.7731%
Height = 00.e00 +37.445e05*X^1
Average CF (EPA method 8000) = 3744529.25  with %RSD = 3.428%
```

Lancaster Laboratories

Where quality is a science.

Initial Calibration Report - Single Component

```
                                                     Run Number: 1C11165

al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume =  1   Area reject =  1500
eference peak area reject =  1500    Sample units = ug/ml

6  delta-BHC  Min RT= 19.12 Ret Time= 19.17 Max RT= 19.22 Window= .05

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .1  Low Alarm amount = 0
omponent constant =  0
uantitation will be by peak height.
LEVEL   AMOUNT    HEIGHTHEIGHT/Amt    Source          Date Updated
-----  ---------  -------- -----------  ---------------
 1      0.00100     4971  49707.6E+02 1C11165.03A  06-15-1995 08:45
 2      0.00400    19958  49895.2E+02 1C11165.04A  06-15-1995 08:46
 3      0.00800    39174  48968.0E+02 1C11165.05A  06-15-1995 08:46
 4      0.02000    96375  48187.5E+02 1C11165.06A  06-15-1995 08:46
 5      0.04000   192491  48122.7E+02 Manual       06-15-1995 08:55

Fit type = Average CF with equal weighting
Coef of determination= .9993891  Ave error=1.3480%
Height = 00.e00 +48.976e05*X^1
Average CF (EPA method 8000) = 4897620.5  with %RSD = 1.687%
```

Lancaster Laboratories

Where quality is a science.

Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml

 7  Aldrin  Min RT= 20.5 Ret Time= 20.55 Max RT= 20.6 Window= .05

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL    AMOUNT    HEIGHTHEIGHT/Amt      Source         Date Updated
 -----  ---------  --------  -----------  ---------------
  1      0.00100      3902   39015.2E+02 1C11165.03A  06-15-1995 08:45
  2      0.00400     15756   39390.7E+02 1C11165.04A  06-15-1995 08:46
  3      0.00800     30950   38687.1E+02 1C11165.05A  06-15-1995 08:46
  4      0.02000     73533   36766.7E+02 1C11165.06A  06-15-1995 08:46
  5      0.04000    142053   35513.2E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9924871  Ave error=3.7071%
 Height = 00.e00 +37.875e05*X^1
 Average CF (EPA method 8000) = 3787456.0  with %RSD = 4.391%
```

Lancaster Laboratories
Where quality is a science.

Initial Calibration Report - Single Component

```
                                              Run Number: 1C11165

al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume =  1   Area reject =  1500
eference peak area reject =  1500    Sample units = ug/ml


3  Hept.epox exo  Min RT= 23.32 Ret Time= 23.39 Max RT= 23.46 Window= .07

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .23  Low Alarm amount = 0
omponent constant =  0
uantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt   Source         Date Updated
 -----  --------- -------- -------------------------------
  1      0.00100     3537  35366.4E+02 1C11165.03A  06-15-1995 08:45
  2      0.00400    13621  34052.7E+02 1C11165.04A  06-15-1995 08:46
  3      0.00800    26877  33596.8E+02 1C11165.05A  06-15-1995 08:46
  4      0.02000    64620  32310.1E+02 1C11165.06A  06-15-1995 08:46
  5      0.04000   127979  31994.6E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9961092  Ave error=3.1333%
 Height = 00.e00 +33.464e05*X^1
 Average CF (EPA method 8000) = 3346413.0  with %RSD = 4.085%
```

Lancaster Laboratories
Where quality is a science.

Initial Calibration Report - Single Component

Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 13
Cal file date = 06-15-1995 12:07:40
External standard calibration.
Default injection volume = 1 Area reject = 1500
Reference peak area reject = 1500 Sample units = ug/ml

9 g. Chlordane Min RT= 24.19 Ret Time= 24.26 Max RT= 24.33 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1 Low Alarm amount = 0
Component constant = 0
Quantitation will be by peak height.

LEVEL	AMOUNT	HEIGHT	HEIGHT/Amt	Source	Date Updated
1	0.00100	3661	36610.0E+02	Manual	06-15-1995 12:07
2	0.00400	13711	34276.8E+02	1C11165.04A	06-15-1995 08:46
3	0.00800	27116	33895.5E+02	1C11165.05A	06-15-1995 08:46
4	0.02000	63738	31868.9E+02	1C11165.06A	06-15-1995 08:46
5	0.04000	127306	31826.5E+02	Manual	06-15-1995 08:55

Fit type = Average CF with equal weighting
Coef of determination= .9931358 Ave error=4.3701%
Height = 00.e00 +33.696e05*X^1
Average CF (EPA method 8000) = 3369553.25 with %RSD = 5.88%

Analyst: G. F________ Date: 6/15/95
Reviewed & Approved by: ________ Date: 6/16/95
Chromperfect Version Lanc Reported On 06-15-1995 12:07:53

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Initial Calibration Report - Single Component

```
                                                  Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 12
Cal file date = 06-15-1995 10:41:31
External standard calibration.
Default injection volume =  1    Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 10  a. Chlordane  Min RT= 25.02 Ret Time= 25.09 Max RT= 25.16 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0 .
Component constant =  0
Quantitation will be by peak height.
 LEVEL    AMOUNT    HEIGHTHEIGHT/Amt    Source          Date Updated
 -----  ---------  -------------------  --------------
   1     0.00100      3477  34770.0E+02 Manual          06-15-1995 10:41
   2     0.00400     13287  33216.7E+02 1C11165.04A     06-15-1995 08:46
   3     0.00800     25471  31838.7E+02 1C11165.05A     06-15-1995 08:46
   4     0.02000     62027  31013.5E+02 1C11165.06A     06-15-1995 08:46
   5     0.04000    121263  30315.8E+02 Manual          06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9929551  Ave error=4.3490%
 Height = 00.e00 +32.231e05*X^1
 Average CF (EPA method 8000) = 3223093.5  with %RSD = 5.533%
```

Lancaster Laboratories
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Initial Calibration Report - Single Component

```
                                              Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 12
Cal file date = 06-15-1995 10:41:31
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 11  Endosulfan I  Min RT= 25.13 Ret Time= 25.2 Max RT= 25.27 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt   Source          Date Updated
 -----  --------- -------- ----------- ---------------
  1      0.00100     3189  31890.0E+02 Manual         06-15-1995 10:41
  2      0.00400    12082  30205.9E+02 1C11165.04A    06-15-1995 08:46
  3      0.00800    23611  29513.9E+02 1C11165.05A    06-15-1995 08:46
  4      0.02000    56296  28147.9E+02 1C11165.06A    06-15-1995 08:46
  5      0.04000   112475  28118.8E+02 Manual         06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9946629  Ave error=3.9610%
 Height = 00.e00 +29.575e05*X^1
 Average CF (EPA method 8000) = 2957528.25  with %RSD = 5.324%
```

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Initial Calibration Report - Single Component

```
                                                   Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 12  4,4'-DDE  Min RT= 26.29 Ret Time= 26.36 Max RT= 26.43 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source        Date Updated
 -----  --------- -------- -----------  ---------------
  1      0.00200     6941   34705.2E+02 1C11165.03A  06-15-1995 08:45
  2      0.00800    25542   31927.1E+02 1C11165.04A  06-15-1995 08:46
  3      0.01600    51261   32037.9E+02 1C11165.05A  06-15-1995 08:46
  4      0.04000   122701   30675.3E+02 1C11165.06A  06-15-1995 08:46
  5      0.08000   251390   31423.8E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9982497  Ave error=3.1134%
 Height = 00.e00 +32.154e05*X^1
 Average CF (EPA method 8000) = 3215387.25  with %RSD = 4.74%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml

 13  Dieldrin  Min RT= 26.68 Ret Time= 26.75 Max RT= 26.82 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT   HEIGHTHEIGHT/Amt   Source          Date Updated
 ----- --------- -------- ----------- --------------
  1     0.00200     6069  30344.1E+02 1C11165.03A   06-15-1995 08:45
  2     0.00800    23950  29937.4E+02 1C11165.04A   06-15-1995 08:46
  3     0.01600    48582  30363.6E+02 1C11165.05A   06-15-1995 08:46
  4     0.04000   115342  28835.6E+02 1C11165.06A   06-15-1995 08:46
  5     0.08000   235924  29490.5E+02 Manual        06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9993864  Ave error=1.7040%
 Height = 00.e00 +29.794e05*X^1
 Average CF (EPA method 8000) = 2979423.5  with %RSD = 2.161%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 14  Endrin  Min RT= 28.48 Ret Time= 28.55 Max RT= 28.62 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source          Date Updated
 ----- ---------  -------- ------------ ---------------
  1     0.00200      5212  26059.1E+02 1C11165.03A  06-15-1995 08:45
  2     0.00800     18502  23127.7E+02 1C11165.04A  06-15-1995 08:46
  3     0.01600     35788  22367.7E+02 1C11165.05A  06-15-1995 08:46
  4     0.04000     88153  22038.2E+02 1C11165.06A  06-15-1995 08:46
  5     0.08000    171820  21477.5E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9909449  Ave error=5.3298%
 Height = 00.e00 +23.014e05*X^1
 Average CF (EPA method 8000) = 2301404.5  with %RSD = 7.838%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 15  4,4'-DDD  Min RT= 29.03 Ret Time= 29.1 Max RT= 29.17 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt    Source         Date Updated
 -----  ---------  -------- ----------- ----------------
  1      0.00200      5016  25079.9E+02 1C11165.03A  06-15-1995 08:45
  2      0.00800     17849  22311.1E+02 1C11165.04A  06-15-1995 08:46
  3      0.01600     35776  22359.8E+02 1C11165.05A  06-15-1995 08:46
  4      0.04000     86084  21520.9E+02 1C11165.06A  06-15-1995 08:46
  5      0.08000    178846  22355.8E+02 Manual       06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9983746  Ave error=4.0263%
 Height = 00.e00 +22.726e05*X^1
 Average CF (EPA method 8000) = 2272550.75  with %RSD = 6.0%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

```
Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml

 16  Endosulfan II  Min RT= 29.35 Ret Time= 29.42 Max RT= 29.49 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source          Date Updated
 ----- --------- -------- ------------ ---------------
   1     0.00200     5009  25047.1E+02 1C11165.03A  06-15-1995 08:45
   2     0.00800    18532  23164.5E+02 1C11165.04A  06-15-1995 08:46
   3     0.01600    39737  24835.4E+02 1C11165.05A  06-15-1995 08:46
   4     0.04000    96468  24117.0E+02 1C11165.06A  06-15-1995 08:46
   5     0.08000   190550. 23818.7E+02 Manual       06-15-1995 08:55

  Fit type = Average CF with equal weighting
  Coef of determination= .9995225  Ave error=2.4679%
  Height = 00.e00 +24.197e05*X^1
  Average CF (EPA method 8000) = 2419655.5  with %RSD = 3.165%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume = 1   Area reject = 1500
eference peak area reject = 1500   Sample units = ug/ml

17 4,4'-DDT Min RT= 30.63 Ret Time= 30.7 Max RT= 30.77 Window= .07

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .2 Low Alarm amount = 0
omponent constant = 0
uantitation will be by peak height.

LEVEL	AMOUNT	HEIGHT	HEIGHT/Amt	Source	Date Updated
1	0.00200	6356	31777.9E+02	1C11165.03A	06-15-1995 08:45
2	0.00800	15850	19812.8E+02	1C11165.04A	06-15-1995 08:46
3	0.01600	31555	19721.7E+02	1C11165.05A	06-15-1995 08:46
4	0.04000	76406	19101.4E+02	1C11165.06A	06-15-1995 08:46
5	0.08000	154800	19350.1E+02	Manual	06-15-1995 08:55

Fit type = Linear with equal weighting, extrapolated to zero
Coef of determination= .9997122 Ave error=5.6061%
Height = 11.674e02 +19.118e05*X^1
Average CF (EPA method 8000) = 2195278.0 with %RSD = 25.053%

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Initial Calibration Report - Single Component

```
                                                   Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 18  Endrin aldehyde  Min RT= 31.05 Ret Time= 31.12 Max RT= 31.19 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source          Date Updated
 ----- --------- -------- ------------ ----------------
  1     0.00200      3147  15736.9E+02 1C11165.03A  06-15-1995 08:45
  2     0.00800     11637  14546.4E+02 1C11165.04A  06-15-1995 08:46
  3     0.01600     24758  15473.7E+02 1C11165.05A  06-15-1995 08:46
  4     0.04000     59283  14820.7E+02 1C11165.06A  06-15-1995 08:46
  5     0.08000    119547  14943.4E+02 Manual       06-15-1995 08:55

Fit type = Average CF with equal weighting
Coef of determination= .9996116  Ave error=2.6464%
Height = 00.e00 +15.104e05*X^1
Average CF (EPA method 8000) = 1510423.375  with %RSD = 3.234%
```

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Initial Calibration Report - Single Component

```
                                                   Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml

 19  Endo. sulfate  Min RT= 31.81 Ret Time= 31.88 Max RT= 31.95 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT   HEIGHTHEIGHT/Amt    Source          Date Updated
 -----  --------  ------- ----------- --------------
  1      0.00200     3452  17259.0E+02 1C11165.03A.  06-15-1995 08:45
  2      0.00800    13223  16529.2E+02 1C11165.04A   06-15-1995 08:46
  3      0.01600    27986  17491.3E+02 1C11165.05A   06-15-1995 08:46
  4      0.04000    66041  16510.3E+02 1C11165.06A   06-15-1995 08:46
  5      0.08000   136106  17013.2E+02 Manual        06-15-1995 08:55

 Fit type = Average CF with equal weighting
 Coef of determination= .9996347  Ave error=2.0818%
 Height = 00.e00 +16.961e05*X^1
 Average CF (EPA method 8000) = 1696058.25  with %RSD = 2.574%
```

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Initial Calibration Report - Single Component

```
                                                Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 20  Methoxychlor  Min RT= 36.53 Ret Time= 36.61 Max RT= 36.69 Window= .08

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = 1  Low Alarm amount = 0
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source          Date Updated
 ----- --------- -------- ----------- ---------------.
  1      0.01000    10550  10550.1E+02 1C11165.03A   06-15-1995 08:45
  2      0.04000    22670  56673.9E+01 1C11165.04A   06-15-1995 08:46
  3      0.08000    45043  56303.9E+01 1C11165.05A   06-15-1995 08:46
  4      0.20000   109753  54876.7E+01 1C11165.06A   06-15-1995 08:46
  5      0.40000   221436  55359.0E+01 Manual        06-15-1995 08:55

 Fit type = Linear with equal weighting. extrapolated to zero
 Coef of determination= .9995268  Ave error=7.3643%
 Height = 22.738e02 +54.532e04*X^1
 Average CF (EPA method 8000) = 657429.0  with %RSD = 33.824%
```

Lancaster Laboratories

Where quality is a science.

Initial Calibration Report - Single Component

```
                                                   Run Number: 1C11165

al file = C:\CP\DATA1\1C11165.CAL Version number = 11
al file date = 06-15-1995 08:55:40
xternal standard calibration.
efault injection volume =  1   Area reject =  1500
eference peak area reject =  1500    Sample units = ug/ml


21  Endrin Ketone  Min RT= 37.31 Ret Time= 37.38 Max RT= 37.45 Window= .07

o reference peak for this compound.
o internal standard for this compound.
igh Alarm amount = .2  Low Alarm amount = 0
omponent constant =  0
uantitation will be by peak height.
LEVEL  AMOUNT    HEIGHTHEIGHT/Amt   Source          Date Updated
-----  --------- -------- ----------- --------------
  1    0.00200     2929  14643.1E+02 1C11165.03A   06-15-1995 08:45
  2    0.00800    12049  15060.7E+02 1C11165.04A   06-15-1995 08:46
  3    0.01600    24427  15266.6E+02 1C11165.05A   06-15-1995 08:46
  4    0.04000    59722  14930.6E+02 1C11165.06A   06-15-1995 08:46
  5    0.08000   114160  14270.0E+02 Manual        06-15-1995 08:55

Fit type = Average CF with equal weighting
Coef of determination= .9974507  Ave error=2.0481%
Height = 00.e00 +14.834e05*X^1
Average CF (EPA method 8000) = 1483418.625  with %RSD = 2.616%
```

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Initial Calibration Report - Single Component

Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 11
Cal file date = 06-15-1995 08:55:40
External standard calibration.
Default injection volume = 1 Area reject = 1500
Reference peak area reject = 1500 Sample units = ug/ml

22 DCB Min RT= 52.14 Ret Time= 52.21 Max RT= 52.28 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2 Low Alarm amount = 0
Component constant = 0
Quantitation will be by peak height.

LEVEL	AMOUNT	HEIGHT	HEIGHT/Amt	Source	Date Updated
1	0.00200	3339	16696.9E+02	1C11165.03A	06-15-1995 08:45
2	0.00800	11313	14141.4E+02	1C11165.04A	06-15-1995 08:46
3	0.01600	21772	13607.7E+02	1C11165.05A	06-15-1995 08:46
4	0.04000	51075	12768.7E+02	1C11165.06A	06-15-1995 08:46
5	0.08000	97491	12186.4E+02	Manual	06-15-1995 08:55

DCB concentrations
are 1/2.
files 21-38 were
under these conc

Fit type = Average CF with equal weighting
Coef of determination= .9653278 Ave error=8.6647%
Height = 00.e00 +13.88e05*X^1
Average CF (EPA method 8000) = 1388021.25 with %RSD = 12.572%

Analyst: ____________________ Date: 6/15/95
Reviewed & Approved by: ____________________ Date: 6/11/95
Chromperfect Version Lanc Reported On 06-15-1995 08:56:02

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Initial Calibration Report - Single Component

```
                                              Run Number: 1C11165

Cal file = C:\CP\DATA1\1C11165.CAL Version number = 14
Cal file date = 06-16-1995 11:05:48
External standard calibration.
Default injection volume =  1   Area reject =  1500
Reference peak area reject =  1500    Sample units = ug/ml


 22  DCB  Min RT= 52.14 Ret Time= 52.21 Max RT= 52.28 Window= .07

No reference peak for this compound.
No internal standard for this compound.
High Alarm amount = .2  Low Alarm amount = 0 .
Component constant =  0
Quantitation will be by peak height.
 LEVEL   AMOUNT    HEIGHTHEIGHT/Amt     Source         Date Updated
 -----  --------  -------  ----------  -------------
  1      0.00400     3339  83484.7E+01 Manual         06-16-1995 11:05
  2      0.01600    11313  70706.9E+01 Manual         06-16-1995 11:05
  3      0.03200    21772  68038.4E+01 Manual         06-16-1995 11:05
  4      0.08000    51075  63843.5E+01 Manual         06-16-1995 11:05
  5      0.16000    97491  60931.8E+01 Manual         06-16-1995 11:05

  Fit type = Average CF with equal weighting
  Coef of determination= .9653278  Ave error=8.6647%
  Height = 00.e00 +69.401e04*X^1
  Average CF (EPA method 8000) = 694010.625  with %RSD = 12.572%

Analyst:  _____________________________________Date: 6/16/95
Reviewed & Approved by: _______________________Date: 6/16/95
Chromperfect Version Lanc             Reported On 06-16-1995 11:05:58
```

corrected
DCB concentration:
used for files 3

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Initial Calibration Report - Multiple Componen

Run Number: 1C11165

Area Files Used for Calibration

Area file directory: ______

Applies to Injections: ______

(1) 8 (2) 9 (3) 10 (4) 11
(5) 12 (6) 13 (7) 14 (8) 16
(9) 17 (10) 18 (11) 19 (12) 20
(13) ______ (14) ______ (15) ______ (16) ______

Multiple Component: Aroclor-1016
Calibration Levels: 5
Min # Peaks for Quant: 4

Avg Concentration(ug/ml): .86172
Max %RSD for Compnd Id: 15

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	14.660	16.880	18.840	19.650	20.320	22.130				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Average Height	40125	56865	95106	44399	39388	36134				
RF (Height/Conc)	46564	66014	110367	51524	45709	41932				
%RSD for RF	6.657%	5.777%	6.066%	6.529%	5.811%	5.551%				
Level 1 Height	4828	6870	11670	5516	4727	4309				
Conc.	0.1002	0.1002	0.1002	0.1002	0.1002	0.1002				
Level 2 Height	10142	14076	23735	10886	9813	8968				
Conc.	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004				
Level 3 Height	23033	33378	53875	25771	22957	20939				
Conc.	0.5010	0.5010	0.5010	0.5010	0.5010	0.5010				
Level 4 Height	46192	64210	106619	50167	44747	42232				
Conc.	1.0020	1.0020	1.0020	1.0020	1.0020	1.0020				
Level 5 Height	105099	151707	257992	117087	105017	95099				
Conc.	2.5050	2.5050	2.5050	2.5050	2.5050	2.5050				

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Initial Calibration Report – Multiple Component

Run Number: 10/1165

– [illegible] #20

Multiple Component:	**Aroclor-1221**		
Calibration Levels:	1	Concentration (ug/ml):	.2502
Min # Peaks for Quant:	3	Max %RSD for Compnd Id:	5

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	13.310	13.530	14.650							
RT Window (mins)	0.10000	0.10000	0.10000							
Height	10346	9054	18449							
RF (Height/Conc)	41351	36187	73737							

Multiple Component:	**Aroclor-1232**		
Calibration Levels:	1	Concentration (ug/ml):	.2502
Min # Peaks for Quant:	4	Max %RSD for Compnd Id:	10

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	13.320	14.660	16.870	18.840	19.640	25.190				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	9509	14646	8192	13388	6560	6813				
RF (Height/Conc)	38006	58537	32742	53509	26219	27230				

Multiple Component:	**Aroclor-1242**		
Calibration Levels:	1	Concentration (ug/ml):	.25
Min # Peaks for Quant:	4	Max %RSD for Compnd Id:	30

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	16.870	18.830	19.640	23.480	23.790	25.180				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	15626	24643	11752	11429	12214	12689				
RF (Height/Conc)	62504	98572	47008	45716	48856	50756				

Initial Calibration Report - Multiple Component

Run Number: 1C11165

Multiple Component: **Aroclor-1248**
Calibration Levels: 1
Min # Peaks for Quant: 4
Concentration (ug/ml): .2502
Max %RSD for Compnd Id: 30

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	18.840	20.490	22.120	23.450	23.790	25.180				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	14223	11867	16327	19845	19733	20679				
RF (Height/Conc)	56847	47430	65256	79317	78869	82650				

Multiple Component: **Aroclor-1254**
Calibration Levels: 1
Min # Peaks for Quant: 4
Concentration (ug/ml): .2505
Max %RSD for Compnd Id: 40

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	24.190	24.550	27.130	27.760	28.510	30.680				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	19214	22528	34737	29301	20760	25891				
RF (Height/Conc)	76703	89932	138671	116970	82874	103357				

Initial Calibration Report - Multiple Component

Run Number: 1C11165

Multiple Component: **Aroclor-1260**
Calibration Levels: 5
Min # Peaks for Quant: 4
Avg Concentration(ug/ml): .86
Max %RSD for Compnd Id: 40

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	28.040	28.510	30.690	30.930	33.080	34.050				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Average height	65873	124432	72723	93613	61906	199133				
RF (Height/Conc)	76596	144688	84562	108852	71924	231550				
%RSD for RF	11.154%	7.203%	7.424%	5.427%	6.664%	6.875%				
Level 1 Height	5710	15768	9355	11419	7885	25010				
Conc.	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000				
Level 2 Height	16764	30527	17690	23123	15000	48373				
Conc.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000				
Level 3 Height	34419	68967	39741	53191	34547	110159				
Conc.	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000				
Level 4 Height	68482	142325	82326	106574	69713	234600				
Conc.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0008				
Level 5 Height	186652	331414	197500	253751	168153	527172				
Conc.	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000				

Multiple Component: **Toxaphene**
Calibration Levels: 1
Min # Peaks for Quant: 4
Concentration (ug/ml): .5
Max %RSD for Compnd Id: 30

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	26.820	27.750	28.740	29.080	29.530	30.790				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	7486	7176	9142	11888	13696	10437				
RF (Height/Conc)	14972	14352	18284	23776	27392	20874				

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Initial Calibration Report - Multiple Component

Run Number: 101165

Multiple Component: Chlordane
Calibration Levels: 1
Min # Peaks for Quant: 2
Concentration (ug/ml): .2
Max %RSD for Compnd Id: 20

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	17.970	18.820	24.270	24.500	25.090	29.890				
RT Window (mins)	0.10000	0.10000	0.10000	0.10000	0.10000	0.10000				
Height	28659	32321	65343	34456	55517	21580				
RF (Height/Conc)	143295	161605	326715	172280	277585	107900				

