Harding Lawson Associates

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July 18, 1991

20184,003.09

Mrs. Cathy Waldron
CAM Properties
18250 68th Avenue South
Kent, Washington 98032

Dear Mrs. Waldron:

Independent Cleanup Action Report
CAM Properties
18250 - 68 Avenue South
Kent, Washington

INTRODUCTION

This letter report presents the results of an independent cleanup action performed by Northwest Enviroservice, Inc. (NEI), and monitored by Harding Lawson Associates (HLA) for CAM Properties at 18250 - 68 Avenue South, Kent, Washington. This cleanup action was performed in accordance with the general guidelines presented in CAM Properties' letter to the Washington State Department of Ecology (WDOE) dated March 4, 1991. HLA had previously completed a Phase I Preliminary Hazardous Materials Site Assessment (PSA) and a Phase II Site Investigation for the subject property. The results of these two investigations are presented in reports dated November 1, 1990, and January 14, 1991, respectively. A copy of the Phase II Site Investigation report is attached as Appendix A.

FIELD INVESTIGATIONS

The property consists of a metal fabrication and manufacturing facility currently operated by CAB Systems, Inc. in Kent, Washington (Figure 1). The property is owned by CAM Properties. The discovery that a historic release had occurred at the facility was identified as a result of a Phase II Investigation conducted by HLA. The Phase II Investigation was performed to further evaluate the findings of a Phase I PSA, also conducted by HLA, which indicated there was a potential that surface soils may have been impacted from operation of an exhaust air wet scrubber. The PSA also indicated there was a potential that subsurface soil may have been impacted by the use of two underground storage tanks (USTs) used to store gasoline and diesel.

The storage tanks were removed in 1987, and a soil sample obtained at the time of removal was tested for total oil and grease. The results of this analysis were below the detection limit.

The results of the Phase II Investigation report (Appendix A) indicated that surface soils in the vicinity of the wet scrubber contained concentrations of chromium and lead in excess of the cleanup levels for soil for industrial sites provided in the Model Toxics Control Act Cleanup Regulation (WAC 173-340). Also, one of the soil samples obtained in the vicinity of the previous location of the USTs contained total petroleum hydrocarbons (TPH) slightly above the limits specified in the regulation.

As a result of these findings, CAM Properties elected to proceed with an independent cleanup action at the site to remove the contaminated soils from these two areas, as outlined in their letter to WDOE dated March 4, 1991. Soil excavation, disposal, and confirmation sampling have now been completed at the site. The results of these activities are presented in the following section.

SOIL REMOVAL

CAM Properties contracted with Northwest Enviroservice, Inc. (NEI) in February 1991 to excavate soils from the two different areas, test the excavated soils, and then properly dispose of any contaminated soil. HLA was retained by CAM Properties to oversee the soil excavation activity, and perform confirmation sampling of the remaining soil following excavation.

Former UST Location

The first area to be excavated was in the vicinity of the former underground storage tanks (see Figure 2). The area planned for excavation was approximately 13 feet by 15 feet. Soil excavation was to proceed down until the top of the water table was reached (estimated to be 10 to 12 feet below ground surface).

NEI conducted the soil excavation on February 21, 1991. Excavated soils were placed on clean plastic sheeting in two stockpiles next to the excavation. At a depth of approximately 2.5 feet, debris from a concrete pad was encountered. More concrete was unearthed at a depth of 4 feet. At this point, HLA's field engineer advised NEI to prepare the second stockpile area for the remainder of the soil to be excavated. Soil excavation then continued to a depth of 11 feet, at which time groundwater was encountered, and the excavation was terminated. Approximately 17 cubic yards (CY) of soil was stockpiled in the first pile, and 37 CY in the second. Both stockpiles were covered with plastic sheeting.

Soil samples were collected from both stockpiles, and from the base of the excavation on February 22, 1991. Sampling locations and descriptions are summarized in Table 1, and shown in Figure 3. Analytical results are summarized in Table 2. Analytical laboratory data sheets, and chain-of-custody forms are included in Appendix B.