Analyst: ____________ Date: 6/15/95

Reported on 06-15-1995 13:14:56   Last Calibrated on 06-15-1995 13:13:52   ChromPerfect Version .01   CheckPCB Version 3.22

ck 6/15/95

```
=============================SW846===================================
Sample Name: MIXA395B                       C      1.095165999999937
 Instrument ID: CP11--V3780A          Injected on: Jun 16, 1995  03:03:03
 Volume Inj. per column: 1          GC Column ID: DB608
 Sample Amount: 1                   Dilution Factor: 1
 Raw File: C:\CP\DATA1\1C11165.31R
-----------------------------------------------------------------------
GC Conditions: Injector 250C    Detector 300C   Carrier: He 5.5 ml/min
Oven: 150C HOLD 2 MIN TO 260C @ 4C/MIN HOLD 25 MIN
Analyst: 440
-----------------------------------------------------------------------
Integration & Calculation Parameters:
   Threshold: 7              Width: .05            Area Reject: 1500

   Calib. Type: EXTERNAL    Quantitation: HEIGHT
-----------------------------------------------------------------------
Peak Table:

MIN RT  Ret Time  MAX RT   Peak       Amount
(min)   (min)     (min)    Height     ppb       Peak Name            RPD (%)
 0.00    6.15      0.00       608     0.0000                            0.
 0.00    6.58      0.00       842     0.0000                            0.
 0.00    6.87      0.00      3583     0.0000                            0.
 0.00    8.20      0.00       832     0.0000                            0.
 0.00   10.61      0.00      2208     0.0000                            0.
11.24   11.28     11.34     50829     0.0174   TCX                    -10.
 0.00   12.99      0.00       779     0.0000                            0.
 0.00   13.31      0.00       746     0.0000                            0.
 0.00   13.53      0.00       814     0.0000                            0.
14.81   14.85     14.91     48228     0.0086   alpha-BHC              -11.
16.83   16.92     16.98     41144     0.0087   gamma-BHC              -10.
17.21   17.26     17.31     17938     0.0091   beta-BHC               -15.
 0.00   18.31      0.00      1360     0.0000                            0.
18.76   18.81     18.86     34468     0.0092   Heptachlor             -15.
19.12   19.17     19.22     42856     0.0088   delta-BHC               -9.
20.50   20.55     20.60     34267     0.0090   Aldrin                 -11.
 0.00   21.27      0.00      1239     0.0000                            0.
23.32   23.38     23.46     29790     0.0089   Hept.epox exo          -11.
 0.00   23.79      0.00      1080     0.0000                            0.
24.19   24.25     24.33     29707     0.0088   g. Chlordane           -10.
25.02   25.07     25.16     28573     0.0089   a. Chlordane           -12.
25.13   25.19     25.27     26704     0.0090   Endosulfan I           -13.
26.29   26.36     26.43     57942     0.0180   4,4'-DDE               -13.
26.68   26.74     26.82     53363     0.0179   Dieldrin               -10.
28.48   28.54     28.62     40904     0.0178   Endrin                 -14.
29.03   29.09     29.17     41040     0.0181   4,4'-DDD               -15.
29.35   29.40     29.49     42551     0.0176   Endosulfan II           -7.
 0.00   30.43      0.00      1208     0.0000                            0.
30.63   30.69     30.77     35437     0.0179   4,4'-DDT               -12.
```

```
31.05   31.10    31.19    26708      0.0177  Endrin aldehyde           -8.
 0.00   31.47     0.00     2043      0.0000                             0.
31.81   31.87    31.95    30215      0.0175  Endo. sulfate   .         -8.
 0.00   33.33     0.00     1538      0.0000                             0.
36.53   36.58    36.69    50670      0.0887  Methoxychlor             -12.
37.31   37.36    37.45    26426      0.0178  Endrin Ketone             -8.
52.14   52.18    52.28    25557      0.0184  DCB                      -17.

-----------------------------------------------------------------------------
Calculation for RPD % = (ICAL LVL 3 RF)-(CCAL LVL 3 RF)/(ICAL LVL 3 RF)

* = This component is not contained in this standard mix.
```

Reviewed by: Jackie Ulrich Date: 6-16-95

```
FILES:
Area file: C:\CP\DATA1\1C11165.31A
method file: C:\CP\DATA1\PPLCC.MET
Calibration File: C:\CP\DATA1\1C11165.CAL
Format File: C:\CP\DATA1\PESTCC.FMT
Area file created on: 06/16/95 03:04:28 .
File reported on: 06-16-1995at 03:04:37
```

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```
                                                                   Batch No:  95165999999
                                                  C
Sample Name: AR16395A
Injected on: 06-16-1995_04:03:15   Instrument: CP11--V3780A      Analyst: 440     Area File Name:  C:\CP\DATA1\1C11165.32A
                                                                 Sample Amount:  1 G or L   Total Volume:  1 mL

  Units:   uG/L or mG/kG          No Of Peaks                   Maximum
                                          Minimum               Allowed      Worst
Pattern        Amount Found       Found   Required    %RSD       %RSD        Case**                Comments
============   ============      ======= ========   =========  =========   ============  ==========================================
Aroclor-1016          0.5382        6       4        2.04150%   15.0000%     0.521583    ÷.5= 108 %
Aroclor-1221*         0.2440        2       3       57.96621%    5.0000%     0.144006    ____________________________________
Aroclor-1232*         0.9110        4       4       35.07152%   10.0000%     0.059155    ____________________________________
Aroclor-1242*         0.5791        3       4        0.74074%   30.0000%     0.031736    ____________________________________
Aroclor-1248*         0.5543        3       4       71.76501%   30.0000%     0.019489    ____________________________________
Aroclor-1254*         0.1889        3       4       19.30026%   40.0000%     0.023032    ____________________________________
Aroclor-1260          0.5163        6       4        1.85200%   40.0000%     0.510270    ÷.5= 103 %
Toxaphene    *        0.4543        3       4      130.36842%   30.0000%     0.042186    ____________________________________
Chlordane    *        0.0749        3       2       40.38113%   20.0000%     0.041108    ____________________________________

Peaks Used To Quantify Above Amount Found Values:
Pattern     Retention Time and Calculated Amount Found for Each Peak
==================================================================================================================================
Aroclor-1016     14.659      16.380      18.843      19.649      20.318      22.126
                  0.5448      0.5453      0.5216      0.5268      0.5440      0.5466
Aroclor-1221     13.535      14.659
                  0.1440      0.3441
Aroclor-1232     14.659      16.880      18.843      19.649
                  0.4334      1.0994      1.0758      1.0353
Aroclor-1242     16.880      18.843      19.649
                  0.5759      0.5840      0.5774
Aroclor-1248     18.843      20.495      22.126
                  1.0127      0.2990      0.3512
Aroclor-1254     24.197      24.562      27.148
                  0.1751      0.1613      0.2302
Aroclor-1260     28.036      28.515      30.679      30.927      33.050      34.046
                  0.5338      0.5104      0.5110      0.5111      0.5103      0.5214
Toxaphene        27.765      29.103      29.494
                  0.1877      0.0422      1.1330
Chlordane        17.988      24.197      24.562
                  0.0994      0.0411      0.0542
Non-Quantitation Peaks with matching retention times:
Aroclor-1232     25.197
                  0.0592
Aroclor-1242     25.197      23.491      23.757
                  0.0317      0.1040      0.1364
Aroclor-1248     25.197      23.491      23.757
                  0.0195      0.0600      0.0345
Aroclor-1254     28.515      30.679      27.765
                  0.8911      0.4181      0.0230
Chlordane        18.843
                  0.3562
```

Reviewed by Jackie Ulrich

Date: 6-16-95

%SSR(A): ______%

%SSR(B): ______%

```
=============================SW846===================================
Sample Name: EVALX95A                      C      1.095165999999937
 Instrument ID: CP11--V3780A        Injected on: Jun 16, 1995  05:03:22
 Volume Inj. per column: 1      GC Column ID: DB608
 Sample Amount: 1               Dilution Factor: 1
 Raw File: C:\CP\DATA1\1C11165.33R
----------------------------------------------------------------------
GC Conditions: Injector 250C   Detector 300C   Carrier: He 5.5 ml/min
Oven: 150C HOLD 2 MIN TO 260C @ 4C/MIN HOLD 25 MIN
Analyst: 440
----------------------------------------------------------------------
Integration & Calculation Parameters:
   Threshold: 7               Width: .05          Area Reject: 1500

   Calib. Type: EXTERNAL    Quantitation: HEIGHT
----------------------------------------------------------------------
Peak Table:

MIN RT  Ret Time  MAX RT   Peak      Amount
(min)    (min)    (min)   Height     ppb      Peak Name              RPD (%)
 0.00     6.25     0.00     1136     0.0000                               0.
 0.00     6.87     0.00     2334     0.0000                               0.
 0.00     7.79     0.00     1110     0.0000                               0.
 0.00     8.65     0.00      881     0.0000                               0.
 0.00     9.43     0.00      838     0.0000                               0.
 0.00    10.29     0.00      963     0.0000                               0.
11.24    11.28    11.34    61765     0.0212   TCX                       -34.
 0.00    11.87     0.00     1019     0.0000                               0.
 0.00    12.59     0.00     1131     0.0000                               0.
 0.00    13.32     0.00      811     0.0000                               0.
 0.00    14.20     0.00      793     0.0000                               0.
14.81    14.85    14.91    62120     0.0111   alpha-BHC                 -43.
 0.00    16.46     0.00     2414     0.0000                               0.
16.88    16.92    16.98    52953     0.0113   gamma-BHC                 -41.
17.21    17.25    17.31    19582     0.0100   beta-BHC                  -25.
 0.00    17.95     0.00      891     0.0000                               0.
 0.00    18.71     0.00     1159     0.0000                               0.
 0.00    21.27     0.00      967     0.0000                               0.
26.29    26.35    26.43     5791     0.0018   4,4'-DDE                   89.
 0.00    27.14     0.00      497     0.0000                               0.
28.48    28.54    28.62   120117     0.0522   Endrin                   -236.
29.03    29.09    29.17     3484     0.0015   4,4'-DDD                   90.
29.35    29.49    29.49      751     0.0003   Endosulfan II              98.
 0.00    30.41     0.00      953     0.0000                               0.
30.63    30.69    30.77   206055     0.1072   4,4'-DDT                 -553.
31.05    31.10    31.19     1396     0.0009   Endrin aldehyde            94.
 0.00    31.47     0.00     1058     0.0000                               0.
 0.00    33.32     0.00     4032     0.0000                               0.
 0.00    34.04     0.00     3188     0.0000                               0.
```

```
36.53   36.59    36.69    144272      0.2604  Methoxychlor          -220.
37.31   37.38    37.45      1235      0.0008  Endrin Ketone           95.
 0.00   37.81     0.00      1191      0.0000                           0.
52.14   52.17    52.28     15459      0.0111  DCB                     29.
```

```
Calculation for RPD % = (ICAL LVL 3 RF)-(CCAL LVL 3 RF)/(ICAL LVL 3 RF)

** = This component is not contained in this standard mix.
```

Reviewed by: Jackie Ulrich Date: 6-16-95

```
FILES:
Area file: C:\CP\DATA1\1C11165.33A
Method file: C:\CP\DATA1\PPLCC.MET
Calibration File: C:\CP\DATA1\1C11165.CAL
Format File: C:\CP\DATA1\PESTCC.FMT
Area file created on: 06/16/95 05:04:52
File reported on: 06-16-1995at 05:05:01
```

$$\% \text{ Breakdown DDT} = \frac{5791 + 3484}{206055 + 5791 + 3484} \times 100 = 4.31\,\%$$

$$\% \text{ Breakdown Endrin} = \frac{1396 + 1235}{120117 + 1396 + 1235} \times 100 = 2.14\,\%$$

JSU
6-16-95

Quality Control Summary

Surrogate Recovery
Volatiles by GC - Water

LLI Sample No.	Sample Designation	Dilution Factor	S1 (MeBrCl)	S2 (1Cl3FBn)	S3 (1Cl3FBn)	S4 (1,2,3-TCP)	S5 (ProBn)	Other	TOT OUT	Comment

	QC Limits LOW	QC Limits HIGH
S1 (MeBrCl) = Bromochloromethane (Hall Det)	75	125
S2 (1Cl3FBn) = 1-Chloro-3-fluorobenzene (Hall Det)	75	125
S3 (1Cl3FBn) = 1-Chloro-3-fluorobenzene (PID Det)	75	125
S4 (1,2,3-TCP) = 1,2,3-Trichloropropane (Hall Det)	75	125
S5 (ProBn) = n-Propylbenzene (PID Det)	75	125

* Values outside QC limits

D Surrogates diluted out

Nominal concentration of the surrogate spike used is 30 ug/l.

Quality Control Summary

Method Blank
Primary Run
Volatiles by GC

*** BLANK INFORMATION ***
Matrix......................: Water
Batch Number...............: 95108/A15
Injection Number...........: 186
Analysis Date..............: 04/20/95
Concentration Units........: ug/l

Instrument....................: 05586
Column ID.....................: 75m x 0.45mm ID J&W Scientific DB-VRX

Sample Information				Blank Contamination Information			
LLI Sample #	Sample Designation	Analysis Date	Analysis Time	CAS Number	Compound	Blank Result	LOQ
				74-87-3	Chloromethane	ND	5
				74-83-9	Bromomethane	ND	5
				75-01-4	Vinyl chloride	ND	1
				75-00-3	Chloroethane	ND	1
				75-09-2	Methylene chloride	ND	1
				75-69-4	Trichlorofluormethane	ND	1
				75-35-4	1,1-Dichloroethene	ND	1
				75-34-3	1,1-Dichloroethane	ND	1
				540-59-0	1,2-Dichloroethene (c/t)	ND	1
				67-66-3	Chloroform	ND	1
				76-13-1	Trichlorotrifluoroethane	ND	1
				107-06-2	1,2-Dichloroethane	ND	1
				71-55-6	1,1,1-Trichloroethane	ND	1
				56-23-5	Carbon tetrachloride	ND	1
				75-27-4	Bromodichloromethane	ND	1
				78-87-5	1,2-Dichloropropane	ND	1
				10061-02-6	trans-1,3-Dichloropropene	ND	1
				79-01-6	Trichloroethene	ND	1
				124-48-1	Dibromochloromethane	ND	1
				79-00-5	1,1,2-Trichloroethane	ND	1
				10061-01-5	cis-1,3-Dichloropropene	ND	1
				75-25-2	Bromoform	ND	2
				79-34-5	1,1,2,2-Tetrachloroethane	ND	2
				127-18-4	Tetrachloroethene	ND	1
				108-90-7	Chlorobenzene	ND	1
				71-43-2	Benzene	ND	1
				108-88-3	Toluene	ND	1

ABBREVIATION KEY

LOQ = Limit of Quantitation
ND = None Detected
* = above detection limit

Quality Control Summary

Matrix Spike/Matrix Spike Duplicate
Primary Run
Volatiles by GC

Unspiked Sample Number : 2120251
Spiked Sample Number : 2120252
Spiked Dup Sample Number : 2120253

Inj. : 529
Inj. : 530
Inj. : 531

Batch Number : 94124/A12
Matrix : Water

Date : 05/05/94

Instrument....................: 03819
Column........................: 1% SP-1000 on Carbopack B

This MS/MSD applies to the following samples	Compound	Spike Added (ug/l)	Sample Conc (ug/l)	MS Conc (ug/l)	MSD Conc (ug/l)	MS % REC	MSD % REC	QC Limits REC	RPD	QC Limits RPD
	Chloromethane	20.0	ND					25 -168		20
	Bromomethane	20.0	ND					46 -136		20
	Vinyl chloride	20.0	ND					48 -163		20
	Chloroethane	20.0	ND					46 -137		20
	Methylene chloride	19.3	ND					78 -128		15
	1,1-Dichloroethene	18.6	ND					74 -137		15
	1,1-Dichloroethane		ND					91 -130		15
	1,2-Dichloroethene(cis/trans)		ND					92 -126		15
	Chloroform		ND					91 -127		15
	1,2-Dichloroethane		ND					80 -130		15
	1,1,1-Trichloroethane		ND					87 -138		15
	Carbon Tetrachloride		ND					91 -134		15
	Bromodichloromethane		ND					87 -123		15
	1,2-Dichloropropene		ND					87 -128		15
	Trichloroethene		ND					91 -131		15
	Dibromochloromethane		ND					88 -131		15
	Bromoform		ND					74 -119		15
	Tetrachloroethene		ND					91 -129		15
	Chlorobenzene		ND					90 -125		15
	Benzene		ND					93 -124		15
	Toluene		ND					92 -120		15
	Ethylbenzene		ND					94 -119		15

ABBREVIATION KEY

MS = Matrix Spike
MSD = Matrix Spike Duplicate
ND = None Detected
RPD = Relative Percent Difference

Quality Control Summary

Initial Calibration
Primary Run
Volatiles by GC

Calibration Batch.............: 95003/A15

Sample Batch Number......: 95026/A15

Calibration Date..............: 01/03/95

Instrument....................: 05586
Column ID.....................: 75m x 0.45mm ID J&W Scientific DB-VRX

	Laboratory Standard ID										
Compound	2.5-500 +12.5 Rf STD 1	4-200 +20 Rf STD 2	10-200 +20 Rf STD 3	10-50 +10 Rf STD 4	35-50 +20 Rf STD 5	70-50 +30 Rf STD 6	AVE RF	%RSD	QC Limit	RT	ID Window
Chloromethane	0.001411	0.001668	0.001307	0.001949	0.001585	0.001394	0.001553	15.2	20	2.10	+/- 0.3 min
Bromomethane	0.003348	0.003280	0.002448	0.002366	0.002576	0.001980	0.002666	20.3	20 *	3.52	+/- 0.3 min
Vinyl chloride	0.001178	0.001732	0.001443	0.001537	0.001511	0.001294	0.001449	13.4	20	4.50	+/- 0.3 min
Chloroethane	0.001072	0.001265	0.001076	0.001064	0.001078	0.001009	0.001094	8.0	20	5.75	+/- 0.3 min
Methylene chloride	0.000695	0.000732	0.000751	0.000729	0.000712	0.000688	0.000718	3.4	20	8.24	+/- 0.2 min
1,1-Dichloroethene	0.001042	0.000907	0.000716	0.000736	0.000684	0.000727	0.000802	17.6	20	11.14	+/- 0.2 min
1,1-Dichloroethane	0.000989	0.000870	0.000791	0.000740	0.000730	0.000754	0.000812	12.4	20	12.46	+/- 0.2 min
cis-1,2-Dichloroethene	0.001391	0.001111	0.000886	0.000852	0.000824	0.000784	0.000974	24.0	20 *	13.22	+/- 0.2 min
Chloroform	0.000770	0.000666	0.000611	0.000565	0.000571	0.000570	0.000626	12.9	20	13.78	+/- 0.2 min
1,2-Dichloroethane	0.001341	0.001096	0.000936	0.000834	0.000825	0.000788	0.000970	22.0	20 *	14.65	+/- 0.2 min
1,1,1-Trichloroethane	0.001002	0.000982	0.000835	0.000809	0.000798	0.000806	0.000872	10.8	20	15.90	+/- 0.2 min
Carbon tetrachloride	0.000845	0.000718	0.000621	0.000597	0.000593	0.000584	0.000660	15.7	20	16.30	+/- 0.2 min
Bromodichloromethane	0.001315	0.001202	0.001001	0.000922	0.000893	0.000836	0.001028	18.5	20	16.85	+/- 0.2 min
1,2-Dichloropropane	0.001566	0.001361	0.000994	0.000985	0.000990	0.000944	0.001140	22.7	20 *	18.30	+/- 0.2 min
Trichloroethene	0.001007	0.000874	0.000717	0.000705	0.000676	0.000676	0.000776	17.4	20	19.06	+/- 0.2 min
Dibromochloromethane	0.002343	0.001957	0.001613	0.001590	0.001456	0.001384	0.001724	21.0	20 *	19.81	+/- 0.2 min
Bromoform	0.006067	0.004307	0.003584	0.003356	0.003115	0.002659	0.003848	31.6	20 *	22.61	+/- 0.4 min
Tetrachloroethene	0.000814	0.000805	0.000619	0.000677	0.000641	0.000646	0.000700	12.3	20	24.73	+/- 0.2 min
Chlorobenzene	0.003257	0.003025	0.002402	0.002333	0.002347	0.002104	0.002578	17.6	20	27.61	+/- 0.2 min
Benzene	0.026492	0.037147	0.033503	0.035573	0.031104	0.029908	0.032288	12.1	20	19.54	+/- 0.2 min
Toluene	0.038457	0.040149	0.037709	0.040768	0.036457	0.035646	0.038198	5.3	20	26.14	+/- 0.2 min
Ethylbenzene	0.071343	0.069934	0.070323	0.078276	0.069296	0.067727	0.071150	5.2	20	30.39	+/- 0.2 min

This initial calibration applies to samples:

2249687 UNSPK
2249688 MS
2249689 MSD
2249690
2250495
2250496
2250497
2250498
2250499
2250500
2250501
2250502
Inj #494 BLK
Inj #536 BLK
Inj #562 BLK
Inj #599 BLK

For initial calibration 01/03/95, the %RSD for bromomethane, cis-1,2-dichloroethene, 1,2-dichloroethene, 1,2-dichloropropane, dibromochloromethane and bromoform is outside the QC limit as set by Lancaster Laboratories, Inc. However, EPA Method SW-846 5030A/8010A & 8020 does not specify QC limits for this parameter when a calibration curve is used. In addition, these compounds were not detected in any of the samples analyzed under this method.

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Quality Control Summary

Continuing Calibration
Primary Run
Volatiles by GC

Calibration Date..............: 04/12/95

Continuing Calibration Date...: 05/16/95

Batch Number..................: 95133/A12

Inj #.........................: 766

Instrument....................: 03819
Column........................: 1% SP-1000 on Carbopack B

	Compound	Amount Spiked	Laboratory Control Sample Result	% Recovery	Acceptance Range	Out of Range
2308195 Inj #765 BLK	Chloromethane	20.0	25.7	128.4	60 % - 141 %	
	Bromomethane	20.0	20.4	102.1	59 % - 142 %	
	Vinyl chloride	20.0	22.7	113.4	69 % - 132 %	
	Chloroethane	20.0	22.3	111.4	77 % - 123 %	
	Methylene chloride	20.1	22.1	110.1	78 % - 123 %	
	Trichlorofluoromethane	20.1	20.6	102.7	67 % - 134 %	
	1,1-Dichloroethene	20.1	20.7	102.8	63 % - 137 %	
	1,1-Dichloroethane	20.1	23.3	116.1	84 % - 116 %	*
	1,2-Dichloroethene (c/t)	20.1	20.7	102.9	64 % - 136 %	
	Chloroform	20.1	20.7	103.0	75 % - 125 %	
	1,2-Dichloroethane	20.2	18.1	89.5	72 % - 129 %	
	1,1,1-Trichloroethane	20.0	21.5	107.5	71 % - 129 %	
	Carbon tetrachloride	20.1	22.8	113.3	69 % - 132 %	
	Bromodichloromethane	20.0	19.8	98.8	76 % - 124 %	
	1,2-Dichloropropane	20.1	20.2	100.3	74 % - 126 %	
	Trichloroethene	20.1	21.4	106.6	77 % - 123 %	
	Dibromochloromethane	20.1	18.8	93.6	66 % - 135 %	
	2-Chloroethyl vinyl ether	20.1	22.4	111.4	60 % - 140 %	
	Bromoform	20.1	19.8	98.7	74 % - 127 %	
	Tetrachloroethene	20.1	21.0	104.5	70 % - 130 %	
	Chlorobenzene	20.1	21.0	104.5	72 % - 128 %	

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Quality Control Summary

Check Standard Summary
Retention Time
Primary Run
Volatiles by GC - Water

Initial Calibration Date......: 01/03/95
Sample Batch..................: 95061/A01
Injection Number..............: 056
Injection Date................: 03/02/95
Method........................: EPA Method 601

Instrument....................: 02030
Column........................: 1% SP-1000 on Carbopack B

Sample Number	Compound	Retention Time	ID Window
2265581 UNSPK	Chloromethane	2.16	+/- 0.3 min
2265584 MS	Bromomethane	3.59	+/- 0.3 min
2265585 MSD	Vinyl chloride	4.62	+/- 0.3 min
Inj #063 BLK	Chloroethane	5.87	+/- 0.3 min
	Methylene chloride	8.29	+/- 0.2 min
	Trichlorofluoromethane	10.47	+/- 0.2 min
	1,1-Dichloroethene	11.18	+/- 0.2 min
	1,1-Dichloroethane	12.48	+/- 0.2 min
	cis-1,2-Dichloroethene	13.26	+/- 0.2 min
	Chloroform	13.79	+/- 0.2 min
	1,2-Dichloroethane	14.71	+/- 0.2 min
	1,1,1-Trichloroethane	15.92	+/- 0.2 min
	Carbon tetrachloride	16.32	+/- 0.2 min
	Bromodichloromethane	16.95	+/- 0.2 min
	1,2-Dichloropropane	18.44	+/- 0.2 min
	Trichloroethene	19.13	+/- 0.2 min
	Dibromochloromethane	19.92	+/- 0.2 min
	2-Chloroethyl vinyl ether	21.16	+/- 0.2 min
	Bromoform	22.62	+/- 0.4 min
	Tetrachloroethene	24.72	+/- 0.2 min
	Chlorobenzene	27.62	+/- 0.2 min

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Quality Control Summary

Retention Time Shift Summary
Primary Run
Volatiles by GC - Water

Initial Calibration Date ......: 01/03/95
Initial Calibration Batch.....: 95003/A01
Sample Batch..................: 95003/A01
Method ....: EPA Method SW-846 5030A/8010A

Instrument....................: 02030
Column........................: 1% SP-1000 on Carbopack B

SURROGATE RT FROM INITIAL CALIBRATION
MeBrCl: 11.62 1Cl3FBn (Hall): 28.76

LLI Sample No.	Sample Designation	Date Analyzed	Time Analyzed	RT (MeBrCl)	RT (1Cl3FBn) Hall Det.

(MeBrCl) = Bromochloromethane (Hall Det)
(1Cl3FBn) = 1-Chloro-3-fluorobenzene (Hall Det)

QUALITY ASSURANCE SUMMARY

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: LANCASTER_LABORATORIES________

SDG No.: TEST___

Client Sample ID	Lab Sample ID

Were ICP interelement corrections applied ?	Yes/No	YES
Were ICP background corrections applied ?	Yes/No	YES
If yes - were raw data generated before application of background corrections ?	Yes/No	NO_

LEGEND:
U = Below MDL B = Below LOQ

FLAGS: (indicate matrix interference)
N = Matrix Spike OOS
* = Duplicate OOS
W = Method F Analytical Spike Recovery <85% or >115% when the sample conc. is <50% of the spike conc.
S = Analysis Determined by MSA
\+ = MSA Correlation Coefficient <0.995
E = Matrix Effects exist as proven by Serial Dilution or Spiked Dilution
Presence of FLAGS does not invalidate data

METHODS:
A = Flame Atomic Absorption
P = Inductively Coupled Plasma
F = Graphite Furnace
AS = Hydride Generation
CV = Cold Vapor
NR = Not Required

TERMS:
MDL = Method Detection Limit
LOQ = Limit Of Quantitation
OOS = Out Of Specification
MSA = Method Of Standard Addition

I certify that this data package is in full compliance with the terms and conditions as specified by the NJDEP, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:________________________ Name:________________________

Date:________________________ Title:________________________

QUALITY ASSURANCE SUMMARY

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

Lab Name: LANCASTER_LABORATORIES________
SDG No.: TEST__
Matrix (soil/water): WATER
Level (low/med): LOW
% Solids: _____0

Lab Sample ID: ________
Date Received: 10/19/92

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum		-		NR
7440-36-0	Antimony		-		NR
7440-38-2	Arsenic		-		NR
7440-39-3	Barium		-		NR
7440-41-7	Beryllium		-		NR
	Boron		-		NR
7440-43-9	Cadmium		-		NR
7440-70-2	Calcium		-		NR
7440-47-3	Chromium		-		NR
7440-48-4	Cobalt		-		NR
7440-50-8	Copper		-		NR
7439-89-6	Iron		-		NR
7439-92-1	Lead		-		P
	Lithium		-		NR
7439-95-4	Magnesium		-		NR
7439-96-5	Manganese		-		NR
7439-97-6	Mercury		-		NR
	Molybdenu		-		NR
7440-02-0	Nickel		-		NR
7440-09-7	Potassium		-		NR
7782-49-2	Selenium		-		NR
	Silicon		-		NR
7440-22-4	Silver		-		NR
7440-23-5	Sodium		-		NR
	Strontium		-		NR
7440-28-0	Thallium		-		NR
	Tin		-		NR
	Titanium		-		NR
7440-62-2	Vanadium		-		NR
7440-66-6	Zinc		-		NR
			-		-
			-		-

Color Before: ________
Color After: ________

Clarity Before: ______
Clarity After: ______

Texture: ______
Artifacts: ______

Comments:

QUALITY ASSURANCE SUMMARY

BLANKS

b Name: LANCASTER_LABORATORIES__________

SDG No.: TEST__

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	M
Aluminum											NR
Antimony											NR
Arsenic											NR
Barium											NR
Beryllium											NR
Boron											NR
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead											P
Lithium											NR
Magnesium											NR
Manganese											NR
Mercury											NR
Molybdenu											NR
Nickel											NR
Potassium											NR
Selenium											NR
Silicon											NR
Silver											NR
Sodium											NR
Strontium											NR
Thallium											NR
Tin											NR
Titanium											NR
Vanadium											NR
Zinc											

QUALITY ASSURANCE SUMMARY

SPIKE SAMPLE RECOVERY

CLIENT SAMPLE NO.

Lab Name: LANCASTER_LABORATORIES

SDG No.: TEST

Matrix: WATER

% Solids for Sample: 0.0

Level (low/med): LOW

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	75-125	28.0000		28.0000		2000.00	0.0	N	P
Lithium									NR
Magnesium									NR
Manganese									NR
Mercury									NR
Molybdenu									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silicon									NR
Silver									NR
Sodium									NR
Strontium									NR
Thallium									NR
Tin									NR
Titanium									NR
Vanadium									NR
Zinc									NR

NOTE: An (N) in column "Q" indicates a spike recovery that is not within the control limits. The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample page of the Quality Assurance Summary.

Comments:

QUALITY ASSURANCE SUMMARY

CLIENT SAMPLE NO.

DUPLICATES

Lab Name: LANCASTER_LABORATORIES________

SDG No.: TEST__

Level (low/med): LOW

Matrix (soil/water): WATER

% Solids for Duplicate: ____0

% Solids for Sample: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M NR
Aluminum								NR
Antimony								NR
Arsenic								NR
Barium								NR
Beryllium								NR
Boron								NR
Cadmium								NR
Calcium								NR
Chromium								NR
Cobalt								NR
Copper								NR
Iron								P
Lead								NR
Lithium								NR
Magnesium								NR
Manganese								NR
Mercury								NR
Molybdenu								NR
Nickel								NR
Potassium								NR
Selenium								NR
Silicon								NR
Silver								NR
Sodium								NR
Strontium								NR
Thallium								NR
Tin								NR
Titanium								NR
Vanadium								NR
Zinc								

NOTE: An asterisk(*) in column "Q" indicates poor duplicate precision. The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample page of the Quality Assurance Summary.

QUALITY ASSURANCE SUMMARY

STANDARD ADDITION RESULTS

Lab Name: LANCASTER_LABORATORIES________

SDG No.: TEST__

Concentration Units: ug/L

EPA Sample No.	An	0 ADD ABS	1 ADD		2 ADD		3 ADD		Final Conc.	r	Q
			CON	ABS	CON	ABS	CON	ABS			

EPA SAMPLE NO.

ICP SERIAL DILUTIONS

Lab Name: ______ Contract: ______

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: ______

Matrix (soil/water): ______ Level (low/med): ______

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ-ence	Q	M
Aluminum							
Antimony							
Arsenic							
Barium							
Beryllium							
Cadmium							
Calcium							
Chromium							
Cobalt							
Copper							
Iron							
Lead							
Magnesium							
Manganese							
Mercury							
Nickel							
Potassium							
Selenium							
Silver							
Sodium							
Thallium							
Vanadium							
Zinc							

QUALITY ASSURANCE SUMMARY

LABORATORY CONTROL SAMPLE

ab Name: LANCASTER_LABORATORIES________

DG No.: TEST__

olid LCS Source: ____________

queous LCS Source: LLI_________

Analyte	Aqueous (ug/L)			Solid (mg/kg)					
	True	Found	%R(1)	True	Found	C	Control Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Boron									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Lithium									
Magnesium									
Manganese									
Mercury									
Molybdenu									
Nickel									
Potassium									
Selenium									
Silicon									
Silver									
Sodium									
Strontium									
Thallium									
Tin									
Titanium									
Vanadium									
Zinc									

(1) Control Limits: All Metals 80-120

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ______________________ Contract: __________

Lab Code: ______ Case No.: _____ SAS No.: ______ SDG No.: ______

ICP ID Number: ____________ ICS Source: ____________

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

QUALITY ASSURANCE SUMMARY

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: LANCASTER_LABORATORIES

SDG No.: TEST

Initial Calibration Source: LLI

Continuing Calibration Source: LLI

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	20.0	1.00	5.0	20.0	1.00	5.0			P
Lithium									NR
Magnesium									NR
Manganese									NR
Mercury									NR
Molybdenu									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silicon									NR
Silver									NR
Sodium									NR
Strontium									NR
Thallium									NR
Tin									NR
Titanium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

QUALITY ASSURANCE SUMMARY

Method Detection Limits (Annually)

Lab Name: LANCASTER_LABORATORIES
SDG No.: TEST
Date: 01/15/92
ICP Method No.:
Other AA Method No.:
Furnace AA Method No.: GF_1,2,3_AQUEOU

Analyte	Wave-length (nm)	Back-ground	LOQ ** (ug/L)	MDL (ug/L)	M
Aluminum			200		NR
Antimony			200		NR
Arsenic			5		NR
Barium			100		NR
Beryllium			10		NR
Boron			40		NR
Cadmium			10		NR
Calcium			200		NR
Chromium			50		NR
Cobalt			50		NR
Copper			20		NR
Iron			100		NR
Lead	283.30	BD	3	1.0	F
Lithium			20		NR
Magnesium			100		NR
Manganese			10		NR
Mercury			0.2		NR
Molybdenu			100		NR
Nickel			50		NR
Potassium			500		NR
Selenium			3		NR
Silicon			300		NR
Silver			20		NR
Sodium			400		NR
Strontium			10		NR
Thallium			10		NR
Tin			300		NR
Titanium			10		NR
Vanadium			10		NR
Zinc			40		NR

** The LOQ must be adjusted for % Solids and Sample Weight for samples reporting in mg/Kg.

Comments:

QUALITY ASSURANCE SUMMARY

PREPARATION LOG

Lab Name: LANCASTER_LABORATORIES________

SDG No.:_TEST__

Method: P_

Client Sample No.	Preparation Date	Weight (gram)	Volume (mL)

ANALYSIS RUN LOG

ab Name: ________________________ Contract: ________

ab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: ______

Instrument ID Number: ____________ Method: __

tart Date: ________ End Date: ________