Samples 5B, 6B, 7X, and 8X were collected from soils at this location, and tested by Pacific Northwest Environmental Laboratory, Inc. (PNELI) for TPH using EPA Method 8015 (modified). Neither of the two soil samples collected from the base of the excavation from the former UST location contained levels of TPH above the MTCA cleanup levels of 200 mg/kg for diesel or other hydrocarbons. Sample 8X from the second soil stockpile also had TPH levels well below the 200 mg/kg cleanup level. However, sample 7X from the first soil stockpile contained 270 mg/kg of TPH, quantified as motor oil. Since this exceeds the MTCA cleanup level of 200 mg/kg, the soil in this stockpile was judged to be contaminated with petroleum hydrocarbons. CAM Properties retained NEI to transport and dispose of this soil (17 CY) at a permitted landfill at a future date.

Soil from stockpile #2 (approximately 37 CY), which was determined not to contain concentrations of TPH in excess of 200 mg/kg, was used to partially backfill the excavation. Imported fill material will be brought in at a later date by CAM Properties to complete the backfilling of this excavation.

Wet Scrubber Area

The previous site investigation work had indicated that there was a good correlation between discolored soils and the presence of elevated levels of metals in the soil. Therefore, the excavation plan for the second area (wet scrubber) called for initial excavation of stained soil to a depth of 6 inches in the area shown in Figure 2. At that point, further excavation would be undertaken in any areas where visible staining of the soil was still present. Excavation would continue until all stained soils had been removed.

The excavation work in this area was also carried out by NEI on February 21, 1991. The hazardous materials storage shed, located adjacent to the blast room, had been moved earlier by CAB Systems to allow soil excavation to proceed in this area. Six to 12 inches of soil was removed from the area shown on Figure 3. Grit-like materials of varying colors (e.g. red, black) were encountered in the soil during this excavation. Approximately 28 CY of soil was excavated from this area, and stockpiled nearby on plastic sheeting. The stockpile was also covered with plastic sheeting.

Samples 1B, 2B, 3X and 4X were collected from soils associated with the wet scrubber area and tested for various metals by PNELI. Three of the four soil samples collected from the wet scrubber area were found to contain levels of chromium and lead above the MTCA cleanup levels for industrial soil (1,000 mg/kg for lead and 500 mg/kg for chromium) as shown in Table

2. Only sample 2B, from the base of the excavation, near the scrubber pad, did not contain concentrations of metals exceeding the MTCA cleanup levels. As a result, it was determined that further excavation of soils in the vicinity of sample 1B was required.

On March 5, 1991, HLA's field engineer returned to the site to collect a sample (9B) of the black grit material encountered in a thin (<1 inch thick) layer of the soil at a depth of 6 to 12 inches below ground surface. The purpose of this analysis was to determine whether this black grit material was also a source of metals contamination in this area (i.e., in addition to the red-stained soil that had been excavated). This sample was found to contain lead and cadmium concentrations above the MTCA cleanup levels. Therefore, it was decided that further soil excavation efforts would be required in this area in order to achieve removal of this black grit.

NEI was again mobilized to the site on June 5, 1991 to undertake the excavation of the black grit layer in the soil. A backhoe was used to excavate this material from the approximate area shown in Figure 3, at depths up to about one foot. The excavation started from the approximate location of soil sample 9B and proceeded in all directions until no further signs of the black grit were observed or until obstructions were encountered. In general, soil excavation was able to proceed without interruption to the north, east and south, allowing for complete removal of this material. However, soil excavation to the west was terminated due to obstruction by the blast room building foundation and the concrete apron. Soil excavation was conducted right up the the building foundation and to the edge of the concrete pad. The HLA field engineer observed that a thin layer (<1-inch thick) of black grit was still present in the soil at a depth of 12-15 inches below ground surface at some locations along the concrete apron and building foundation. This material appeared to extend below the building foundation and the concrete apron, but further excavation was not possible below these structures. At this point, excavation work was terminated and two soil samples were collected for analysis of barium, cadmium, chromium, copper, lead, nickel and zinc. Sample 10B was taken from the base of the newly excavated area (near where sample 9B had been collected) and sample 11S was taken from the sidewall of the excavation at the edge of the concrete apron. Sample 11S contained the black grit material that appeared to extend under the concrete apron and the blast room foundation.