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN

FORM XIV - IN

3/90

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Quality Control Summary
TOTAL ORGANIC CARBON
~~Method Blank~~
Instrumental Analysis

Method Blank Analysis   Matrix: SOIL

Method Blank Designation	LLI Sample No.	Client Designation	Method	Analysis Date	Batch Number	Blank Result	Units	LOQ
BLANK	2302108	Q17T1	TOC	5/04/95	95118-201	< LOQ	mg/kg	50
	2302109	Q17T2						
	2302110	Q17T3						
	2302111	Q17T4						
	2302112	Q16T2						
	2302113	Q16T3						
	2302114	Q16T4						
	2302115	Q16T5						
	2302116	Q16S2						
	2302108	SPK, DUP						
BLANK	2303628	S20-8	TOC	5/04/95	95122-201	< LOQ	mg/kg	50
	2303629	S20-9						
	2303630	S2010						
	2303631	S2011						
	2303633	S19S5						
BLANK	2303632	R19S4	TOC	5/18/95	95122-201 *	< LOQ	mg/kg	50
	2303634	S19S4						
	2303635	S1942						

Comments: The blank is acceptable when the result is less than the limit of quantitation.

* The blank prepped with the repeated samples retains the original batch number.

ABBREVIATION KEY

IC	= Ion Chromatography	---	= Analysis Not Requested
D	= Distillation	ND	= Not Detected
TOC	= Total Organic Carbon	AK	= AlpKem
TOX	= Total Organic Halogens	LOQ	= Limit of Quantitation
*	= Out of Specification	NA	= Not Applicable

Quality Control Summary

Lancaster Laboratories
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~~Matrix Spike Analysis~~
Instrumental Analysis

Matrix: SOIL

Sample Information		Matrix Spike Analysis										
LLI Sample No.	Client Designation	Parameter	Meth	Analysis Date	Unspiked Desig.	Unspiked Result	LOQ	Spiked Desig.	Spike Added	Spiked Result	Units	%REC
2302108	Q17T1	Total Organic Carbon	TOC	5/04/95	BKG	33056	4000	SPIKE	17857	51843	mg/kg	105.2
2302109	Q17T2											
2302110	Q17T3											
2302111	Q17T4											
2302112	Q16T2											
2302113	Q16T3											
2302114	Q16T4											
2302115	Q16T5											
2302116	Q1652											
2303628	S20-8											
2303629	S20-9											
2303630	S2010											
2303631	S2011											
2303632	S19S4											
2303633	S19S5											
2303634	S19S4											
2303635	S1942											

% Recovery Control Limit 75
% Recovery Control Limit 125

Comments:

ABBREVIATION KEY

IC	= Ion Chromatography	---	= Analysis Not Requested
D	= Distillation	ND	= Not Detected
TOC	= Total Organic Carbon	AK	= AlpKem
TOX	= Total Organic Halogens	LOQ	= Limit of Quantitation
*	= Out of Specification	NA	= Not Applicable

Quality Control Summary
~~Duplicate Analysis~~
Instrumental Analysis

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Sample Information

LLI Sample No.	Client Designation
2302108	Q17T1
2302109	Q17T2
2302110	Q17T3
2302111	Q17T4
2302112	Q16T2
2302113	Q16T3
2302114	Q16T4
2302115	Q16T5
2302116	Q1652
2303628	S20-8
2303629	S20-9
2303630	S2010
2303631	S2011
2303632	S19S4
2303633	S19S5
2303634	S19S4
2303635	S1942

Duplicate Analysis Matrix: SOIL

Parameter	Meth	Analysis Date	1st Dup Desig.	1st Dup Result	LOQ	2nd Dup Desig.	2nd Dup Result	Units	RPD (%)	Control Limit %
Total Organic Carbon	TOC	5/04/95	BKG	32439	4000	DUP	33673	mg/kg	3.7	35

Comments: If one or more sample values are less than the limit of quantitation, the RPD is not calculated.

ABBREVIATION KEY

IC = Ion Chromatography	--- = Analysis Not Requested
D = Distillation	ND = Not Detected
TOC = Total Organic Carbon	AK = AlpKem
TOX = Total Organic Halogens	LOQ = Limit of Quantitation
* = Out of Specification	NA = Not Applicable

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Quality Control Summary
Laboratory Control Standard
~~Instrumental Analysis~~

Sample Information		Laboratory Control Standard							Matrix: SOIL
LLI Sample No.	Client Designation	Parameter	Meth	Analysis Date	True LCS Value	LCS Result	LOQ	Units	%REC
2302108	Q17T1	Total							
2302109	Q17T2	Organic							
2302110	Q17T3	Carbon	TOC	5/04/95	25	26.74	50	mg/kg	107.0
2302111	Q17T4	RPD= 5.1%	TOC	5/04/95	25	28.14	50	mg/kg	112.6
2302112	Q16T2								
2302113	Q16T3								
2302114	Q16T4	RPD= 1.7%	TOC	5/04/95	25	26.66	50	mg/kg	106.6
2302115	Q16T5		TOC	5/04/95	25	26.23	50	mg/kg	104.9
2302116	Q16S2								
2303628	S20-8	RPD= 3.6%	TOC	5/04/95	25	26.66	50	mg/kg	106.6
2303629	S20-9		TOC	5/04/95	25	26.23	50	mg/kg	104.9
2303630	S2010								
2303631	S2011								
2303632	S19S4								
2303633	S19S5								
2303634	S19S4								
2303635	S1942								

Comments: The recovery range for the LCS is +/- 20%.

ABBREVIATION KEY

IC = Ion Chromatography
D = Distillation
TOC = Total Organic Carbon
TOX = Total Organic Halogens
* = Out of Specification

--- = Analysis Not Requested
ND = Not Detected
AK = AlpKem
LOQ = Limit of Quantitation
NA = Not Applicable

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Quality Control Summary
Initial Calibration & Linearity Check
~~Instrumental Analysis~~
TOTAL ORGANIC CARBON
Instrument Identification: 5214
Calibration Date: 5/04/95
MATRIX: SOIL

Std mass: 25.0000 ug
Scaling Factor: 0.04080 Cl mV

Batch Numbers: 95118-201

Blank:	41.1680 mv	Standard:	624.385 mv
Blank:	30.9270 mv	Standard:	610.960 mv
Blank:	41.3370 mv	Standard:	602.709 mv
Average:	37.8107 mv	Average:	612.685 mv

This IC applies to samples:	Client Designation	Analysis #	Method Blank	ICV/ 5	ICV/ 10	ICV/ 25	ICV/ 50	ICV/ 75	Units= ug
2302108	Q17T1	138	0.238	4.954	10.441	25.448	51.842	74.583	
2302109	Q17T2								
2302110	Q17T3								
2302111	Q17T4								
2302112	Q16T2								
2302113	Q16T3								
2302114	Q16T4								
2302115	Q16T5								
2302116	Q1652								
2302108	SPK, DUP								
BLANK									
LCSS									
LCSSD									
2303628	S20-8								
2303629	S20-9								
2303630	S2010								
2303631	S2011								
2303633	S19S5								
BLANK									
LCSS									
LCSSD									

Continuing Calibration Dates: 5/04/95
Concentration units: mg/l

Parameter TOC	Reference Concentration	Result Cont. Cal	% Rec.	Acceptance Range -/+ 10%		Out of Specification
CCV	25.0	25.623	102.5	22.5	27.5	
CCV	25.0	25.250	101.0	22.5	27.5	
CCV	25.0	26.023	104.1	22.5	27.5	
CCV	25.0	26.262	105.0	22.5	27.5	

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Quality Control Summary

Method Blank
Miscellaneous Wet Chemistry

Method Blank Analysis

Matrix:

Method Blank Designation	LL Sample No.	Sample Code	Method	Analysis Date	Batch Number	Blank Result	Units	LOQ

Comments: The blank is acceptable when the result is less than the limit of quantitation.

ABBREVIATION KEY

TI = Titration
CO = Colorimetric
IR = Infrared Spectrophotometry
OD = Oven Dried
DI = Distillation
G = Gravimetric
U = Under Method Detection Limit

ND = Not Detected
J = Estimated Value < LOQ
< = Less Than
LOQ = Limit of Quantitation
NA = Not Applicable
M = Meter
* = Out of Specification

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Quality Control Summary

Matrix Spike Analysis
Miscellaneous Wet Chemistry

Sample Information		Matrix Spike Analysis						Matrix:					
LL Sample No.	Sample Code	Parameter	Meth	Analysis Date	Unspiked Desig.	Unspiked Result	LOQ	Spiked Desig.	Spike Added	Spiked Result	Units	Rec (%)	Acceptance Window (%)

Comments: Sample values shown may be rounded to be consistent with the limit of quantitation.

ABBREVIATION KEY

TI = Titration
CO = Colorimetric
IR = Infrared Spectrophotometry
OD = Oven Dried
DI = Distillation
G = Gravimetric
U = Under Method Detection Limit

ND = Not Detected
J = Estimated Value < LOQ
< = Less Than
LOQ = Limit of Quantitation
NA = Not Applicable
M = Meter
* = Out of Specification

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Quality Control Summary

Duplicate Analysis
Miscellaneous Wet Chemistry

ample Information		Duplicate Analysis						Matrix:				
LL Sample No.	Sample Code	Parameter	Meth	Analysis Date	1st Dup Desig.	1st Dup Result	LOQ	2nd Dup Desig.	2nd Dup Result	Units	RPD (%)	Control Limit % </=

Comments: If one or more sample values are less than the limit of quantitation, the RPD is not required.

Sample values shown may be rounded to be consistent with the limit of quantitation.

ABBREVIATION KEY

TI = Titration
CO = Colorimetric
IR = Infrared Spectrophotometry
OD = Oven Dried
DI = Distillation
G = Gravimetric
U = Under Method Detection Limit

ND = Not Detected
J = Estimated Value < LOQ
< = Less Than
LOQ = Limit of Quantitation
NA = Not Applicable
M = Meter
* = Out of Specification

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Quality Control Summary

Laboratory Control Standard
Laboratory Control Standard Duplicate
Miscellaneous Wet Chemistry

Sample Information		Laboratory Control Standards							Matrix:		
LL Sample No.	Sample Code	Parameter	Analysis Date	True LCS/D Value	LCS Result	LCSD Result	LOQ	Units	LCS/D Acceptance Range	% RPD Result	% RPD Acceptance < / =

Comments: LCS/LCSD values shown may be rounded to be consistent with the limit of quantitation.

Quality Control Summary

Lancaster Laboratories
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Initial Calibration
Miscellaneous Wet Chemistry
Instrument Identification:

Calibration Date:

Batch Number:

This IC applies to samples:	Sample Code	Parameter	Blank 0.0000	STD 1 0.1000	STD 2 0.2000	STD 3 0.6000	STD 4 1.0000	STD 5 2.0000	STD 6 4.0000	Corr. Coef.

Calibration Date:

Batch Number:

Parameter	Reference Concentration	Result Cont. Cal	% Rec.	Acceptance Range -/+ 10%	Out of Specification

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FILE COPY

February 6, 1997

Mr. Marc Boutwell
Attorney at Law
Barrett Law Offices
404 Court Square North
Lexington, MS 39095

Re: Evaluation of Michael Pisani & Associates, Inc's "Site Investigation Work Plan" for the Former Gulf States Creosoting Site, Hattiesburg, Mississippi, dated January 7, 1996.

Dear Marc:

McLaren/Hart Environmental Engineering Corporation (McLaren/Hart) has reviewed and evaluated the January 7, 1996, "Site Investigation Work Plan" (Work Plan) prepared by Michael Pisani & Associates, Inc. (MPA). (McLaren/Hart assumes the correct date of the Work Plan is January 7, 1997.) The purpose of McLaren/Hart's evaluation was to determine if the Work Plan met the following objectives which are essential in evaluating potential remedial alternatives for the site:

- Determine the horizontal and vertical extent of contamination.
- Positively determine if there are one or two sources of contamination present, and if the two sources are isolated, determine their relationship.
- Obtain geologic information across a large area subject to potential remediation.
- Determine groundwater flow conditions at Gordon's Creek.
- Determine groundwater flow conditions across the entire site.
- Determine the continuity of a previously identified shallow clay layer.
- Determine the continuity of a previously identified deep clay layer believed the limiting factor in the depth of the contamination.

McLaren/Hart's comments are provided below. All references to sections and figures pertain to the Work Plan, unless otherwise stated.

Section 2, Site Background, of the Work Plan provides summaries of the previous investigations, as well as MPA's evaluation of the data. The following comments are provided:

1. May 1996 McLaren/Hart Investigation (reference Section 2.3.7)
   The Work Plan stated that a map with boring locations was not provided with the McLaren/Hart report. A map was included with the report. The map is attached for

MPA's review and incorporation into the site maps and geologic cross sections.

The Work Plan did not include in Appendix A, Soil Borings from Previous Investigations, several of the boring logs from McLaren/Hart's investigation. Specifically, SB-1 located in the area of the former processing area and SB-2 and GP-7 located in the vicinity of Gordons Creek were excluded (reference the attached map). These borings indicated soil staining and the presence of free product. The boring logs are attached for inclusion in the Work Plan.

2. Site Geology (reference Section 2.5.2)
   The geologic cross section did not incorporate boring B-2 from TDS's June 1996 investigation. This boring, in the vicinity of Gordon's Creek, indicated a 10 foot thick continuous sand layer. The boring further supports the basis for a continuous sand layer across the site and the potential for a contaminant pathway. McLaren/Hart recommends the inclusion of B-2 in the geologic cross section.

McLaren/Hart's comments regarding Section 4, Current Site Conditions, of the Work Plan are as follows:

1. Conceptual Understanding of Site (reference Section 4.2)
   Paragraph 2 of this section states "..However, the results of work performed by TDS on June *1996 indicate that subsurface soils to the north and east of the Gordon's Creek fill* area (in the direction of the former process area) are unaffected. This suggests that the two areas are distinct and separate and that subsurface migration from the former process area was not the source of affected soils in the Gordons Creek fill area."

   McLaren/Hart disagrees that the available information supports this statement. Specifically, the lack of stratigraphic data and hydrogeologic data (vertical and horizontal gradients and groundwater quality) across the site precludes this conclusion, especially given the presence of creosote materials in Gordons Creek. McLaren/Hart recommends that this section is appropriately amended.

2. Identification of ARARs (reference Section 4.4)
   This section states that as "a precautionary measure" investigation activities will be performed in compliance with the requirements of 29CFR 1910.120.

   Compliance with 29CFR 1910.120 is not optional for the proposed site investigative activities. A review of the Health and Safety Plan (Section 7) indicates that all of the required elements of 29CFR 1910.120(b)(4)(ii) are not addressed. Elements that the Health and Safety Plan does not address include:

a. Implementation of a medical surveillance program.
b. Frequency and types of air monitoring.
c. Personnel monitoring and environmental sampling techniques and instrumentation.
d. Requirements for upgrading personal protection.

McLaren/Hart recommends amending the Health and Safety Plan prior to the site investigation activities for compliance with 29CFR 1910.120.

Section 5 of the Work Plan proposes four (4) field activities. The proposed activities and McLaren/Hart's evaluation and recommendations are summarized below:

1. Stratigraphic definition and determination of soil properties (reference Section 5.1)

Proposed Activities; Cone penetrometer testing (CPT) will be conducted at fourteen (14) locations northwest, west and southwest of the former process area (reference Figure 5-1). Three (3) soil borings will be installed with up to four (4) samples per boring analyzed for chemical transport and geotechnical properties.

Evaluation; The proposed CPT methodology can provide useful stratigraphic information, especially relative to the continuity of the shallow and deep clay layers, at the proposed locations. However, no locations are proposed to the northeast, east, and southeast of the former processing area or west of Gordons Creek. Stratigraphic information is necessary from these areas given their proximity to the known source areas, in order to evaluate potential transport mechanisms. Finally, the proficiency of the CPT operator and data evaluator is critical in obtaining and accurately interpreting the CPT logs.

Recommendations; In addition to the proposed activities, McLaren/Hart recommends 3-4 CPT locations northeast, east and southeast of the former processing area and two (2) CPT locations west of Gordons Creek. Given the size of the site and the heterogeneity of the geology an additional three (3) borings are recommended for obtaining samples for chemical transport and geotechnical properties. A calibration boring is also recommended at the initiation of the investigation in order to compare and correlate a geotechnical log with a CPT log. Finally, the experience and qualifications of the CPT operator and data evaluator should be reviewed and approved prior to the initiation of the field investigation.

2. Source characterization (reference Section 5.2)

Proposed Activities; Rapid Optical Screening Tool (ROST) /CPT, utilizing a laser induced fluorescence (LIF) detector, will be conducted at 57 locations (reference Figure 5-2). Contaminant delineation information for the source area media (unsaturated soils) and stratigraphic information will be obtained at all locations. Utilizing the CPT, soil samples will be obtained from 10%, i.e., 5-6, of the locations and analyzed for volatile and semivolatile organics.

__Evaluation__; The ROST is a relatively new in-situ screening technology. Information obtained by McLaren/Hart indicates the following:

a. The sensitivity of the technology is in the "triple digit part per million" range; consequently, this technique may not provide data adequate for the delineation of impacts.
b. Operation of the system and interpretation of the data is complex and requires a skilled and trained operator.
c. Sensitivity of the instrumentation, calibration factors, etc. will vary significantly with soil types, i.e., sand vs. clay.
d. Detectors other than a LIF may be more sensitive to creosote compounds since they are not strong fluorescers.
e. Unless extensive on-site calibration is conducted, the best use of the technology is for screening purposes.

The Work Plan did not provide any information relative to the appropriateness of the technology to the site conditions, anticipated sensitivity of the methodology, or the chemical constituents that can/will be targeted. Specifications, methodology, procedures, standard operating procedures, etc. for the ROST were not provided in the Work Plan.

Finally, the ROST/CPT unit is normally mounted on a large (25 ton) truck. Many of the proposed ROST/CPT locations in the Gordons Creek area would be inaccessible to a large road rig (reference Figure 5-2).

__Recommendations__; In addition to the proposed activities, McLaren/Hart recommends utilizing the CPT to obtain soil samples at the horizontal limits of the two (2) source areas, as determined in the field utilizing ROST, for volatile and semivolatile organic laboratory analyses. Six (6) to eight (8) locations, with 3-4 samples per location, per source area are recommended for sampling. Provisions should be made to ensure access of the CPT/ROST unit to the proposed locations or propose/utilize alternate equipment and techniques to obtain the data.

Evaluation of the specifications, methodology, and standard operating procedures for the ROST unit prior to the field activities is recommended. Additionally, obtaining information specifying the sensitivity, detection limits and target compounds and an evaluation of the applicability of the technology to the site conditions is recommended. Finally, the experience and qualifications of the ROST operator should be reviewed and approved prior to the initiation of field activities.

3. Groundwater investigation (reference section 5.3)

Proposed Activities; Five (5) monitoring wells will be installed northwest, west and southwest of the process area. An optional location is proposed at the northeast corner of the process area (reference Figure 5-4). The wells will be screened over the entire saturated thickness of the first water bearing unit. The monitoring well samples will be analyzed for volatiles, semivolatiles and inorganics. Slug testing to determine hydraulic conductivities will be conducted on each well.

Evaluation; The proposed placement of the well screens will not allow for the differentiation of stratified contaminants or evaluation of vertical gradients. Likewise, the proposed well screen placements will not allow for a correlation or comparison of the analytical data or water level elevations with the existing (4) monitoring wells. The proposed activities do not incorporate the four (4) existing site monitoring wells. Finally, no well locations are proposed northeast of the source area or in the vicinity of Gordons Creek.