The laboratory results for sample 10B showed that the concentrations for all metals of concern were well below the MTCA Method A Cleanup Levels, as expected. The results for sample 11S indicated that cadmium and lead concentrations exceeded the Method A Cleanup Levels for industrial soil. These results were consistent with previous analyses of soil samples from other areas that contained the black grit material.

The soil excavated on June 5 was added to the existing stockpile created on February 21 adjacent to the main building. All soil from this stockpile (approximately 38 CY) was loaded onto two tandem trailers by NEI, weighed at an offsite scale, manifested and transported to the Chemical Waste Management secure landfill in Arlington, Oregon for disposal as hazardous waste. The total weight of the soil in the two tandem trailers was 97,040 pounds (48.5 tons).

SUMMARY AND CONCLUSIONS

Based on observations by HLA's field engineer, it appears that a thin layer (<1 inch thick) of black grit extends some distance beneath some of the blast room building foundation and the concrete apron. This material was observed to be present at a depth of approximately 1-1.5 feet below ground surface at these locations. It is not known how far this layer of black grit extends horizontally below the building or concrete apron. A shallow test excavation dug to a depth of two feet on the north side of the concrete apron did not encounter any black grit or stained soil, which infers that the black grit layer terminates at some point under the apron.

Concentrations of cadmium, lead and occasionally chromium in excess of the MTCA Method A Cleanup Levels for industrial soil are present in this thin layer of black grit. However, it is physically impossible to remove this material from the subsurface without demolition of the blast room and the adjoining concrete apron. Therefore, this material should be allowed to remain in place at the present time under the following assumptions and conditions:

- the CAB Systems site in Kent meets the definition of an industrial site under MTCA (WAC 173-340-745)
- institutional controls will be implemented in accordance with WAC 173-340-440
- removal of the black grit material from these areas is not technically feasible without demolition of the structures
- the extent of the metals contamination appears to be limited to a very thin layer of material (<1-inch thick)
- laboratory testing of the soil sample collected from below the black grit layer (10B) indicates that the surrounding soils have not been significantly impacted by this material (i.e., leaching of metals from this material does not appear to be a problem)
- the material under the building and concrete apron is isolated from direct contract with surface water infiltration and groundwater
- the grit material should be excavated and properly disposed or treated if the blast room and concrete apron are eventually demolished (either by CAB Systems, CAM Properties or by subsequent property owners)
- institutional controls will include a restrictive covenant on the property recorded with the county register of deeds

did restrictive covenant occur?

We believe that this report provides you with the information you require at this time. CAM Properties should forward a copy of this report to Mr. Joe Hickey at the Northwest Regional Office of WDOE at their earliest convenience.