Recommendation; McLaren/Hart recommends expanding the groundwater investigation to include the areas northeast of the source area and Gordon's Creek, the existing monitoring wells, and well nests at all new locations. Specifically:

a. Installation of the five (5) monitoring wells at the locations proposed in Figure 5-4, and the optional well location.
b. Installation of one (1) monitoring well northeast of the process area and two (2) monitoring wells west and east of Gordon's Creek, i.e., both sides of the creek.
c. Monitoring wells should intersect the water table utilizing 10 foot screens.
d. Installation of piezometers, consisting of 5 foot well screens at the bottom of the shallow aquifer, at all locations.
e. Obtain and analyze samples, including samples from the four (4) existing wells, for semivolatile organics, volatile organics and inorganics.
f. Survey the location and casing elevation of all wells. Obtain water level measurements to determine vertical and hydraulic gradients.
g. Conduct slug tests on all wells, including the existing wells, in order to determine hydraulic conductivities.

4. Surface soil sampling (reference Section 5.4)

> *Proposed Activities*; Twenty (20) surface soil samples will be obtained from a 0-12" depth interval (reference Figure 5-6). The samples will be analyzed for semivolatiles.
>
> *Evaluation*; The activity will provide information relative to the potential for exposure to the public at the proposed locations. However, no sample locations are proposed for the residential areas adjacent to the process area.
>
> *Recommendation*; In addition to the proposed activities, McLaren/Hart recommends obtaining 8-10 surface samples northeast, east and southeast of the process area.

Implementation of the recommended activities is expected to provide the information to meet the previously referenced objectives in order to evaluate remedial alternatives. However, as with all environmentally complex sites the evaluation of the resultant site investigation data may lead to requirements for additional studies.

If you have any questions please do not hesitate to call.

Sincerely,

McLaren/Hart Environmental Engineering Corp.

Rick Smith

Rick Smith
Office Manager
Principal Environmental Scientist

RS
For Kim Anderson, Ph.D.
Vice President

Duane Stillings
Senior Geoscientist

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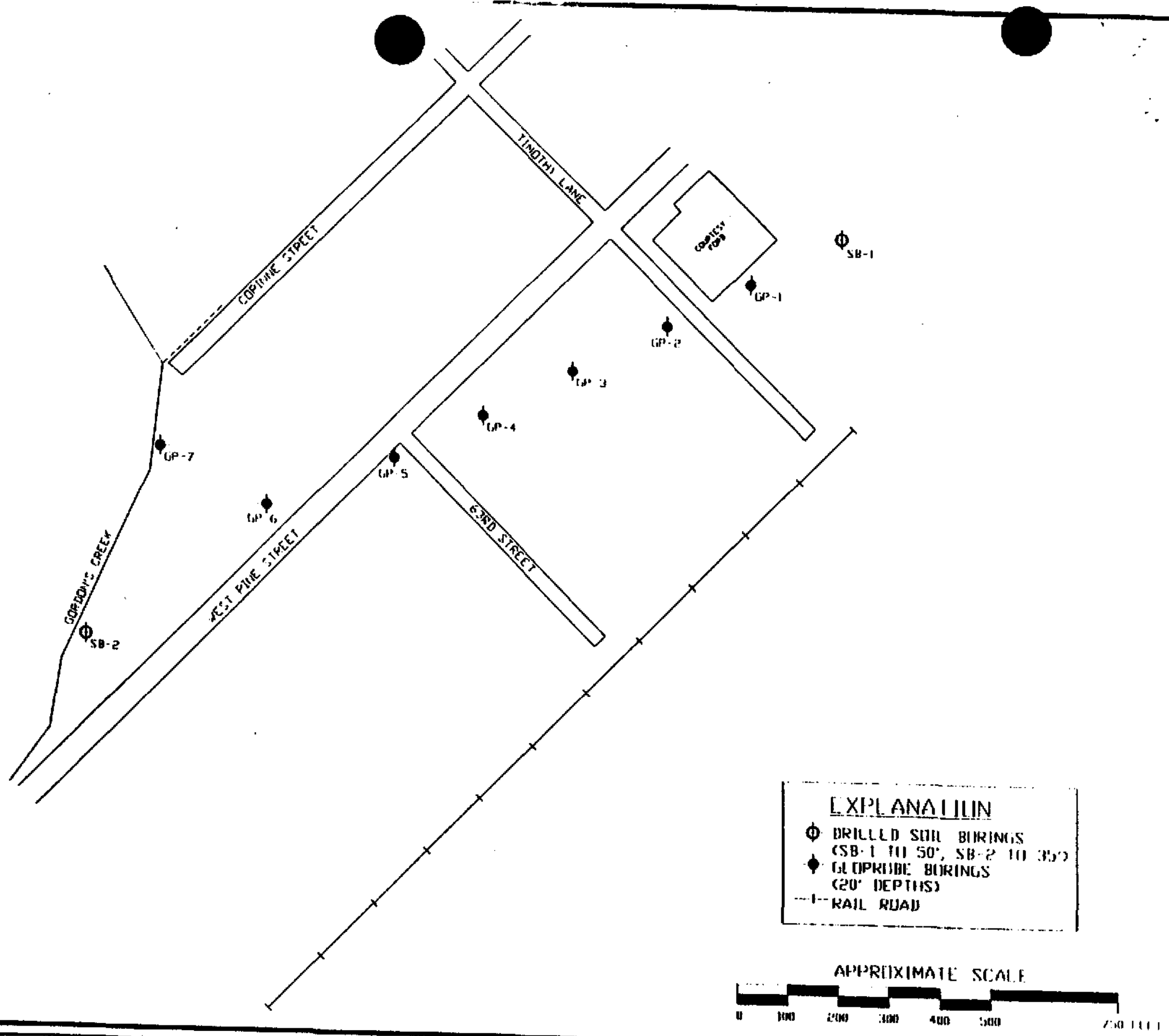

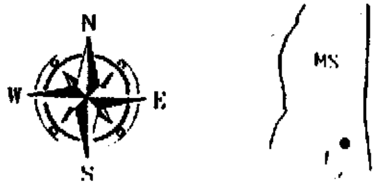

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DRWN: KMC	CHK'D: DAS
JOB#: 10780 3675 000	DATE: 06-14-96

FIGURE 1

BORING LOCATIONS

GULF STATES CREOSOTE SITE
HATTIESBURG, MISSISSIPPI

SOIL DRILLING LOG

McLaren Hart

SB/MW #: SB-1
D-
Page 1 of 1
Geologist: D. Stillings

SIGNATURE OF GEOLOGIST

PROJECT Gulf States Creosote Site LOCATION Hattiesburg, MS
TOC ELEVATION (MSL) DATE(S) 5/30/96 5/30/96 TOTAL DEPTH 50.0'
MONITORING DEVICE SCREENED INTERVAL
SAMPLING METHOD SUBCONTRACTOR & EQPT Griner Drilling/Failing F-10
PERCENTAGE ORDER: (GRAVEL, SAND, SILT, CLAY) MEMO
MEMO

Depth Below Surface (ft.)	Sampler Interval/ Recovery	Sample ID #	PID Reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification	Graphic Log	Borehole Abandonment/ Well Construction Details
2.5				Asphalt parking lot.		☒	
5.0				FILL, sand and gravel, bricks, wet, slight oily odor, black.		▨	
7.5						☒	
10.0				SAND and gravel, wet, strong creosote odor, black.	GP	⁘	
12.5						☒	
15.0				CLAY, silty, 10 YR 7/1 with 10 YR 5/8 mottling and black mottling, creosote odor.	CL	▨	
17.5						☒	
20.0				CLAY, silty, 10 YR 7/1 with 10 YR 5/8 mottling, creosote odor.	CL	▨	
22.5						☒	
25.0				SAND, clayey, moist, 10 YR 7/1 with black layers, oily (wet with oil), strong creosote odor.	SC	▨	
27.5						☒	
30.0				SAND, fine grain, silty, moist to wet, 10 YR 7/1, with black oily layer, strong creosote odor.	SM	┆	
32.5						☒	
35.0				SAND, fine grain, silty, wet (flowing), 2.5 Y 6/2, trace creosote odor. (Sample was probably layered or mottled with two colors, but flowing conditions mixed sample into a homogeneous texture and color.)	SM	┆	
37.5						☒	
40.0				SAND, fine grain, silty, wet, trace creosote odor, 10 YR 7/1.	SM	┆	
42.5						☒	
45.0				SAND, fine grain, with silt, wet, 2.5 Y 5/2, faint but distinct creosote odor.	SM	┆	
47.5						☒	
50.0				CLAY, hard, tight, dense, slightly moist, no odor, chart 2 for gley: 10 G 6/1. End of boring.	CL	▨	

GULF,7/2/96,AUGNBPS

SOIL DRILLING LOG

McLaren Hart

SB/MW #: SB-2
\# D-
Page 1 of 1
Geologist: D. Stillings

SIGNATURE OF GEOLOGIST

PROJECT Gulf States Creosote Site LOCATION Hattiesburg, MS
TOC ELEVATION ______ (MSL) DATE(S) 5/31/96 5/31/96 TOTAL DEPTH 35.0'
MONITORING DEVICE ______ SCREENED INTERVAL ______
SAMPLING METHOD ______ SUBCONTRACTOR & EQPT Griner Drilling/Failing F-10
PERCENTAGE ORDER: (GRAVEL, SAND, SILT, CLAY) MEMO ______
MEMO ______

Depth Below Surface (ft.)	Sampler Interval/ Recovery	Sample ID #	PID Reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification	Graphic Log	Borehole Abandonment/ Well Construction Details
-2.5				Grass and shrub cover.		☒	
-5.0	■			SAND, fine grain, moist, faint creosote odor, 10 YR 6/1.	SP	░	
-7.5						☒	
-10.0	■			SAND, medium grain, moist, visible oil, strong creosote odor, dark brown to black.	SP	░	
-12.5						☒	
-15.0	■			SAND, fine, moist to wet, 10 BG 6/1 (chart 2 for gley) with dark brown oily staining (mottling), strong creosote odor.	SP	░	
-17.5						☒	
-20.0	■			SAND, medium grain, trace silt, wet, 10 BG 6/1 (chart 2 for gley), strong creosote odor.	SP	░	
-22.5						☒	
-25.0	■			SILT and fine sand, trace clay, moist, soft, mottled 5GY 6/1 and 10 GY 5/1 (chart 1 for gley), very faint creosote odor.	ML	▥	
-27.5						☒	
-30.0	■			CLAY, silty, slightly moist, firm, no odor, mottled 10 GY 6/1 (chart 1 for gley) and 10 YR 6/2 and 10 YR 5/6.	CL	▨	
-32.5						☒	
-35.0	■			CLAY, hard, firm, tight, slighly moist to dry, no odor, 10 YR 4/4. End of boring.	CL	▨	

GULF.7/3/96.AUGNBPS

SOIL DRILLING LOG

SB/MW #: GP-7
D-
Page 1 of 1
Geologist: D. Stillings

McLaren Hart

SIGNATURE OF GEOLOGIST

PROJECT Gulf States Creosote Site LOCATION Hattiesburg, MS
TOC ELEVATION ______ (MSL) DATE(S) 5/31/96 5/31/96 TOTAL DEPTH 20.0'
MONITORING DEVICE ______ SCREENED INTERVAL ______
SAMPLING METHOD ______ SUBCONTRACTOR & EQPT W. Abshire/Geoprobe
PERCENTAGE ORDER: (GRAVEL,SAND,SILT,CLAY) MEMO ______
MEMO ______

Depth Below Surface (ft.)	Sampler Interval/ Recovery	Sample ID #	PID Reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification	Graphic Log	Borehole Abandonment/ Well Construction Details
				SAND, fine grain, with trace medium and coarse sand, dry, soft, no odor, 10 YR 6/3.	SP		
2.5							
5.0				SAND, fine grain, trace medium grain, becoming silty at 5 feet, slightly moist at 4 feet, moist to wet at 8 feet, no odor, 10 YR 6/3. 10 YR 6/8.			
7.5				Sand, medium grain, silty. SAND, medium grain, trace silty, trace pebbles, wet, no odor, 10 YR 8/2.			
10.0				SAND, fine grain, silty, wet, no odor, 10 YR 6/8.			
				SILT, trace clay, becoming clayey at 12 feet, moist, no odor, 10 YR 7/1.	ML		
12.5				Slough, sand and pebbles, wet.			
				CLAY, silty, moist, firm, no odor, chart 2 for gley: 5B 6/1.	CL		
15.0				SILT and fine sand, clayey, moist, firm, no odor, chart 2 for gley: 10 BG 6/1.	ML		
17.5				Unknown recovery, couldn't remove tube from sampling spoon, "hammered" out a medium grain sand, wet, noticeable creosote odor, chart 2 for gley: 10 BG 6/1.	SP		
20.0				End of boring.			

FILE COPY

Site Investigation Work Plan

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

January 7, 1996

Project No. 21-02

Michael Pisani & Associates, Inc.
1100 Poydras Street
1430 Energy Centre
New Orleans, Louisiana 70163
(504)582-2468

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Site Investigation Work Plan

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Summary

The former Gulf Coast Creosoting site is located in Hattiesburg, Mississippi near the intersections of U.S. Highways 49 and 11. Preliminary information indicates that the site was operated as a creosoting plant from the early 1900s to approximately 1960. Beginning in approximately 1962, the site was re-developed as a commercial area which is now occupied by car dealerships, automotive repair shops, a strip shopping center, retail stores, and warehouses.

The site has been investigated for the presence of creosote wood treating constituents or indicators in site media (soil, ground water, surface water, sediment, and air) on at least seven previous occasions. Results of these investigations indicate two areas of concern potentially relating to former creosoting operations at the site: the former process area, situated on approximately 2.5 acres at the northeast corner of the site; and a fill area in the southwestern portion of the site near Gordon's Creek. The extent of the fill area is not well defined.

This work plan provides a summary of existing site information and previous site investigations and describes procedures to further characterize the site stratigraphy, surface soil, subsurface soil, and ground water at the site. Site-wide stratigraphic and subsurface soil properties relating to potential contaminant transport will be defined through cone penetrometer testing (CPT) and conventional soil borings to depths of up to 75 feet below grade. Additional stratigraphic characterization and delineation of the lateral extent of high concentrations of hydrocarbons and/or creosote in soil will be performed using a laser-induced fluorescence sensor deployed by CPT equipment, a technology known as the rapid optical screening tool (ROST). The work plan specifies approximately 33 ROST pushes in the former process area and approximately 24 ROST pushes in the Gordon's Creek fill area. Correlation samples will be collected for laboratory analysis at ten percent of the ROST push locations. The ROST system has been demonstrated to be an effective, rapid insitu field method for characterizing hydrocarbons in the subsurface.

Site-wide ground water conditions (occurrence, flow direction, gradient, and velocity) and ground water quality will be determined by the installation and testing of five to six new ground water monitoring wells and the testing of four existing wells. Surface soils (zero to 12 inches below grade) in unpaved areas will be characterized via sampling and analysis for semivolatile constituents.

The work plan includes a Quality Assurance Project Plan (QAPP). The QAPP establishes procedures and methods necessary to assure that collected data is of the appropriate quality for its intended use, which in this case includes risk assessment. Unless otherwise indicated, procedures for quality assurance in the QAPP conform to the requirements of the document *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, US EPA Region IV, May 1996.

The work plan also includes a site-specific Health and Safety Plan and addresses other issues such as community relations and project management.

1.0 Introduction

1.1 Objectives of Investigation

The objective of this site investigation is to define site stratigraphy, ground water conditions, and other physical site characteristics and to determine the presence, nature, extent, fate, and effect of chemical constituents in site soils and ground water. The purpose of this work plan is to establish an orderly and systematic approach for investigating the site and to identify specific procedures for completing the investigation.

1.2 Work Plan Organization

This document and its appendices present all the information and procedures necessary to conduct a comprehensive site investigation at the former Gulf States Creosoting site in Hattiesburg, Mississippi (the site). The work plan includes the following sections:

1.0 Introduction
2.0 Site Background
3.0 Former Wood Treating Operations
4.0 Current Site Conditions
5.0 Field Sampling Plan
6.0 Quality Assurance and Quality Control Plan
7.0 Health and Safety Plan
8.0 Community Relations Plan
9.0 Project Management

2.0 Site Background

2.1 Site Location

The former Gulf States Creosoting site is located in Hattiesburg, Mississippi near the intersections of U.S. Highways 49 and 11. The site is situated entirely within Section 16 of Township 4 North, Range 13 West, Forrest County, Mississippi. The site is bounded by Scooba Street on the northeast, Gordon's Creek and Corinne Street on the northwest, U.S. Highway 49 on the southwest, and the N.O. & N.E. Railroad (also known as the Southern Railroad) on the southeast. The location and approximate boundary of the original plant area are shown on Figure 2-1.

2.2 Site Description

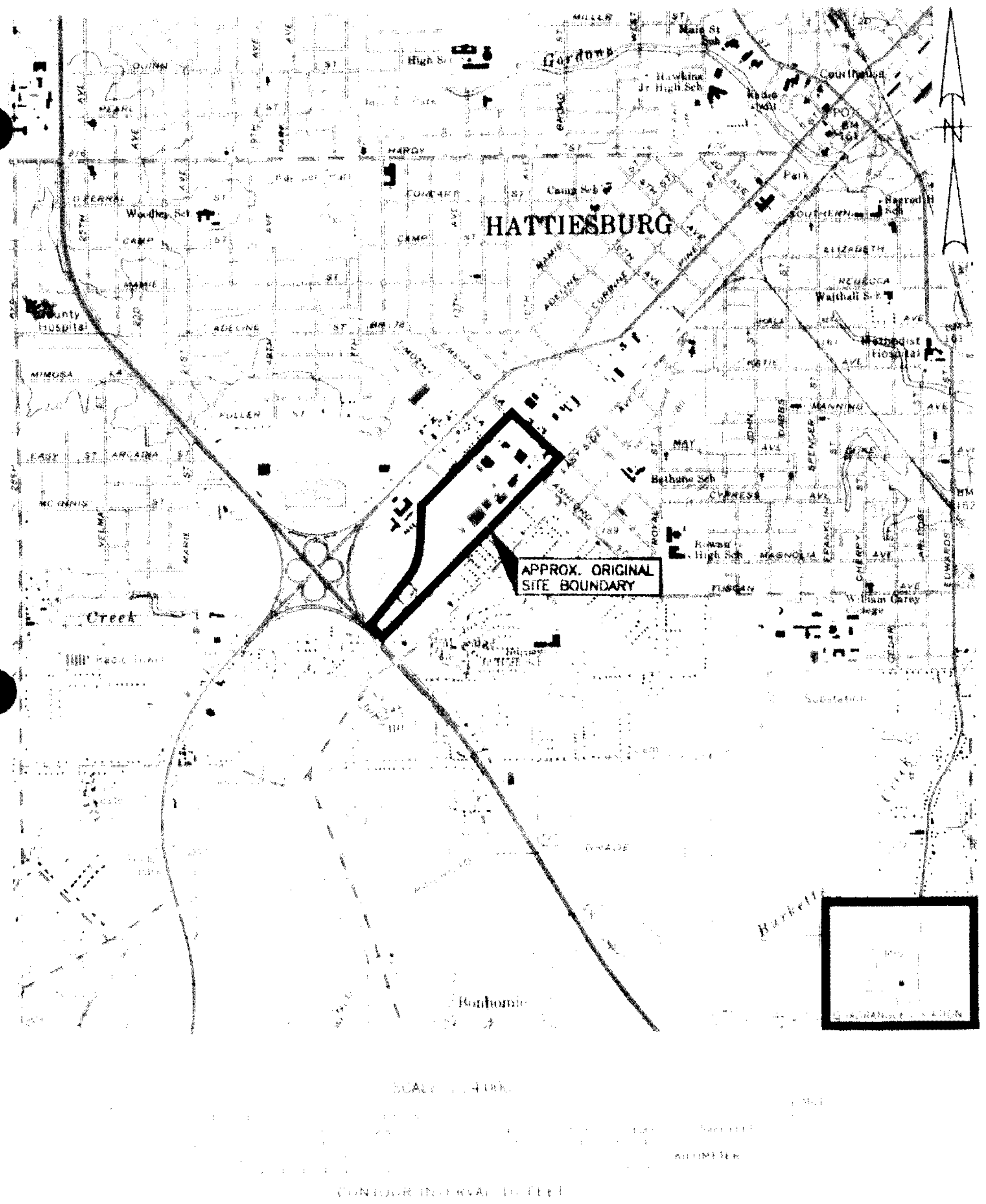
The former Gulf States Creosoting site is an irregularly-shaped, elongated southwest/northeast property located within Hattiesburg, Mississippi. Creosoting and the associated storage and handling of bulk chemicals were confined to a process area located at the northeastern corner of the site. This process area encompassed approximately 2.5 acres and was located in the area currently bounded by Timothy Lane, Scooba Street, West Pine Street, and the N.O. & N.E. Railroad. The portion of the site currently southwest of Timothy Lane between West Pine Street and the Southern Railroad was historically used for the storage of either treated or untreated wood. Subsequent to closure of the facility in approximately 1960, an area at the western edge of the property near Gordon's Creek may have been filled using rubble, soil, wastes, or other materials from the site or from off-site sources. This area is referred to as the Gordon's Creek fill area in this work plan.

The property was developed commercially beginning in approximately 1962. The original plant area is currently occupied by several automobile dealerships, auto parts stores, a beverage dealership, a convenience store, and other commercial operations. The process area and wood storage areas have been regraded, covered with asphalt, and are no longer evident (Weston, May 1990).

2.3 Previous Investigations

Previous investigations performed at the site, with corresponding reports cited, include the following:

- January and March 1990 investigations by Roy F Weston (*Soil Gas and Soil Sampling*, Roy F. Weston, Inc., May 1990);
- An October 1991 investigation by the Mississippi Department of Environmental Quality (MDEQ) (*Site Inpection, Phase II Report*, MDEQ, January 7, 1992);
- A May 1994 investigation by Environmental Protection Systems (EPS) (*Phase II Site Investigation of the Former Gulf States Creosote Company Process Area*, EPS, July 1994);
- A June 1994 investigation by Bonner Analytical Testing Company (*Phase II Investigation of Gibson's Shopping Center*, Bonner, July 7, 1994);
- An October/November 1994 investigation by Bonner Analytical Testing Company (*A Preliminary Subsurface Investigation, Ryan Motors/RSCO Realty*, Bonner, October 31 through November 3, 1994);
- Two late-1995 three-dimensional resistivity surveys by American Remediation Technology (*Three-Dimensional Resistivity Survey, Courtesy Ford Facility*, American Remediation Technology, December 19, 1995 and *Three-Dimensional Resistivity*



SOURCE: USGS MAP OF HATTIESBURG, MISSISSIPPI, 7.5' QUADRANGLE, 1964 PHOTOREVISED 1982

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

SCALE:
DWG. NO.: 21-01/07A

FIGURE 2-1
SITE LOCATION

FORMER GULF STATES CREOSOTING SITE
HATTIESBURG, MISSISSIPPI

Survey, West Pine Street Drainage Ditch Area, American Remediation Technology, December 22, 1995);

- A May 1996 investigation by McLaren/Hart (*Report of Investigative Activities*, McLaren/Hart, June 16, 1996 and *Report of Investigative Activities, Supplemental Information*, McLaren/Hart, June 25, 1996); and
- A June 1996 investigation by TDS (no report issued; laboratory reports and boring logs available).

A map depicting sampling locations from previous investigations is provided as Figure 2-2. Available boring logs from previous investigations are provided in Appendix A. Summaries including the number and types of samples collected and analytical results areprovided in the following sections. Inclusion of these summaries is for informational purposes only and does not represent an endorsement or validation of this work.

2.3.1 1990 Roy F. Weston Investigations

Roy F. Weston conducted site investigation activities in January and March 1990. The following activities were completed during the Roy F. Weston investigations:

- Advanced 17 soil borings to depths ranging from 3 to 14 feet;
- Analyzed 19 subsurface soil samples for polynuclear aromatic hydrocarbons (PAHs);
- Sampled or monitored 65 soil gas sampling stations; and
- Analyzed three air samples for PAHs.

Subsurface soil analytical results from the January and March Roy F. Weston investigations are summarized in Tables 2-1 and 2-2, respectively. Of the 19 subsurface soil samples collected, 12 contained detectable concentrations of PAHs. Samples collected from the Gordon's Creek fill area between West Pine Street and Gordon's Creek exhibited the highest concentrations of PAHs.

Results of the soil gas survey indicated that there was no apparent relationship between field screening results using hand-held photoionization and flame ionization detectors (PIDs and FIDs) and soil gas analytical results. Results of air sampling performed prior to initiation of the investigations indicated that ambient air quality had not been affected by site residuals.

2.3.2 October 1991 MDEQ Investigation

MDEQ conducted site investigation activities in October 1991. The following activities were completed during the MDEQ investigation:

- Advanced two soil borings to unknown depths;
- Analyzed two subsurface soil samples for semivolatile constituents;
- Analyzed three ground water samples (two from temporary wells, one from a City of Hattiesburg municipal well) for semivolatile constituents; and
- Analyzed two sediment samples for semivolatile constituents.

Analytical results from the MDEQ investigation are summarized in Table 2-3. The subsurface soil sample collected as a background sample (GS-SB-01) contained no semivolatile constituents, while the sample collected from the Gordon's Creek fill area (GS-SB-02) contained 3,500 and 4,200 mg/kg phenanthrene and anthracene, respectively, as well as other semivolatile constituents. The sediment sample collected upstream of the

LEGEND

SITE INSPECTION, PHASE II REPORT
1/1992 MDEQ FOR EPA

PHASE II INVESTIGATION OF GIBSON'S SHOPPING CENTER 1994 BY MIKE BONNER FOR MS. THOMAS

SOIL GAS AND SOIL SAMPLING OF GULF STATES CREOSOTE 5/1990–ROY F. WESTON FOR EPA

PHASE II INVESTIGATION OF FORMER GULF STATE CREOSOTE COMPANY PROCESS AREA 1994 BY EPS FOR VAN SLYKE

SOIL BORING ASSESSMENT WORK
6/96 BY TDS

B-2	○	SOIL BORING
REC-1	⊕	RECEIVER WELL
	●	MONITOR WELL
	○	SEDIMENT SAMPLE
	◐	SOIL GAS SAMPLE
	⊗	SOIL GAS/SOIL BORING
⊕ REC-1		THREE-DIMENTIONAL RESISTIVITY STUDY–WEST PINE STREET AREA 12/1995 BY ART FOR VAN SLYKE
⊕ REC-2		THREE-DIMENTIONAL RESISTIVITY STUDY–COURTESY FORD FACILITY 12/1995 BY ART FOR VAN SLYKE

NOTE: NOT INCLUDED: 10-584 TO 11-3-94 RYAN MOTOR INVESTIGATION BY BONNER

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1995

0 100 200 300 400
SCALE FEET

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

TITLE: FIGURE 2-2
PREVIOUS SITE INVESTIGATION SAMPLING LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-01/088

Table 2-1
Summary of Soil Analytical Data
January 1990 Roy F. Weston Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	**B0 2.5**	**D00**	**D00**	**D01**	**D01**	**E20**
Sample Depth	**0-12 in.**	**5 ft.**	**8 ft.**	**5 ft.**	**8 ft.**	**4 ft.**
Constituent						
Naphthalene	ND	178	354	280	148	4.1J
2-Methylnaphthalene	ND	99	197	460	82	3.6J
1-Methylnaphthalene	ND	72	104	340	45	ND
Biphenyl	ND	22J	55	9J	24	ND
2,6-Dimethylnaphthalene	ND	72	65	53	28	ND
Acenaphthylene	ND	4.4J	4.2J	2.3J	ND	ND
Acenaphthene	ND	259	156	225	81	14J
Dibenzofuran	ND	158	125	114	78	4.7J
Fluorene	ND	245	140	219	90	9.4J
Phenanthrene	6.5J	718	325	715	229	26
Anthracene	ND	465	210	521	114	69
Carbazole	ND	173	96	157	38	15J
Fluoranthene	3J	844	215	763	188	138
Pyrene	1.1J	181	64	266	65	98
Benzo(a)anthracene	1.6J	181	54	259	62	104
Chrysene	2.9J	230	61	318	73	160
Benzo(b)fluoranthene	3.8J	ND	78	143	127	248
Benzo(k)fluoranthene	ND	231	74	135	121	236
Benzo(c)pyrene	2.5J	83	25	97	52	83
Benzo(a)pyrene	2.5J	125	35	133	55	116
Indeno(1,2,3-cd)pyrene	1.8J	51	15J	54	26	53
Dibenzo(a,h)anthracene	.5J	23	5J	19J	12J	17J
Benzo(g,h,i)perylene	1.5J	41	11J	42	22	42

Notes: Only those samples containing detectable PAHs are included in this table.
All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-2
Summary of Soil Analytical Data
March 1990 Roy F. Weston Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	D03A	D03A	E19	E24	E25	E27
Sample Depth	10 ft. Top of Auger	Bottom of Auger	11 ft.	8 ft.	8 ft.	8 ft.
Constituent						
Naphthalene	.5J	7.3	2.5	544	48	753
2-Methylnaphthalene	ND	.1J	0.9	224	26	293
1-Methylnaphthalene	ND	.06J	0.6	107	26	193
Biphenyl	ND	.02J	.3J	55	3.5J	140
2,6-Dimethylnaphthalene	ND	ND	.4J	71	13	160
Acenaphthylene	ND	ND	.04J	7.3J	2.4J	20
Acenaphthene	ND	.1J	1.5	264	86	213
Dibenzofuran	ND	.05J	0.7	159	37	125
Fluorene	ND	.05J	0.9	194	66	129
Phenanthrene	ND	.04J	2.7	420	136	425
Anthracene	ND	ND	1.7	87	41	126
Carbazole	ND	0.07	0.3	48	5.5J	59
Fluoranthene	.1J	.03J	2.9	224	144	288
Pyrene	.2J	.04J	3.4	180	126	296
Benzo(a)anthracene	.07J	ND	1.1	52	34	100
Chrysene	.08J	ND	1.2	42	37	86
Benzo(b)fluoranthene	ND	ND	1	ND	ND	86
Benzo(k)fluoranthene	ND	ND	0.4	27J	30	ND
Benzo(c)pyrene	ND	ND	0.5	ND	9.7J	31
Benzo(a)pyrene	ND	ND	0.6	ND	11	42
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND

Notes: Only those samples containing detectable PAHs are included in this table.
All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-3
Summary of Analytical Data
1991 MDEQ Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Location Sample Name	Upgradient Well GS-TW-01	Downgradient Well GS-TW-02	Upstream Sediment GS-SD-01	Downstream Sediment GS-SD-02	Background Soil GS-SB-01	Soil - Source Area GB-SB-02
Constituent						
Naphthalene	ND	ND	ND	240	ND	1,900
2-Methylnaphthalene	ND	ND	ND	240	ND	1,400
Acenaphthylene	ND	ND	ND	Trace	ND	Trace
Acenaphthene	ND	ND	ND	370	ND	970
Dibenzofuran	ND	ND	ND	400	ND	1,000
Fluorene	ND	ND	ND	550	ND	1,500
Phenanthrene	ND	ND	0.47	18,000	ND	3,500
Anthracene	ND	ND	ND	220	ND	4,200
Fluoranthene	ND	ND	0.7	770	ND	1,600
Pyrene	ND	ND	0.47	490	ND	770
Benzo(a)anthracene	ND	ND	Trace	170	ND	270
Chrysene	ND	ND	Trace	160	ND	280
Benzo(b)fluoranthene	ND	ND	ND	58	ND	113
Benzo(k)fluoranthene	ND	ND	ND	72	ND	100
Benzo(a)pyrene	ND	ND	ND	60	ND	85
Indeno(1,2,3-cd)pyrene	ND	ND	ND	Trace	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	Trace	ND	ND

Notes: All concentrations are reported in mg/kg or mg/l (ppm).
ND - Constituent not detected at or above laboratory detection limit.

two drainage pathways (GS-SD-01) contained low concentrations (less than one mg/kg) phenanthrene, fluoranthene, and pyrene; the downstream sediment sample (GS-SD-02) contained 18,000 mg/kg phenanthrene plus other semivolatile constituents. None of the three ground water sample (GS-TW-01, GS-TW-02, or GS-PW-01) contained detectable concentrations of semivolatile constituents.

2.3.3 May 1994 Environmental Protection Systems Investigation

Environmental Protection Systems (EPS) conducted site investigation activities in May 1994. The following activities were completed during the EPS investigation:

- Advanced 16 soil borings to depths ranging from 1.5 to 36 feet in the former process area;
- Analyzed 36 subsurface soil samples for PAHs;
- Installed four ground water monitoring wells; and
- Analyzed four ground water samples for PAHs.

Soil analytical results from the EPS investigation are summarized in Table 2-4. PAHs in subsurface "soil" samples from the former process area were reported at concentrations indicating that either tank bottom materials or other creosote-saturated materials were sampled. Typically, samples collected from borings which met refusal, indicating the presence of subsurface process area debris, contained a higher range of PAHs.

Ground water analytical results from the EPS investigation are summarized in Table 2-5. PAHs were reported in ground water samples collected from three of the monitoring wells completed in the process area.

2.3.4 June 1994 Bonner Investigation

Bonner Analytical Testing Company (Bonner) conducted a Phase II investigation at Gibson's Shopping Center in June 1994. The following activities were completed during the Bonner investigation:

- Advanced 12 soil borings to depths of up to 20 feet
- Analyzed 36 subsurface soil samples for PAHs; and
- Analyzed three ground water samples for PAHs.

Analytical results from the Bonner investigation at Gibson's Shopping Center are summarized in Table 2-6. PAHs were reported in only two of 36 soil samples. PAHs were not reported in any of the three ground water samples collected. No boring logs were provided with the report.

2.3.5 October/November 1994 Bonner Investigation

Bonner Analytical Testing Company (Bonner) conducted a Phase II investigation at Ryan Motors in October and November 1994. The following activities were completed during the Bonner investigation:

- Advanced nine soil borings to depths of up to 20 feet
- Analyzed 18 subsurface soil samples for PAHs; and
- Analyzed seven ground water samples for PAHs.

Table 2-4
Summary of Soil Analytical Data
1994 EPS Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Date Sampled	**5/24/94**	**5/24/94**	**5/24/94**	**5/24/94**	**5/24/94**	**5/24/94**	**5/24/94**	**5/25/94**	**5/25/94**	**5/25/94**	**5/24/94**
Sample Location	**SB1/001**	**SB2/002**	**SB2/003**	**SB2/004**	**SB3/001**	**SB3/002**	**SB4-1/001**	**SB4-3/002**	**SB4-3/003**	**SB4-3/004**	**SB5/001**
Sample Depth	**3-5 feet**	**8-10 feet**	**13 - 15 feet**	**18 - 20 feet**	**3 - 5 feet**	**8 - 10 feet**	**3 - 5 feet**	**8 - 10 feet**	**13 - 15 feet**	**18 - 20 feet**	**3 - 5 feet**
Constituent											
Methylnaphthalene	41.5	52.77	18.12	449	818	ND	21,778	1,475	ND	ND	ND
Acenaphthene	1.63	51.52	49.19	ND	357	ND	4,396	2,541	1,725	48.88	27.84
Acenaphthylene	ND	ND	106	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	7,685	19,261	3,339	3,486	13,115	ND	284,781	327,549	10,261	2,346	196,894
Chrysene	ND	ND	ND	ND	23.79	ND	ND	4,344	ND	ND	ND
Dibenzofuran	136	42.72	36.89	66.6	247	ND	ND	2,459	1,315	ND	ND
Fluoranthene	942	668	210	241	1,555	ND	33,566	97,625	6,326	311	368
Fluorene	290	119	91.91	82.46	404	ND	4,529	8,524	2,494	62.21	47.49
Naphthalene	29	28.9	22.65	ND	23,857	1,390	250,882	195,742	4,615	2,675	ND
Phenanthrene	189	37.7	ND	ND	504	31.12	1,998	ND	ND	ND	ND
Pyrene	521	168	62.78	66.1	409	ND	ND	105,084	4,466	71.1	ND
Benzo(b)fluoranthene	ND	ND	10.35	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	1,066	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	573	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	6,042	ND	ND
Dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	46.62	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	ND	119	124	ND

Notes: Only those samples containing detectable PAHs are included in this table.
Only those parameters detected in one or more samples are included in this table.
All concentrations are reported in mg/kg (ppm) using detection limits for ground water.
ND - Constituent not detected at or above laboratory detection limit.
Table includes only those parameters detected in one or more samples.

Table 2-4
Summary of Soil Analytical Data
1994 EPS Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Date Sampled	5/24/94	5/25/94	5/25/94	5/25/94	5/25/94	5/25/94	5/25/94	5/26/94	5/26/94	5/26/94
Sample Location	**SB5/002**	**SB7/001**	**SB8/001**	**SB9/001**	**SB10/001**	**SB10/002**	**SB10/004**	**SB11/001**	**SB12/001**	**SB13/001**
Sample Depth	**8 -10 feet**	**3 - 5 feet**	**2 feet**	**1.5 feet**	**3 - 5 feet**	**8 - 10 feet**	**18 - 20 feet**	**2 feet**	**3 feet**	**3 - 5 feet**
Constituent										
Methylnaphthalene	20.45	ND	ND	ND	ND	ND	2,506	ND	1,055	ND
Acenaphthene	18.94	18.55	ND	15,136	962	ND	857	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	478,712	10,499	ND	40,722	47,362	86,752	888
Chrysene	ND	ND	ND	ND	ND	ND	76.34	939	ND	ND
Dibenzofuran	165	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	28.2	13.32	ND	167,509	5,034	ND	9,139	5,331	2,133	197
Fluorene	17.8	ND	ND	13,420	772	ND	674	ND	ND	ND
Naphthalene	66.66	146	ND	ND	4,607	ND	10,830	ND	12,573	ND
Phenanthrene	ND	12.84	17,819	ND	ND	ND	818	ND	ND	ND
Pyrene	ND	47.1	17,659	53,986	2,752	ND	3,751	2,261	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	43.48	ND	ND	ND	ND
Methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: Only those samples containing detectable PAHs are included in this table.
Only those parameters detected in one or more samples are included in this table.
All concentrations are reported in mg/kg (ppm) usimg detection limits for ground water.
ND - Constituent not detected at or above laboratory detection limit.
Table includes only those parameters detected in one or more samples.

Table 2-5
Summary of Ground Water Analytical Data
1994 EPS Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Date Sampled	**5/27/94**	**5/27/94**	**5/27/94**
Well Number	**MW1**	**MW2**	**MW3**
Constituent	ND	ND	ND
Naphthalene	123	216	443
Phenol	ND	2.87	ND
2,4-Dimethylphenol	ND	ND	63.36

Notes: Only those samples containing detectable PAHs are included in this table.
Only those parameters detected in one or more samples are included in this ta
All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
Table includes only those parameters detected in one or more samples.
Method detection limit (MDL) = 0.01 ppm

Table 2-6
Summary of Soil Analytical Data
June 1994 Bonner Phase II Investigation
Gibson's Shopping Center

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	Hole #1	Hole #1	Hole #1	Hole #2	Hole #2	Hole #2	Hole #3	Hole #3	Hole #3	Hole #4
Sample Depth	3' - 5'	10'	15'	1'	5'	Composite	0 - 1'	5'	Composite	0 - 1'
Sample Type	Soil	Soil	Water	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Constituent										
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: All concentrations are reported in mg/kg (ppm).

ND - Constituent not detected at or above laboratory detection limit.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-6
Summary of Soil Analytical Data
June 1994 Bonner Phase II Investigation
Gibson's Shopping Center

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	Hole #4	Hole #4	Hole #5	Hole #5	Hole #5	Hole #6	Hole #6	Hole #6	Hole #7	Hole #7
Sample Depth	5'	Composite	0 - 1'	5'	Composite	0 - 1'	5'	Composite	0 - 1'	5'
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Constituent										
Naphthalene	ND	ND	ND	ND	ND	0.0068 J	ND	ND	0.730 J	ND
Acenaphthylene	ND	ND	ND	ND	ND	0.0505 J	ND	ND	4.615 J	ND
Acenaphthene	ND	ND	ND	ND	ND	0.0107 J	ND	ND	2.470 J	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	4.719 J	ND
Phenanthrene	ND	ND	ND	ND	ND	0.0903 J	ND	ND	8.562 J	ND
Anthracene	ND	ND	ND	ND	ND	0.0883 J	ND	ND	8.374 J	ND
Fluoranthene	ND	ND	ND	ND	ND	0.596	ND	ND	78.960	ND
Pyrene	ND	ND	ND	ND	ND	0.698	ND	ND	75.011	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	0.7	ND	ND	42.449	ND
Chrysene	ND	ND	ND	ND	ND	0.727	ND	ND	44.074	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	0.788	ND	ND	43.681	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	0.807	ND	ND	44.746	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	0.501	ND	ND	30.450	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	0.467	ND	ND	22.322	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	0.115 J	ND	ND	5.871 J	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	0.261 J	ND	ND	13.008 J	ND

Notes: All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-6
Summary of Soil Analytical Data
June 1994 Bonner Phase II Investigation
Gibson's Shopping Center

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	Hole #7	Hole #7	Hole #7	Hole #7	Hole #8	Hole #8	Hole #8	Hole #9	Hole #9	Hole #9
Sample Depth	10'	10' Dup	15'	20'	0 - 1'	5'	Composite	0 - 1'	5'	Composite
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Constituent										
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-6
Summary of Soil Analytical Data
June 1994 Bonner Phase II Investigation
Gibson's Shopping Center

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	**Hole #10**	**Hole #10**	**Hole #10**	**Hole #11**	**Hole #11**	**Hole #11**	**Hole #12**	**Hole #12**	**Hole #12**
Sample Depth	**0 - 1'**	**5'**	**Composite**	**0 - 1'**	**5'**	**Composite**	**0 - 1'**	**5'**	**6'**
Sample Type	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Water**
Constituent									
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Analytical results from the Bonner investigation at Ryan Motors are summarized in Table 2-7. PAHs were reported in 12 of 18 soil samples and in five of seven ground water samples collected. No map depicting boring locations, survey data, or boring logs were provided with the report.

2.3.6 1995 American Remediation Technology 3-D Resistivity Surveys

In late 1995, American Remediation Technology performed three-dimensional resistivity (3DR) surveys in both the process area and the Gordon's Creek fill area.

2.3.7 May 1996 McLaren/Hart Investigation

McLaren/Hart conducted site investigation activities in May 1996. The following activities were completed during the McLaren/Hart investigation:

- Advanced nine soil borings to depths ranging from 20 to 50 feet; and
- Analyzed 18 subsurface soil samples for phenols.

Soil analytical results from the McLaren/Hart investigation are summarized in Table 2-8. Phenols were detected in 13 of the 18 subsurface soil samples analyzed. However, only samples from borings SB-1 at a depth of 8 to 10 feet below land surface and SB-2 at a depth of 13 to 15 feet below land surface contained phenols concentrations greater than 6.7 mg/kg (56.8 and 48.4 mg/kg, respectively).

No maps depicting boring locations or survey data were provided with the McLaren/Hart reports. Boring locations depicted on Figure 2-2 are approximate based on a sketch provided in the September 17, 1996 deposition of Joseph W. Abshire.

2.3.8 June 1996 TDS Investigation

TDS conducted site investigation activities in June 1996. The following activities were completed during the TDS investigation:

- Advanced six soil borings in and adjacent to the Gordon's Creek fill area to depths ranging from 16 to 51 feet; and
- Analyzed 12 subsurface soil samples for compounds associated with creosote wood treating operations and total petroleum hydrocarbons (TPH) as diesel and oil.

Soil analytical results from the TDS investigation are summarized in Table 2-9. Only one sample, collected from boring B6 at a depth of 13.5 to 14.0 feet below land surface, contained detectable concentrations of compounds associated with creosote wood treating operations. TPH as diesel and oil were not reported in any samples above laboratory detection limits.

2.4 Topography

2.4.1 Regional Topography

All of Forrest County lies within the Pine Hills physiographic region. The topography of the area is that of a gently sloping plain dissected by a series of parallel, southeastward-flowing streams. These streams have eroded broad terraced valleys which are separated by ridges known as cuestas. These cuestas typically exhibit steep northeasterly and gentle southwesterly slopes (Foster 1941). The City of Hattiesburg is located on the

Table 2-7
Summary of Soil Analytical Data
October/November 1994 Bonner Phase II Investigation
Ryan Motors

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	Hole #2	Hole #5	Hole #5	Hole #5	Hole #5	Hole #5	Hole #2	Hole #2	Hole #2	Hole #11	Hole #1	Hole #3
Sample Depth	0 - 2'	0 - 2'	5'	7'	10'	10'	5'	10'	10'	2'		
Sample Type	Soil	Soil	Soil	Soil	Soil	Water	Soil	Soil	Water	Soil	Water	Water
Constituent												
Naphthalene	ND	ND	16.741 J	90.839	13.967 J	2.377	ND	40.143 J	2.766	40.242 J	ND	ND
Acenaphthylene	ND	1.845 J	ND	1.841 J	ND	0.0205	ND	ND	0.0275	ND	ND	ND
Acenaphthene	ND	ND	3.249 J	28.693 J	2.937 J	0.217	ND	8.537 J	0.178	17.203 J	ND	ND
Fluorene	0.304	ND	4.117 J	46.014 J	3.945 J	0.138	ND	9.547 J	0.193	27.034 J	ND	ND
Phenanthrene	0.538	1.818 J	9.979 J	101.277	9.067 J	0.109	ND	24.684 J	0.275	67.280 J	ND	ND
Anthracene	3.385	2.603 J	9.954 J	136.074	9.465 J	0.0216	ND	4.951 J	0.0453	67.418 J	ND	ND
Fluoranthene	1.326	16.812 J	6.289 J	43.544 J	5.098 J	0.0154	ND	10.105 J	0.0334	29.179 J	ND	ND
Pyrene	1.716	49.564	9.439 J	44.532 J	9.312 J	0.0155	0.339	8.197 J	0.0227	24.495 J	ND	ND
Benzo(a)anthracene	0.503	12.046 J	2.820 J	11.830 J	2.142 J	ND	ND	2.196 J	ND	6.501 J	ND	ND
Chrysene	0.776	17.181 J	3.516 J	12.577 J	2.768 J	ND	0.162 J	2.108 J	ND	6.069 J	ND	ND
Benzo(b)fluoranthene	0.335	21.119	2.530 J	6.763 J	3.785 J	ND	0.289	1.038 J	ND	3.370 J	ND	ND
Benzo(k)fluoranthene	0.307	22.590	2.240 J	6.408 J	4.376 J	ND	0.239	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.232	15.849 J	2.186 J	6.050 J	1.876 J	ND	0.189 J	ND	ND	3.068 J	ND	ND
Indeno(1,2,3-cd)pyrene	ND	7.382 J	ND	1.213 J	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	1.102 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	6.002 J	ND	1.123 J	ND	ND	ND	ND	ND	ND	ND	ND

Notes: All concentrations are reported in mg/kg (ppm).
ND - Constituent not detected at or above laboratory detection limit.
J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-7
Summary of Soil Analytical Data
October/November 1994 Bonner Phase II Investigation
Ryan Motors

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample Location	Hole #4	Hole #6	Hole #9	Hole #3	Hole #4	Hole #8	Hole # 8	Hole #8	Hole #8	Hole #8	Hole #8	Hole #9	Hole #10
Sample Depth				Composite	Composite	Composite	20 '	15'	10'	5'	0 - 2'	Composite	Composite
Sample Type	Water	Water	Water	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Constituent													
Naphthalene	1.079	3.742	4.606	ND	ND	ND	ND	ND	ND	0.00366 J	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	1.424	1.396	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	2.097	2.619	ND	ND	0.00604 J	ND	ND	ND	0.0519 J	ND	ND	ND
Phenanthrene	ND	3.195	8.138	ND	ND	0.0262 J	ND	ND	ND	0.254	ND	ND	ND
Anthracene	ND	ND	8.163	ND	ND	0.00695 J	ND	ND	ND	0.0508 J	ND	ND	ND
Fluoranthene	ND	ND	1.927	ND	ND	0.0125 J	ND	ND	ND	0.0723 J	ND	ND	ND
Pyrene	ND	ND	1.554	ND	ND	0.0110 J	ND	ND	ND	0.0727 J	ND	ND	0.00764 J
Benzo(a)anthracene	ND	ND	ND	ND	ND	0.00276 J	ND	ND	ND	0.0175 J	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	0.00281 J	ND	ND	ND	0.0170 J	ND	ND	0.00282 J
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00899 J	ND	ND	0.00462 J
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0129 J	1.069	ND	0.00534 J
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00675 J	ND	ND	0.00296 J
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: All concentrations are reported in mg/kg (ppm).

ND - Constituent not detected at or above laboratory detection limit.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the lowest linear detection limit of 10.0 ug/ml, but greater than zero and the concentration is given as an approximate value.

Table 2-8
Summary of Soil Analytical Data
May 1996 McLaren/Hart Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Sample ID	Date Sampled	Sample Depth (feet)	Phenols Concentration
SB-1/8-10	5/30/96	8-10	56.8
SB-1/48-50	5/30/96	48-50	1.1
SB-2/13-15	5/31/96	13-15	48.4
SB-2/23-25	5/31/96	23-25	0.8
SB-2/33-35	5/31/96	33-35	6.7
GP-1/3	5/30/96	3	1.3
GP-1/20	5/30/96	20	ND(0.6)
GP-2/0.5	5/30/96	0.5	0.9
GP-2/20	5/30/96	20	1.8
GP-3/1	5/30/96	1	ND(0.6)
GP-3/20	5/30/96	20	1.9
GP-4/1	5/30/96	1	ND(0.6)
GP-5/9	5/31/96	9	ND(0.6)
GP-5/20	5/31/96	20	ND(0.6)
GP-6/15	5/31/96	15	3.2
GP-6/20	5/31/96	20	2.8
GP-7/8	5/31/96	8	1.5
GP-7/20	5/31/96	20	0.6

Notes: All concentrations are reported in mg/kg (ppm).
ND(#) - Constituent not detected at or above laboratory detection limit shown in parentheses.

Table 2-9
Summary of Soil Analytical Data
June 1996 TDS Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Date Sampled	6/13/96	6/11/96	6/11/96	6/11/96	6/11/96	6/11/96
Sample Location	B1 10.5 - 11	B1 49 - 51	B3 12 - 12.5	B2 49 - 51	B2 17.5 - 18	B3 49 - 51
Sample Depth	10.5 - 11 feet	49 - 51 feet	12 - 12.5 feet	49 - 51 feet	17.5 - 18 feet	49 - 51 feet
Constituent						
Phenol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
2-Chlorophenol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
2,4-Dimethylphenol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
2,4-Dinitrophenol	ND(2.0)	ND(2.0)	ND(1.9)	ND(2.0)	ND(2.0)	ND(2.3)
p-chloro-m-cresol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Acenaphthylene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Pentachlorophenol	ND(2.0)	ND(2.0)	ND(1.9)	ND(2.0)	ND(2.0)	ND(2.3)
Fluorene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Naphthalene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Acenaphthene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Fluoranthene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Phenanthrene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Anthracene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Indeno(1,2,3-cd)pyrene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Benzo(b)fluoranthene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Benzo(a)anthracene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Benzo(a)pyrene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Benzo(k)fluoranthene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Dibenzo(a,h)anthracene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Benzo(g,h,i)perylene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Pyrene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Chrysene	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
2,3,4,5-tetrachlorophenol	ND(0.780)	ND(0.800)	ND(0.760)	ND(0.800)	ND(0.780)	ND(0.920)
2,3,4,6-tetrachlorophenol	ND(0.780)	ND(0.800)	ND(0.760)	ND(0.800)	ND(0.780)	ND(0.920)
2,4,5-trichlorophenol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
2,4,6-trichlorophenol	ND(0.390)	ND(0.400)	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.460)
Hydrocarbons as heavy oils	ND(39)	ND(39)	ND(38)	ND(39)	ND(39)	ND(46)
Hydrocarbons as diesel fuel	ND(39)	ND(39)	ND(38)	ND(39)	ND(39)	ND(46)
Percent solids	84	83	86	83	83	70

Notes: All concentrations are reported in mg/kg (ppm).
ND(#) - Constituent not detected at or above laboratory detection limit shown in parentheses.

Table 2-9
Summary of Soil Analytical Data
June 1996 TDS Investigation

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Date Sampled	6/12/96	6/12/96	6/12/96	6/12/96	6/13/96	6/13/96
Sample Location	**B4 14.5 - 15**	**B4 50 - 51**	**B5 10 - 11**	**B5 49.5 - 50.5**	**B6 13.5 - 14**	**B6 15 - 16**
Sample Depth	**14.5 - 15 feet**	**50 - 51 feet**	**10 - 11 feet**	**49.5 - 50.5 feet**	**13.5 - 14 feet**	**15 - 16 feet**
Constituent						
Phenol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
2-Chlorophenol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
2,4-Dimethylphenol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
2,4-Dinitrophenol	ND(1.9)	ND(2.0)	ND(2.0)	ND(2.0)	ND(600)	ND(1.9)
p-chloro-m-cresol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Acenaphthylene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Pentachlorophenol	ND(1.9)	ND(2.0)	ND(2.0)	ND(2.0)	ND(600)	ND(1.9)
Fluorene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	810	ND(0.380)
Naphthalene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	1000	ND(0.380)
Acenaphthene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	640	ND(0.380)
Fluoranthene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	1200	ND(0.380)
Phenanthrene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	1700	ND(0.380)
Anthracene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	1200	ND(0.380)
Indeno(1,2,3-cd)pyrene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Benzo(b)fluoranthene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	140	ND(0.380)
Benzo(a)anthracene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	260	ND(0.380)
Benzo(a)pyrene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	120	ND(0.380)
Benzo(k)fluoranthene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	150	ND(0.380)
Dibenzo(a,h)anthracene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Benzo(g,h,i)perylene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Pyrene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	550	ND(0.380)
Chrysene	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	320	ND(0.380)
2,3,4,5-tetrachlorophenol	ND(0.760)	ND(0.800)	ND(0.780)	ND(0.800)	ND(240)	ND(0.760)
2,3,4,6-tetrachlorophenol	ND(0.760)	ND(0.800)	ND(0.780)	ND(0.800)	ND(240)	ND(0.760)
2,4,5-trichlorophenol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
2,4,6-trichlorophenol	ND(0.380)	ND(0.400)	ND(0.390)	ND(0.400)	ND(120)	ND(0.380)
Hydrocarbons as heavy oils	ND(38)	ND(40)	ND(38)	ND(40)	ND(12,000)	ND(38)
Hydrocarbons as diesel fuel	ND(38)	ND(40)	ND(38)	ND(40)	ND(12,000)	ND(38)
Percent solids	85	83	85	83	75	86

Notes: All concentrations are reported in mg/kg (ppm).
ND(#) - Constituent not detected at or above laboratory detection limit shown in parentheses.

southwestern face of a cuesta formed by the Leaf River.

2.4.2 Site Topography and Drainage

The City of Hattiesburg, including the site, is situated upon the lowermost of the high terraces of the Leaf River (Foster 1941). Elevations at the site range from approximately 195 feet in the north central portion of the site to 176 feet at the southwestern edge of the site adjacent to Gordon's Creek. The site is drained via surface flow to Gordon's Creek or by the Southern Railroad ditch, which flows southwestward into a ditch at the south end of the site, that in turn flows northwestward into Gordon's Creek. Gordon's Creek flows northward then eastward from the site and ultimately discharges to the Leaf River approximately four miles downstream of the site. The site topography is depicted on Figure 2-3.

2.5 Geology

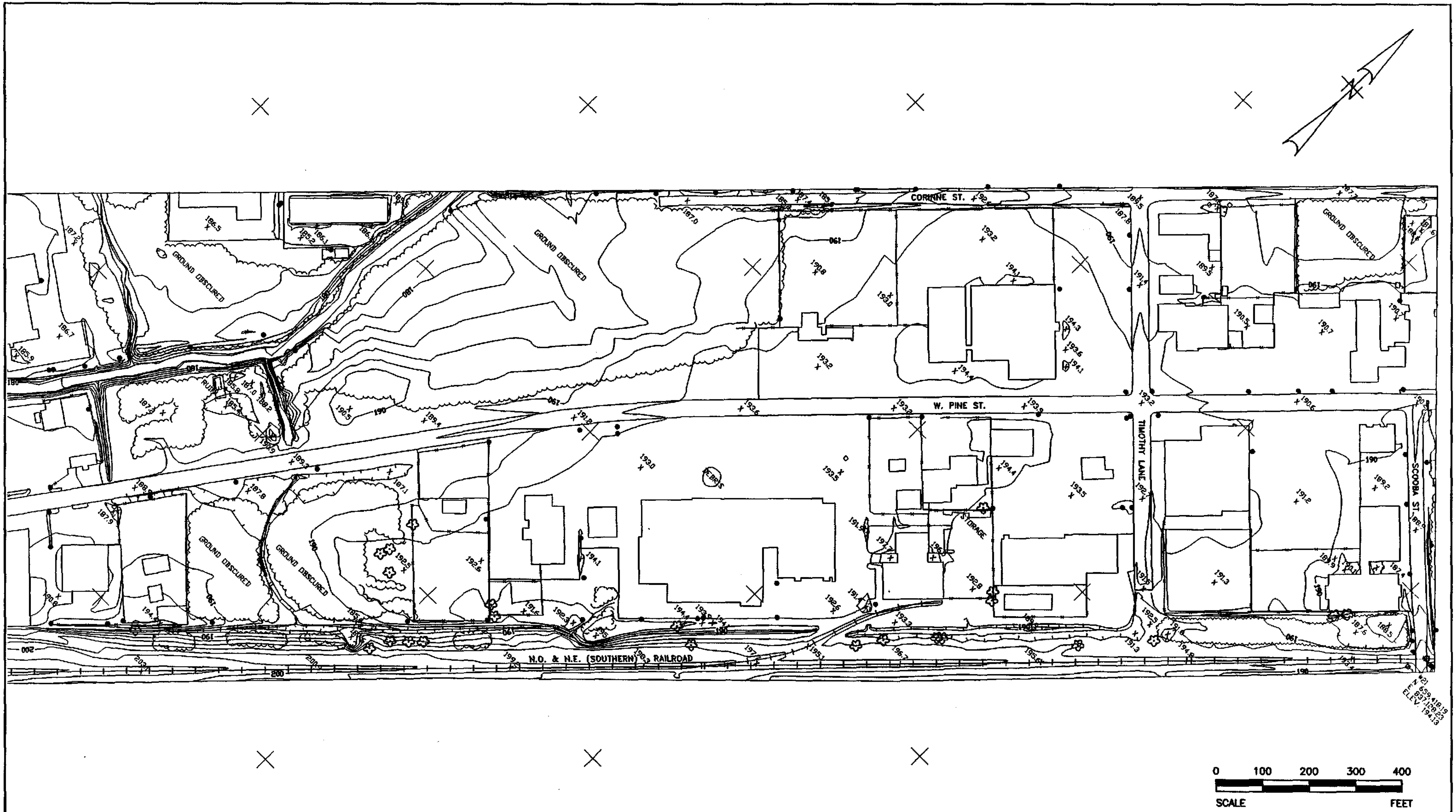
2.5.1 Regional Geology

Forrest County is underlain by a great thickness of massive clay, silt, and clayey fine-grained sand of Miocene age, and gravelly sand probably of Pliocene age. Plio-Pleistocene high terrace deposits and Recent low terraces/alluvium are present within and adjacent to the major stream beds. At Hattiesburg, outcrops in the river bluffs show the Hattiesburg formation to consist of massive clays between 150 and 200 feet thick (Foster 1941). Geophysical logs of borings east of the site indicate the presence of a clay layer beginning at an elevation of approximately 30 feet above mean sea level (amsl) and ranging in thickness from 110 to 180 feet (MDEQ 1992). The thick Hattiesburg clay layer is underlain by interbedded sands and gravels, the sands becoming more prominent and gravelly near the base of the formation (Foster 1941).

2.5.2 Site Geology

Although a number of borings has been advanced at the site as part of previous investigations, the large majority of these borings were only advanced to shallow depths of 20 feet or less. Three cross-sections have been generated using logs of on-site soil borings. Figure 2-4 shows the locations of cross-section lines and Figure 2-5 and 2-6 present our current understanding of the stratigraphy of the upper 50 feet beneath the site.

Borings at the site have been advanced to depths of up to 51 feet, or to an elevation of approximately 135 feet amsl. The massive Hattiesburg clay, which was encountered at an elevation of 30 feet amsl in borings east of the site, is not believed to have been reached in borings advanced at the site. The surface geology at the site has been classified as high terrace deposits (Foster 1941). At the site, the upper 20 feet can be characterized as mostly clay, with some discontinuous sand lenses. The major exception is in borings immediately adjacent to Gordon's Creek, where the upper 20 feet is comprised predominantly of sand. In this area, the upper silts and clay have apparently been eroded away, which is consistent with the site topography. Near Gordon's Creek, boring logs show the sandy zone to be underlain by a significant clay layer; only one boring (McLaren/Hart's boring SB-1) within the process area was advanced to a sufficient depth to fully penetrate the sand and tag a clay beneath the sand, at a depth of approximately 48 feet below grade.



BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

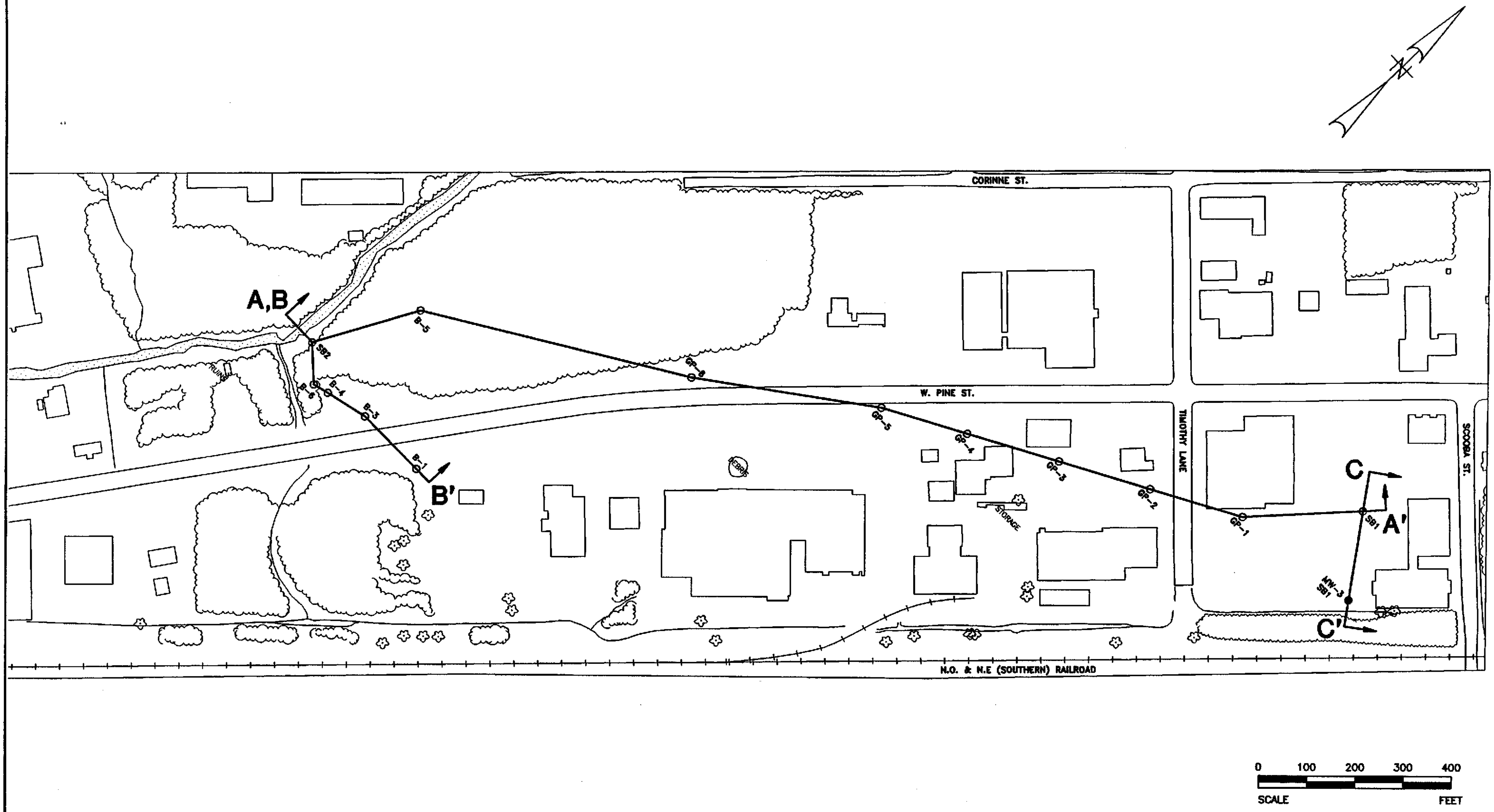
TITLE:
FIGURE 2-3
SITE TOPOGRAPHIC SURVEY

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE:

DWG. NO.: 21-01/09B



BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

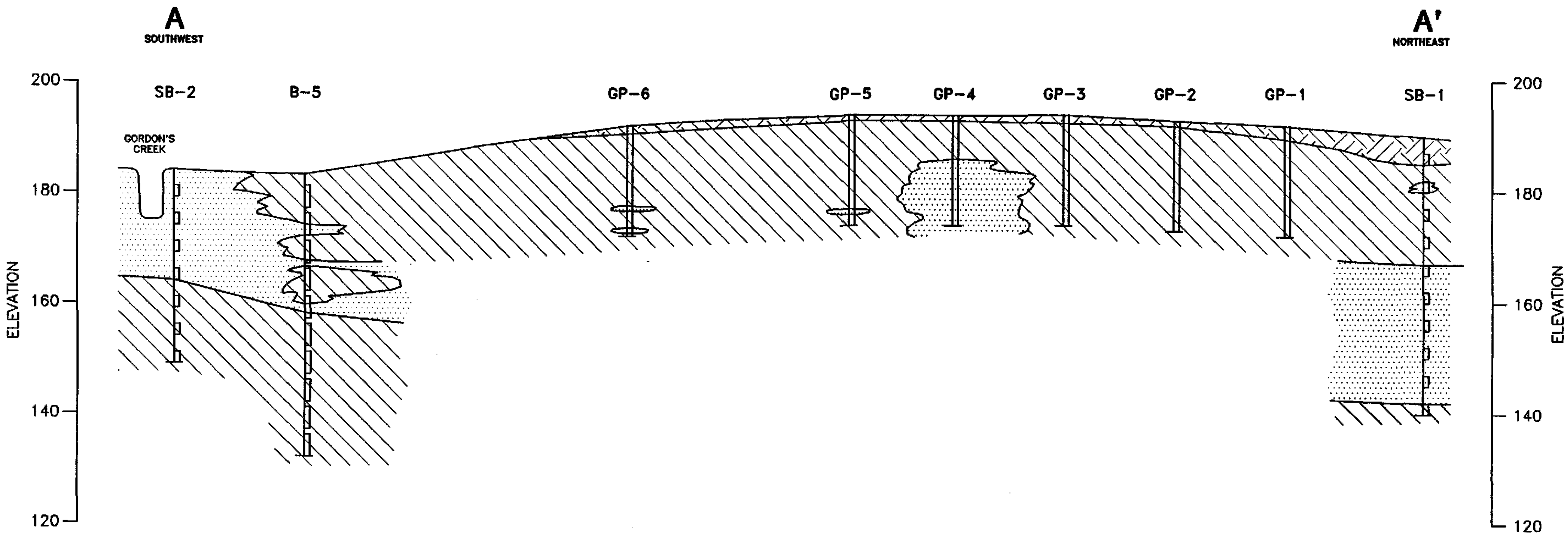
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

TITLE:
FIGURE 2-4
LOCATIONS OF CROSS-SECTIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-01/10B



LEGEND

▯ INTERVAL SAMPLED AND LOGGED

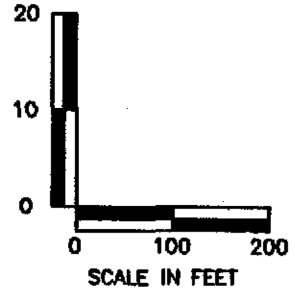
▨ FILL

░ SAND

▧ CLAY

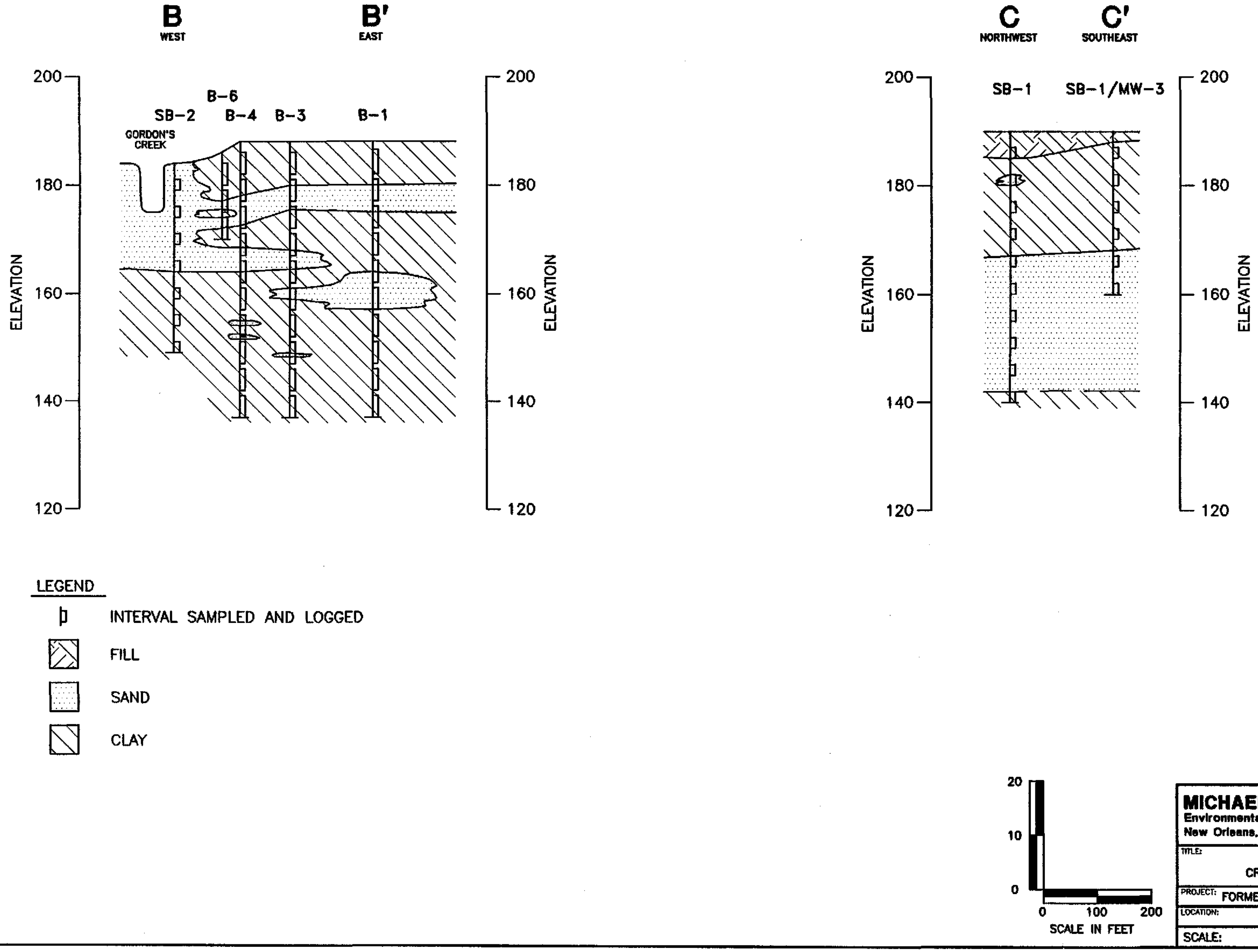
NOTES:

LOCATIONS FOR BORINGS GP-1 THROUGH GP-6 ARE APPROXIMATE BASED ON EXHIBIT 3 FROM SEPTEMBER 17, 1996 DEPOSITION OF JOSEPH ABSHIRE.



MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 2-5 CROSS-SECTION A-A'	
PROJECT: FORMER GULF STATES CREOSOTING SITE	
LOCATION: HATTIESBURG, MISSISSIPPI	
SCALE:	DWG. NO.: 21-01/11B



MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

TITLE: FIGURE 2-6 CROSS-SECTIONS B-B' & C-C'	
PROJECT: FORMER GULF STATES CREOSOTING SITE	
LOCATION: HATTIESBURG, MISSISSIPPI	
SCALE:	DWG. NO.: 21-01/12B

2.6 Ground Water

2.6.1 Regional Ground Water

Southern Mississippi is underlain by several thick Miocene-age (10 to 25 million years old) aquifer systems, including the Catahoula, Hattiesburg, and Citronelle aquifers. These aquifers consist of thick beds of sand or gravel separated by clay layers (Water Resources of Mississippi Bulletin 113, 1970). The aquifers are frequently considered a single hydraulic unit referred to as the Miocene Aquifer System (MDEQ 1992).

The U.S. Geological Survey (USGS) maintains a computerized listing and description of ground water wells in the State of Mississippi. A search of the USGS computerized listing was conducted in November 1996 to obtain information on the presence, locations, screened intervals, and usage of ground water wells in the vicinity of the site. A copy of the printout from the search is provided as Appendix B.

Four public supply wells for the City of Hattiesburg are located approximately one and one-half miles east of the site. These municipal wells and the majority of domestic wells identified by the search are screened within the sands of the Miocene Aquifer System. Wells completed within these sands are typically screened at depths ranging from 300 to 800 feet below land surface (i.e., below the massive Hattiesburg clay). The USGS identified three shallower wells (all approximately 120 feet deep) within a two-mile radius of the site as being utilized for domestic purposes. It is not known if these wells are currently used.

2.6.2 Site Ground Water

The only water-bearing zone identified during previous site investigations is the shallow sand body described in Section 2.5.2, encountered at depths of zero to 20 feet below grade adjacent to Gordon's Creek and at depths of 23 to 48 feet below grade beneath the former process area. Four monitoring wells, designated MW-1 through MW-4, were installed within the former process area by EPS during their 1994 Phase II site investigation. The wells were all constructed using ten-foot well screens with screened intervals ranging in depth from 20 to 35 feet below land surface. Water levels in the wells ranged from 17.4 to 21.1 feet below land surface during the investigation. Water level elevations in the wells at the time of the investigation indicated a northwesterly ground water flow direction. However, the wells are all within 500 feet of one another so it is not known if this is indicative of site-wide ground water flow.

2.7 Precipitation

The climate of southeastern Mississippi is humid and semitropical. Average annual rainfall in the vicinity of the site is approximately 61 inches. Average annual runoff from the numerous streams in the area is approximately 20 inches. The remainder of the precipitation either infiltrates into the ground or is dissipated through evapotranspiration. The net annual precipitation in the Hattiesburg area is approximately 15 inches.

3.0 Former Wood Treating Operations

3.1 General Industry Practices

Wood treating operations are conducted in a batch operation. Wood to be treated is typically prepared by debarking, cutting, planing, boring, and drying. The prepared wood is then loaded into tram cars which travel on small-gauge rail tracks. The tram cars are conveyed into a pressure-treater cylinder which is typically a steel vessel from six to eight feet in diameter and typically range in length from 50 to 135 feet. A site may contain from one to six or more treating cylinders. Cylinders are equipped with bolt-down and gasketed doors. The treating cycle consists of steam heating, vacuum extraction, and application of chemicals under high pressure. The treated wood may be steamed and subjected to further vacuum after treatment and prior to removal from the cylinder. Unused chemicals are typically returned to the working tank for in subsequent batches. Wastes containing treating chemicals generated in the process typically include steam condensate, working tank water draws, storage tank and cylinder sludges, drippage in the track area located immediately adjacent to the cylinder, and spills and leaks.

3.2 Site Creosoting Operations

Creosoting operations are believed to have been conducted at the site between the early 1900s and approximately 1960 (Roy F. Weston 1990). Interviews with former employees indicate that during the life of the facility, operations consisted of treating primarily cross-ties in a single pressure cylinder. In an August 1994 deposition, a former plant supervisor indicated that to his knowledge, the only preservative ever used at the site was creosote (Deposition of Paul Davis Mabry, August 30, 1994). The major constituents in creosote produced in the U.S. are listed in Table 3-1 (US EPA, October 1992).

3.3 Site Operational Layout

Historical aerial photographs and Sanborn maps have been used to establish the former locations of the various wood treating components. The following are among the components identified within the process area: a settling basin (or U-basin), boiler house, treating room(s), a dry kiln, storage and working tanks, wood storage areas, and an office. Locations of operational features are shown on a 1960 photograph provided as Figure 3-1.

Table 3-1
Major Chemical Constituents of Creosote Produced in the United States (1)

Former Gulf States Creosoting Site
Hattiesburg, Mississippi

Compound	Percentage
Naphthalene	3.0
Methylnaphthalene	2.1
Diphenyl dimethylnaphthalene	- - -
Biphenyl	0.8
Acenaphthene	9.0
Dimethylnaphthalene	2.0
Diphenyloxide	- - -
Dibenzofuran	5.0
Fluorene-related compounds	10.0
Methyl fluorenes	3.0
Phenanthrene	21.0
Anthracene	2.0
Carbozole	2.0
Methylphenanthrene	3.0
Methyl anthracene	4.0
Fluoranthene	10.0
Pyrene	8.5
Benzoflourene	2.0
Chrysene	3.0
Total	**90.4**

(1) - Lorenz and Gjovik, 1972

Figure 3-1
MER GULF STATES CREOSOTING SITE
Aerial Photography Analysis
Hattiesburg, Mississippi

4.0 Current Site Conditions

4.1 Site Features

The property was developed commercially beginning in approximately 1962. The original plant area is currently occupied by several automobile dealerships, auto parts stores, a beverage dealership, a convenience store, and other commercial operations. The process area and wood storage areas have been regraded, covered with asphalt, and are no longer evident (Weston, May 1990). Figure 4-1 is a map depicting the location of known current site features. Figure 4-2 shows current site features relative to 1960 site operational features.

4.2 Conceptual Understanding of Site

The facility is a former wood treating site which used only creosote in the treating process. Two potential areas of concern have been identified during previous investigations: the former process area and the Gordon's Creek fill area. The former process area contained several operational features (e.g., the settling basin, tankage, treating and blending areas, and drip track area) any of which may have contributed to the presence of creosote wood treating constituents in environmental site media (i.e., subsurface soil and ground water). The site also includes other potential sources of contamination associated with commercial development and use of the site, such as underground storage tanks and automobile repair shops. The existing asphalt cover precludes direct contact with any shallow affected soils within the former process area.

Following closure of the facility in approximately 1960, the site was re-developed beginning in approximately 1962. An area at the western edge of the property near Gordon's Creek may have been filled using materials from the site or off-site sources. Results of previous investigations indicate that subsurface soils immediately adjacent to the creek contain creosote wood treating constituents. However, the results of work performed by TDS on June 1996 indicate that subsurface soils to the north and east of the Gordon's Creek fill area (in the direction of the former process area) are unaffected. This suggests that the two areas are distinct and separate and that subsurface migration from the former process area was not the source of affected soils in the Gordon's Creek fill area.

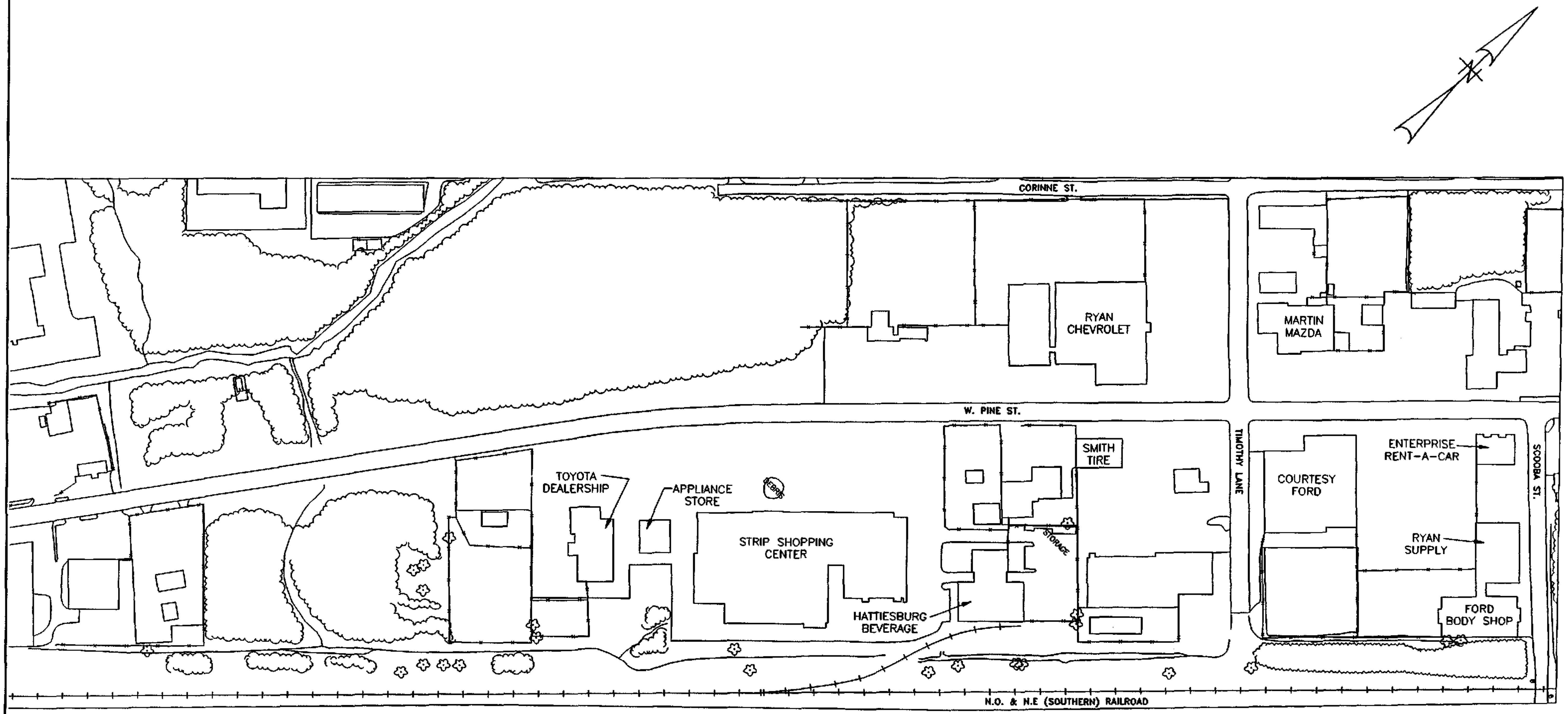
Other areas of the site are not believed to be of concern, as creosoting operations and filling are only believed to have occurred in the areas discussed above. However, additional data will be obtained on a site-wide basis to better delineate affected media and develop a more thorough understanding of potential migration pathways.

4.3 Likely Response Scenarios

Identification of likely response scenarios is premature at this time due to the lack of basic stratigraphic definition and ground water characterization.

4.4 Identification of ARARs

Identification of Applicable or Relevant and Appropriate Regulations (ARARs) will be performed subsequent to the investigation, as appropriate. As a precautionary measure, all investigation activities shall be performed in compliance with the training and other requirements of the 29 CFR 1910.120 regulations.



NOTE: PROPERTY AND OTHER IDENTIFICATIONS
BASED ON OLDER MAPS; NEED FIELD VERIFICATION

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 4-1
CURRENT SITE FEATURES

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE:
DWG. NO.: 21-01/138

Figure 4-2
FORMER GULF STATES CREOSOTING SITE
Aerial Photography Analysis
Hattiesburg, Mississippi

5.0 Field Sampling Plan

The field sampling plan has been broken down into five specific tasks. The tasks proposed to complete the site investigation are:

1. Stratigraphic Definition and Determination of Soil Properties
2. Source Characterization
3. Ground Water Investigation
4. Surface Soil Sampling
5. Site Investigation Report

Proposed activities for each investigation task are detailed in the following sections. Sampling locations depicted on maps are approximate and may be modified based on field conditions and/or property access problems.

5.1 Stratigraphic Definition and Determination of Soil Properties

The purpose of this task is to more thoroughly characterize the site-wide stratigraphy and to collect the soil data necessary to allow for the evaluation of contaminant migration potential and/or control. The task will be accomplished by implementing a cone penetrometer testing (CPT) program for stratigraphic definition and collecting and testing subsurface soil samples to determine the geotechnical and contaminant transport properties of various soil horizons beneath the site.

5.1.1 CPT Push and Borehole Locations

A total of 14 CPT pushes will be advanced at regular intervals along three southwest-northeast lines: the N.O. & N.E. Railroad right-of-way, West Pine Street, and Corinne Street (proposed locations are depicted on Figure 5-1). Three soil borings will be advanced for the collection of subsurface soil samples at locations shown on Figure 5-2. The three soil borings are located adjacent to CPT pushes so that soil boring logs can be used to correlate CPT findings.

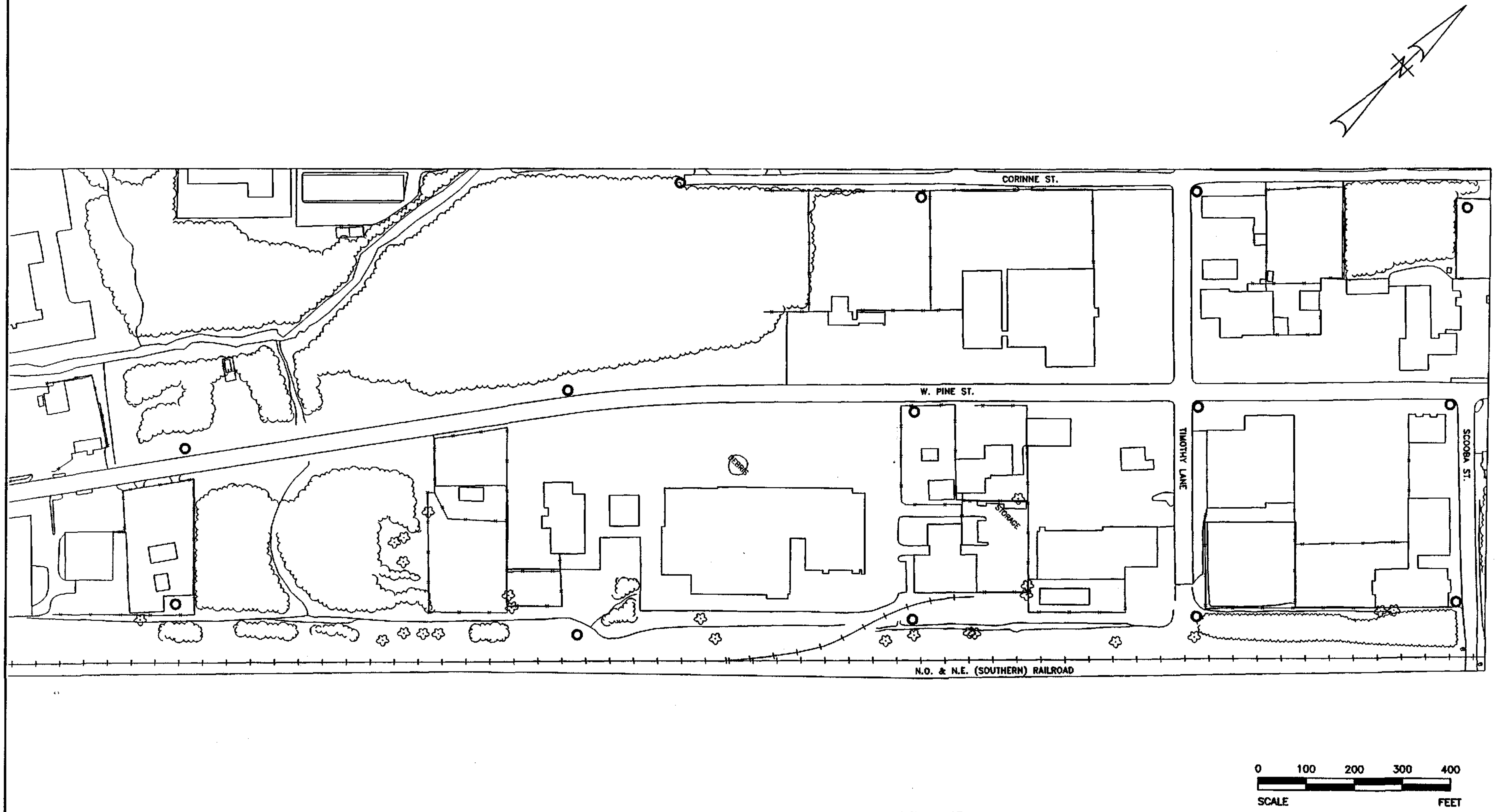
5.1.2 Borehole Depths and Sampling Intervals

Each CPT push will be advanced to a depth of 75 feet or a minimum of 5 feet into a competent clay layer below the base of shallow sands. Real-time, continuous soil profiles of each push will be generated in the field using the CPT on-board instrumentation. Each of the three soil borings will be advanced and continuously logged to a depth of 50 to 75 feet. Samples will be collected from up to four distinct soil horizons using split-spoon samplers or Shelby tubes, depending on soil type. Because sampling intervals will be determined based on lithologic breaks, sample collection depths will be determined in the field.

5.1.3 Field Procedures

Field procedures will consist of the following:

- Prior to field mobilization, each location will be checked, to the extent possible, for underground and overhead utilities.
- CPT pushes will be advanced via direct push technology in accordance with ASTM standard D 5778-95.
- Soil borings will be advanced using 4.25-inch inside diameter (I.D.) hollow-stem augers. Hollow-stem auger drilling will be performed in accordance with the



LEGEND

○ PROPOSED STRATIGRAPHIC CPT

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

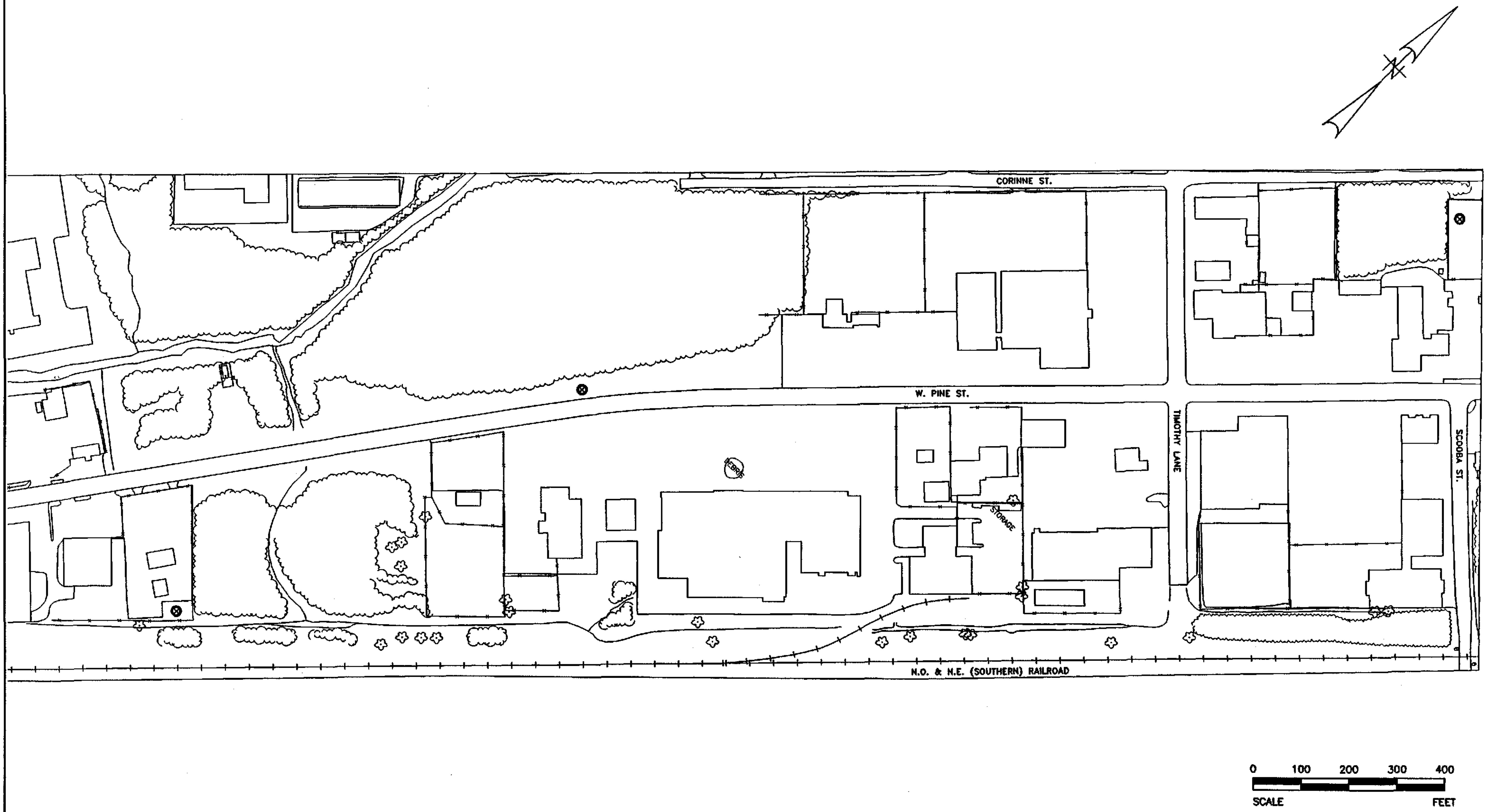
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

TITLE: FIGURE 5-1
PROPOSED STRATIGRAPHIC CPT SAMPLING LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-01/148



LEGEND

⊗ PROPOSED GEOTECHNICAL BORING

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana **Houston, Texas**

TITLE:
FIGURE 5-2
PROPOSED GEOTECHNICAL BORING LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-01/158

provisions of Section 6.3.1 of *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, US EPA Region IV, May 1996 (EISOP/QAM).

- Soil samples to be tested for geotechnical and contaminant transport properties will be collected using split-spoon samplers or Shelby tubes. Physical handling of samples will be performed using stainless steel tools and latex gloves.
- All resulting boreholes will be pressure grouted from bottom to top to help ensure complete filling.
- Field CPT logs and soil boring logs will be generated for each push or boring. In addition to descriptions of soils, boring logs will include recovery percentages, blow counts, and PID or FID measurements.

5.1.4 Laboratory Soil Testing

Selected soil samples will be laboratory tested to determine the geotechnical and contaminant transport properties of various soil horizons beneath the site. Depending on soil types, testing will be performed to determine grain size (via sieve and potentially hydrometer methods), Atterberg limits, moisture content, density, vertical permeability, and total organic carbon content.

5.2 Delineation of Source Areas

The purpose of this task is to characterize potential residual materials from former and current site operations. The task will be accomplished by utilizing the Rapid Optical Screening Tool (ROST) to delineate the vertical and horizontal extent of potential source materials in the former process area and the Gordon's Creek fill area.

5.2.1 Source Area Definition

For the purpose of this investigation, a source area shall be defined as any area in which site media contain free product or other high concentrations of hydrocarbon constituents.

5.2.2 Investigative Approach

ROST is a laser-induced fluorescence sensor deployed by CPT equipment that characterizes stratigraphy and petroleum hydrocarbons in soils. The process is accomplished continuously and in real time. Advantages of the tool are:

- **Waste-Free Testing** - Deployment by CPT eliminates soil cuttings.
- **Product Differentiation** - Various hydrocarbon types can be identified in real time.
- **Speed** - typically produces greater than 300 linear feet of testing per day.
- **Regulatory Validation** - ROST is the only commercially-available sensor of its type to have its performance validated by the US EPA.

Boring logs from both the former process area and the Gordon's Creek fill area have identified the presence of oily residuals in the subsurface. Due to the presence of such residuals, it is believed that the ROST system will provide an effective, rapid, insitu field screening method for characterizing the subsurface.

5.2.3 ROST Locations and Depths

A total of 57 CPT/ROST pushes are planned for the source characterization task: 33 in the former process area and 24 in the Gordon's Creek fill area (see Figure 5-3). Due to the nature of source characterization, locations may be added or eliminated from the program based on field observations. In the former process area, pushes will be advanced to depths of 25 feet on a 100-foot grid pattern, exclusive of buildings and other structures. The depth limit of 25 feet for source characterization is based on the depth to ground water (between 17 and 21 feet below grade).

In the Gordon's Creek fill area, pushes will be advanced to depths of 25 feet on a 100-foot grid pattern, with intensified sampling in the vicinity of the former channel of Gordon's Creek. Approximately 15 pushes will be advanced an additional 20 feet to evaluate potential containment options (e.g., sheet piling or slurry wall).

5.2.4 Field Procedures

Field procedures will consist of the following:

- Prior to field mobilization, each location will be checked, to the extent possible, for underground and overhead utilities.
- CPT pushes will be advanced via direct push technology in accordance with ASTM standard D 5778-95.
- All resulting boreholes will be pressure grouted from bottom to top to help ensure complete filling. In accordance with the provisions of Section 6.9.1 of the EISOP/QAM, the top two feet of the borehole will be poured with concrete.
- Field CPT logs will be generated for each push.

5.2.5 Correlation/Confirmation Sampling and Analysis

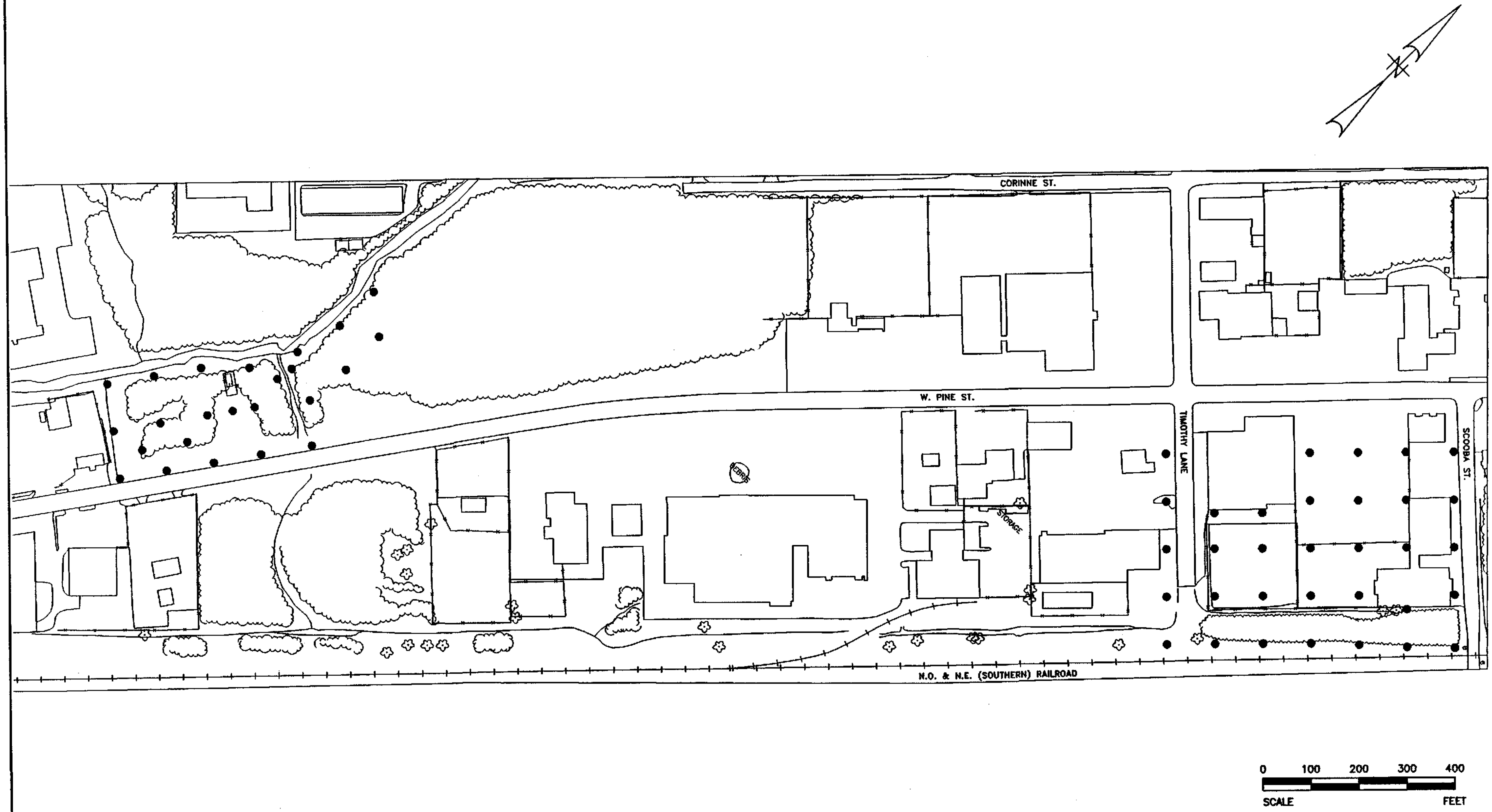
Correlation soil samples will be collected from approximately 10% of locations using the CPT soil sampling tool. This sampler is a piston-type soil sampler which allows for collection of an undisturbed soil sample. All samples will be analyzed for TCL volatile and semivolatile constituents. Due to the nature of the Gordon's Creek fill area (i.e., fill of unknown origin), samples from the fill area will also be analyzed for pesticides and PCBs.

5.3 Ground Water Investigation

The purpose of this task is to develop a basic understanding of shallow ground water flow direction and velocity, to determine the presence of site-related constituents in ground water, and to evaluate the potential for migration of any identified constituents. The task will be accomplished by implementing a ground water investigation to determine ground water quality, ground water flow direction and gradient, and aquifer characteristics.

5.3.1 Monitoring Well Locations

Six monitoring wells will be installed as part of the ground water investigation. Well locations were selected to provide site-wide coverage and to allow for the evaluation of ground water quality near the site boundary. Proposed monitoring well locations are depicted on Figure 5-4.



LEGEND

● PROPOSED ROST LOCATION

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

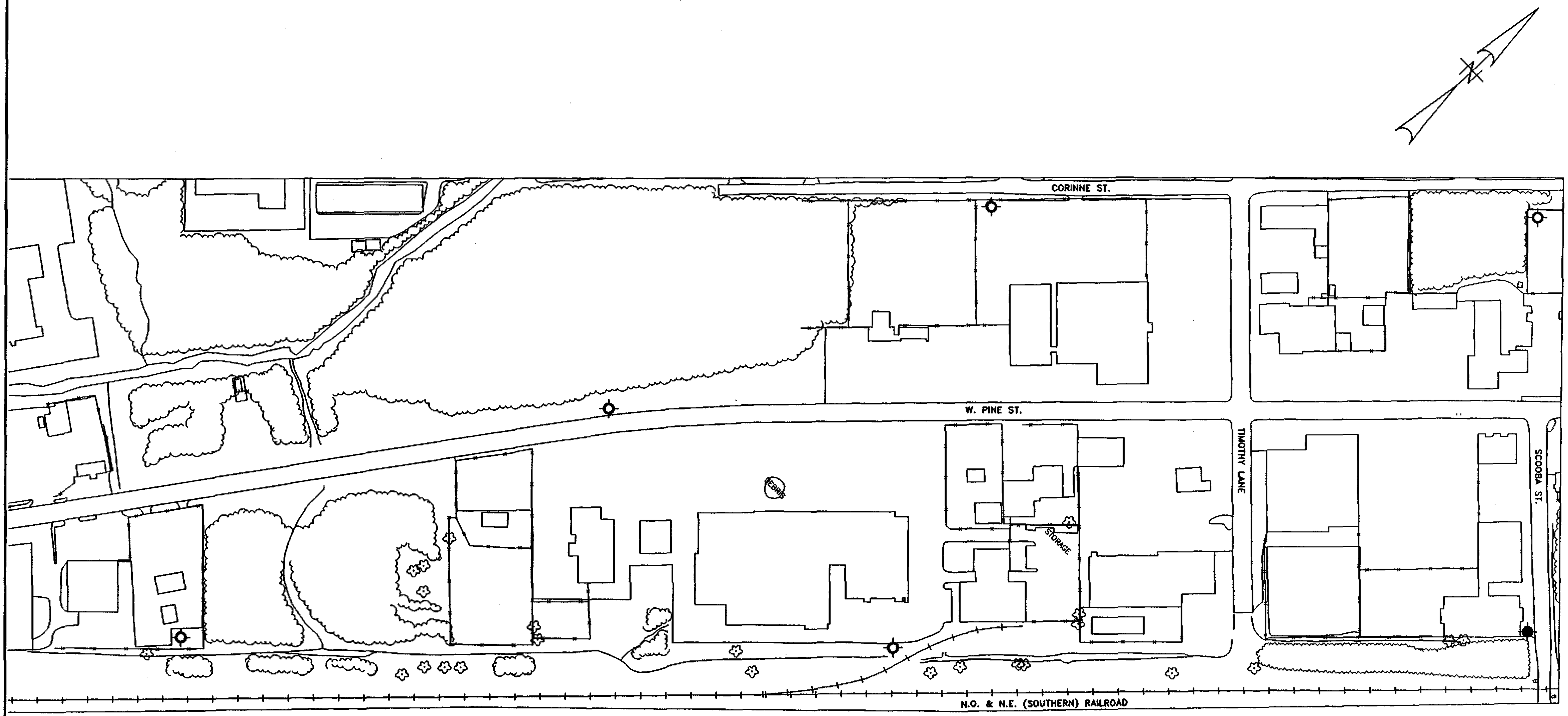
MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 5-3
PROPOSED ROST SAMPLING LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: DWG. NO.: 21-01/16B



LEGEND

- ○ PROPOSED MONITORING WELL
- ● WELL OPTIONAL DEPENDING ON COMPARISON OF CPT DATA TO BORING LOGS OF EXISTING WELLS MW–1 THROUGH MW–4

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

0 100 200 300 400
SCALE FEET

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 5–4
PROPOSED MONITORING WELL LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE
LOCATION: HATTIESBURG, MISSISSIPPI
SCALE: DWG. NO.: 21–01/17B

5.3.2 Screened Intervals

Each well will be constructed so that the entire saturated thickness of the first water-bearing zone is screened, up to a maximum screened interval of 20 feet. If 20 feet of screen is not sufficient to fully penetrate the first entire water-bearing zone completely, the uppermost 20 feet of the zone will be screened.

5.3.3 Well Installation and Construction Procedures

Wells will be installed and constructed in accordance with procedures presented in two documents: the previously cited EISOP/QAM and *Surface Water and Ground Water Use and Protection Regulations*, MDEQ, revised December 1994. Wells will be installed through hollow-stem augers, the preferred method of drilling listed in the EISOP/QAM. Once a borehole has reached the desired depth, the well, consisting of flush-joint, threaded, two-inch Schedule 40 PVC will be lowered into place through the augers. Well components will include a 10- to 20-foot screened section with a 2.5-foot sump and bottom cap attached and riser from the top of screen to land surface.

Once the well is in place, a filter pack consisting of 20/40 grade silica sand will be poured to a height at least two feet above the top of screen. A three-foot layer of bentonite pellets will be poured above the filter pack to provide a seal. After the bentonite has been allowed to hydrate for a minimum of eight hours, the annular space above the seal will be filled with pure bentonite grout or 5% bentonite/cement grout from the top of the seal to approximately two feet below grade through a rigid tremie pipe. The grout will be allowed to set for a minimum of 24 hours before the surface completion is installed.

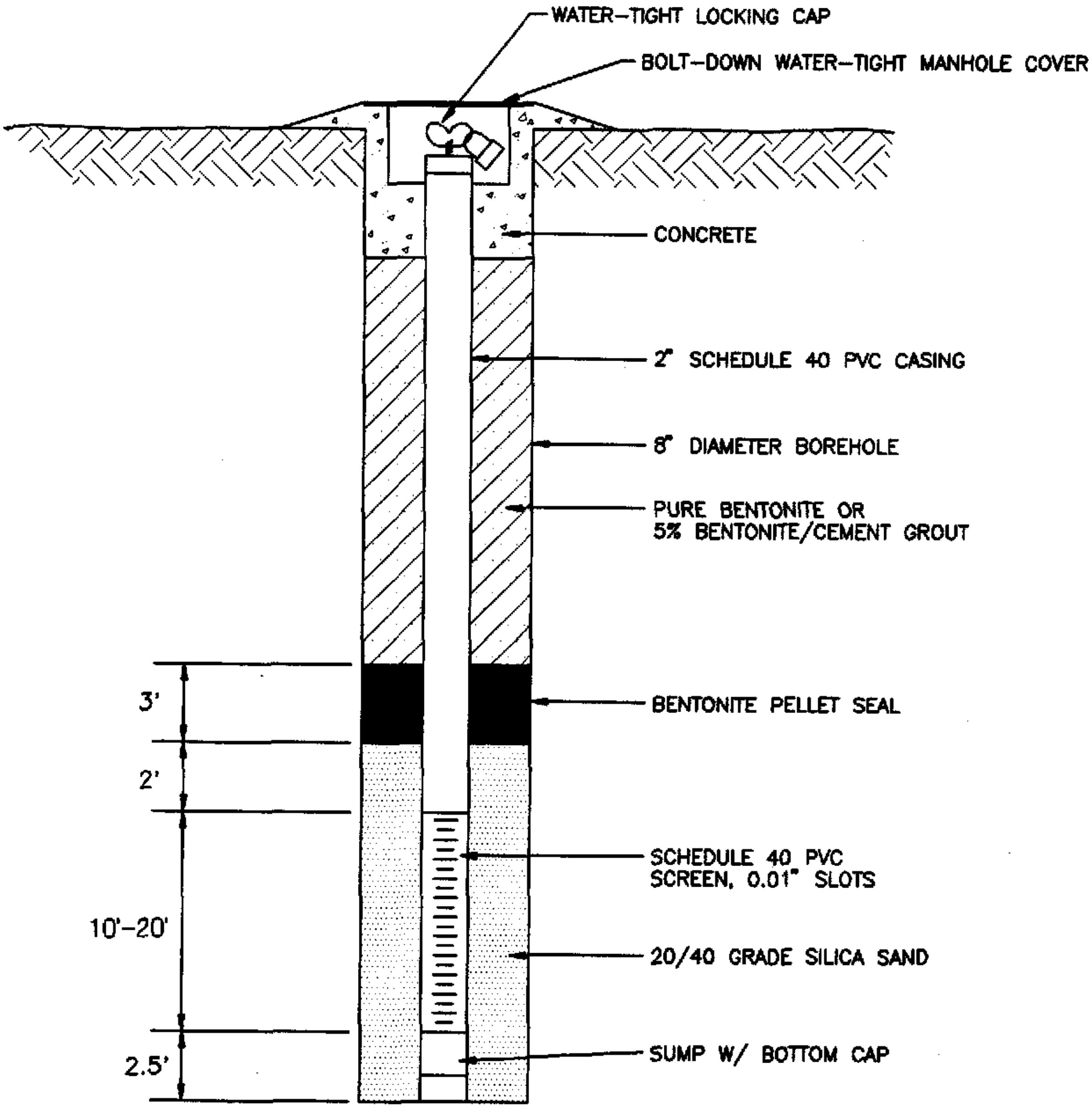
Due to their locations in high traffic areas (i.e., in parking lots or along roadways), wells will be completed at grade with water-tight, flush-mount manhole covers. The manhole assembly will be set in a four-inch thick concrete pad to provide strength. The pad will be sloped gently away from the bolt-down manhole cover, which will be fitted with a rubber gasket to inhibit the entry of water. In addition, the well will be fitted with a water-tight locking cap. Typical well construction details are shown on Figure 5-5.

5.3.4 Well Development

Prior to sampling, wells will be developed to remove sediment and to facilitate the collection of samples which are representative of the screened interval. Initially the water level in each well will be measured from the top of casing and subtracted from the well depth to determine the height of the water column. This information will be used to calculate the volume of the water column. Wells will be developed by bailing, pumping, air lifting, or a combination of these methods. Well development will continue until ground water is essentially sediment-free, and temperature, pH, and specific conductance have stabilized. A minimum of three well volumes will be removed from each well during development.

5.3.5 Ground Water Sampling Procedures

If wells are not sampled within 24 hours of development, it will be necessary to purge the wells to remove stagnant water prior to sampling. Purging will be performed with a pump or disposable bailers. During purging, the volume of water removed will be observed and recorded and the temperature, pH, and specific conductance of the water will be monitored. Well purging will be complete when these parameters have stabilized and a minimum of three well volumes have been removed.



MICHAEL PISANI & ASSOCIATES
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New Orleans, Louisiana Houston, Texas

SCALE:

DWG. NO.: 21–01/18A

FIGURE 5–5
TYPICAL WELL CONSTRUCTION DIAGRAM

FORMER GULF STATES CREOSOTING SITE
HATTIESBURG, MISSISSIPPI

Once a well has been developed or purged, a ground water sample will be collected using a disposable bailer. Ground water will be poured directly from the bailer into clean, laboratory-supplied sample containers. The order of collection will be: volatiles, semivolatiles, cyanide, and metals.

5.3.6 Ground Water Analysis

Samples will be analyzed for TCL volatile and semivolatile constituents and TAL inorganics.

5.3.7 Slug Testing

Slug tests will be performed at each well to estimate a range of hydraulic conductivities for the first water-bearing zone. Initially, the water level in a well will be measured to determine the static water level. A pressure transducer on a cable, connected to a datalogger at the surface, will be lowered to the base of the well. A solid PVC or stainless steel "slug" of a known volume will then be lowered beneath the water's surface, and the water level will be allowed to return to its static level. The slug will be removed rapidly, causing an instantaneous decrease in the water level, and the slug test will begin. During the test, the datalogger will record water levels with respect to time until the well has completely recovered. Depending on the time required for complete well recovery, more than one test may be performed at a well. The data will be analyzed using an appropriate method for the aquifer type, for example the Bouwer and Rice method analysis of slug test data.

5.4 Surface Soil Sampling

The purpose of this task is to collect the data necessary to evaluate the risks, if any, of exposure to site-related constituents in surface soils. The task will be accomplished by collecting and analyzing soil samples within the upper 12 inches below land surface in exposed (i.e., unpaved or uncovered) areas.

5.4.1 Sampling Locations and Intervals

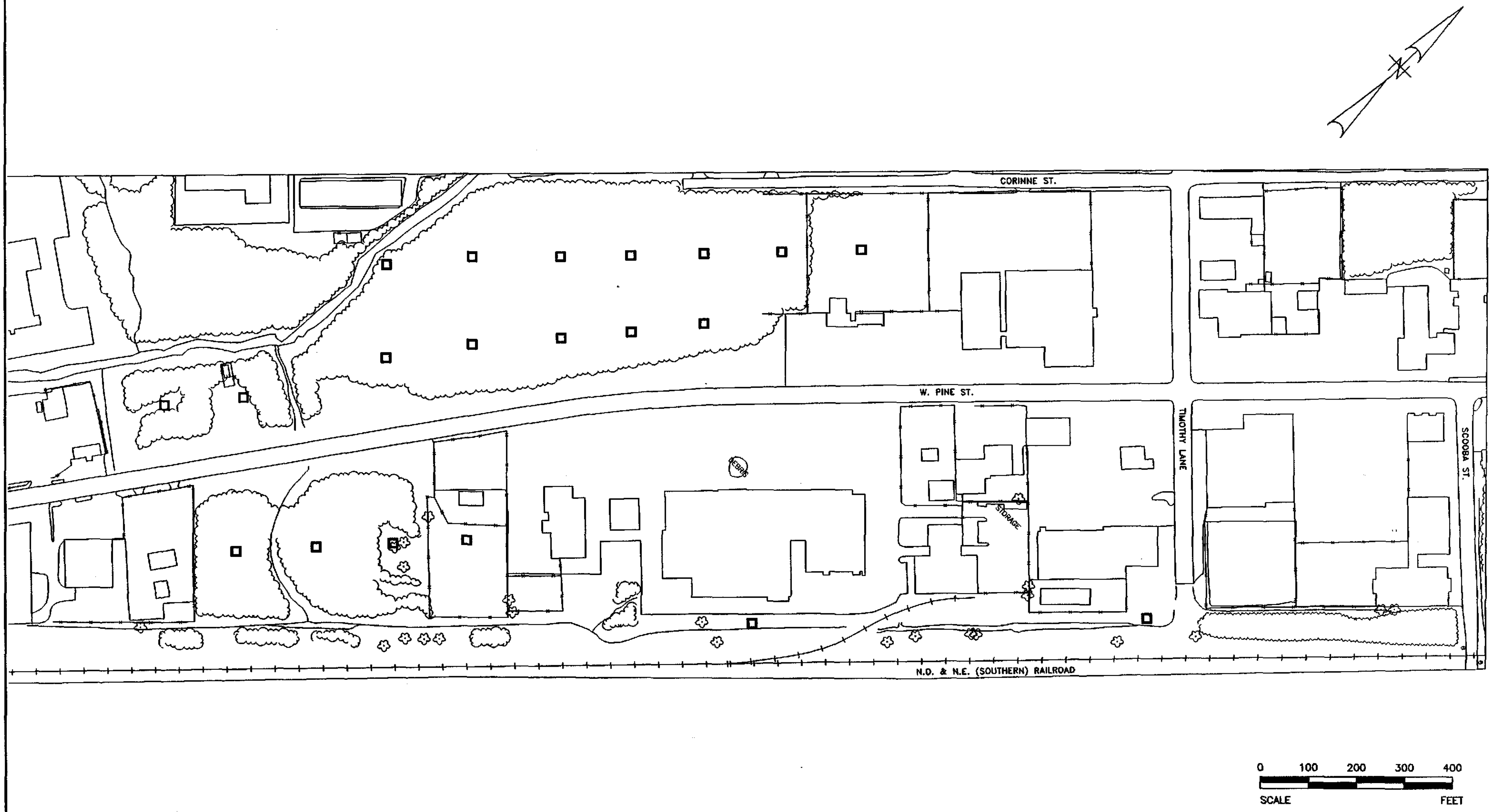
A total of 20 surface soil samples will be collected at a rate of approximately one per each 40,000 square feet. Samples will be collected from the 0- to 12-inch depth interval. Proposed locations are depicted on Figure 5-6.

5.4.2 Surface Soil Sampling Procedures

Sample locations will be cleared of vegetation and debris prior to sampling. Soil samples will be collected using either a stainless steel hand auger or a slide hammer equipped with acrylic sleeves. At each location, soils will be penetrated to a depth of 12 inches below ground surface. Soil samples will be placed on aluminum foil and field screened for organic constituents using a PID or FID capable of detecting PAHs. Samples will be homogenized on the aluminum foil prior to placement in laboratory-supplied sample containers.

5.4.3 Surface Soil Analysis

Surface soil samples will be analyzed for TCL semivolatiles.



LEGEND

□ PROPOSED SURFACE SOIL SAMPLE

BASE MAP FROM ATLANTIC TECHNOLOGIES, LTD.,
HUNTSVILLE, ALABAMA, APRIL 1, 1996

MICHAEL PISANI & ASSOCIATES
Environmental Management and Engineering Services
New Orleans, Louisiana Houston, Texas

TITLE: FIGURE 5-6
PROPOSED SURFACE SOIL SAMPLING LOCATIONS

PROJECT: FORMER GULF STATES CREOSOTING SITE

LOCATION: HATTIESBURG, MISSISSIPPI

SCALE: | DWG. NO.: 21-01/19B

5.5 Surveying

The horizontal position and vertical elevation of sampling locations will be surveyed using a differential global positioning system (GPS) and/or conventional surveying methods in accordance with the provisions of Sections 15.2 and 15.3 of the EISOP/QAM. Survey data will include horizontal positions at all sampling locations, ground surface elevations at all boring, CPT, and well locations, and top-of-casing elevations at all well locations.

5.6 Equipment Decontamination and Residuals Management

5.6.1 Decontamination Procedures

In order to guard against potential cross-contamination, it is essential to thoroughly decontaminate reusable sampling equipment between each location. When possible, equipment will be dedicated to a single sampling point (e.g., dedicated bailers and rope for ground water sampling). Other manual sampling equipment, such as stainless steel hand tools (knives, trowels, and spoons), hand augers, etc. will be decontaminated by the following steps:

- Wash in potable water and phosphate-free detergent;
- Rinse with potable water;
- Rinse with distilled or deionized water; and
- Allow to air dry.

All heavy equipment, such as hollow-stem augers, sampling rods, CPT rods, and downhole samplers, will be cleaned using a high-pressure hot-water washer. Decontamination of heavy equipment will be performed on a lined decon pad or using an alternative containment system so that all liquid and solid residuals can be containerized for proper disposition.

5.6.2 Residuals Management

All cuttings, development water, and decontamination residuals will be containerized pending the results of laboratory analysis. Containers will be clearly marked with the contents and date of generation. If no target constituents are detected in ground water samples from a well, the development water from that well will be discharged on site. Cuttings will be tested to determine proper disposition.

6.0 Quality Assurance and Quality Control

All work associated with the former Gulf States Creosoting site will be performed in accordance with the Quality Assurance Project Plan provided as Appendix C. In addition, all documents prepared for submittal to MDEQ will undergo a minimum of two reviews, one by a senior person other than the primary author and one by the Principal-In Charge. This review process will result in a high-quality work product and overall project consistency.

7.0 Health and Safety

All field activities conducted at the former Gulf States Creosoting site will be performed in accordance with the Health and Safety Plan provided as Appendix D.

8.0 Community Relations Plan

MDEQ will coordinate all community relations concerns with Kerr-McGee. In addition to MDEQ activities, owners of land and site occupants where sampling is proposed will be advised of the scope and timing of the work outlined herein.

9.0 Project Management

Information regarding key project personnel and the project schedule for the former Gulf States Creosoting site investigation is provided in the following subsections.

9.1 Key Personnel

Contact information regarding project team members is provided below.

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Michael E. Pisani, P.E.
Principal-In-Charge

David C. Upthegrove
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Telephone (601) 961-5072
Facsimile (601) 961-5741

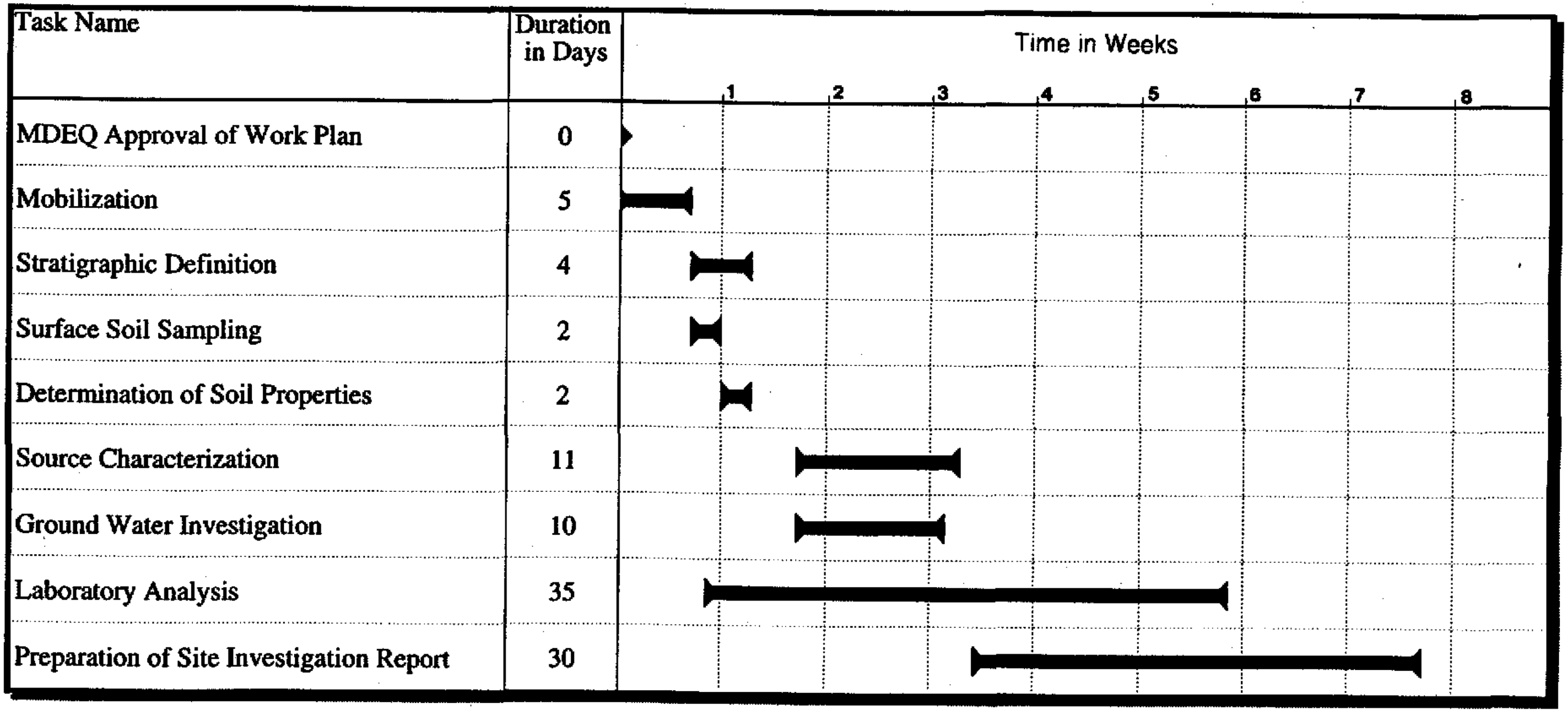
Russell Smith
Uncontrolled Sites Section Supervisor

9.2 Schedule

The project schedule for the Tasks 1 through 4 is shown in Figure 9-1. Since the schedule for all investigation activities is contingent upon formalizing an agreement with MDEQ, MDEQ approval of the work plan (if necessary), and site access, the schedule commences with the completion of the latest of these activities.

Figure 9-1
Agressive Schedule for
Site Investigation Activities

Former Gulf Coast Creosoting Site
Hattiesburg, Mississippi



Task Name	Duration in Days
MDEQ Approval of Work Plan	0
Mobilization	5
Stratigraphic Definition	4
Surface Soil Sampling	2
Determination of Soil Properties	2
Source Characterization	11
Ground Water Investigation	10
Laboratory Analysis	35
Preparation of Site Investigation Report	30