Yours very truly,

HARDING LAWSON ASSOCIATES

Richard S. Reis, P.E.
Associate Engineer

Daniel A. Balbiani, P.E.
Managing Principal Engineer

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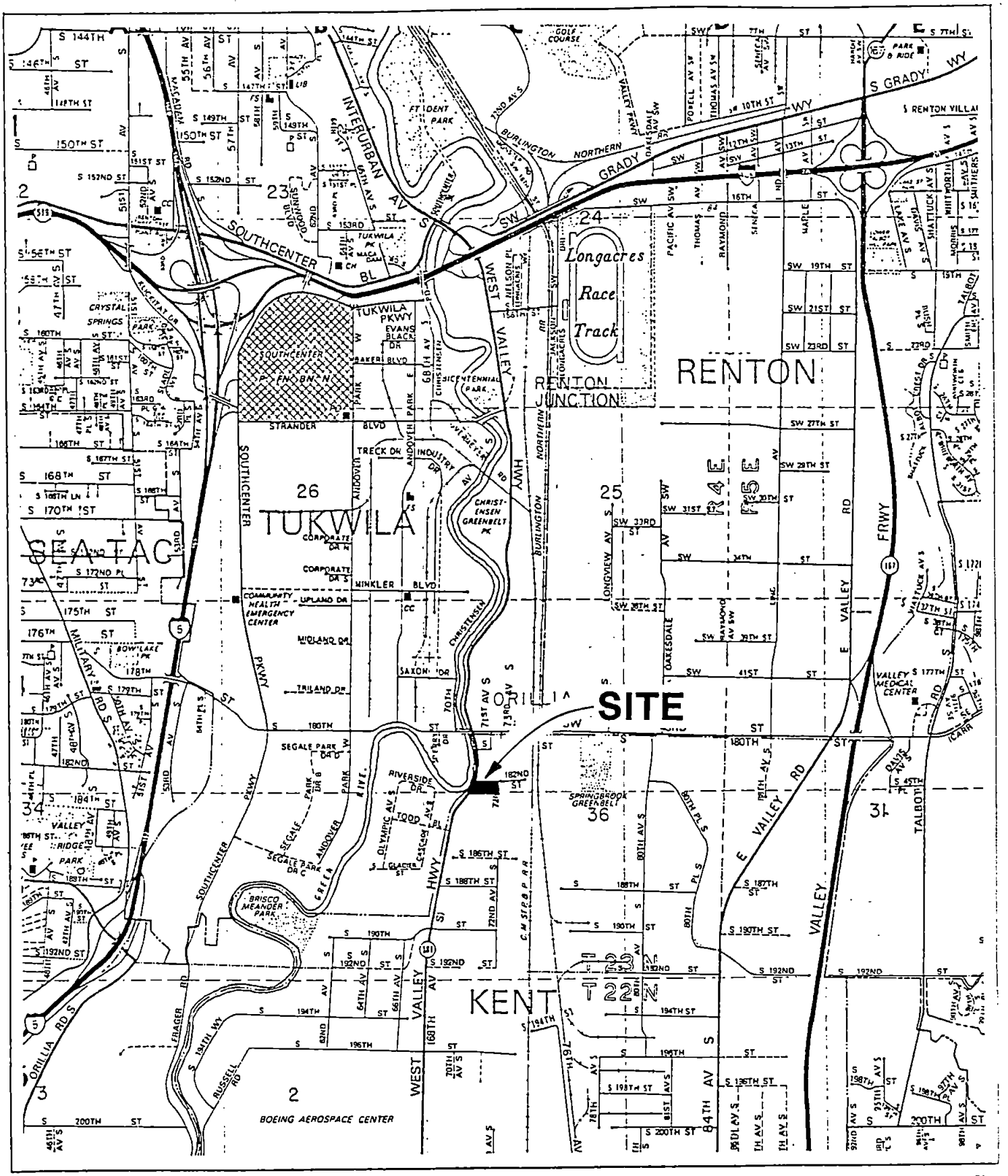
TABLE 1
SAMPLING LOCATIONS AND DESCRIPTIONS

Sample no.	Date	Location	Description
1B	02/22/91	Near grit blow-out, beneath excavated soil.	Tan, compacted silty sand with gravel.
2B	02/22/91	Near scrubber pad, beneath excavated soil.	Tan, compacted silty sand with gravel.
3X	02/22/91	From excavated soil stockpile at scrubber.	Loose, brown-tan silty sand with orange-red staining.
4X	02/22/91	From excavated soil stockpile at scrubber.	Loose, brown-tan silty sand with orange-red staining.
5B	02/22/91	From bottom of excavation at former UST location.	Wet, brown-gray, silty clay.
6B	02/22/91	From bottom of excavation at former UST location.	Wet, brown-gray, silty clay.
7X	02/22/91	From excavated soil stockpile no. 1 at former UST location.	Loose, brown soil with gravel.
8X	02/22/91	From excavated soil stockpile no. 2 at former UST location.	Wet, brown-gray soil.
9B	03/05/91	Near former hazmat building, beneath excavated soil.	Fine black grit.
10B	06/05/91	Near former hazmat building, beneath excavated soil.	Tan, compacted silty sand with gravel.
11S	06/05/91	Near concrete pad.	Fine black grit.

TABLE 2
ANALYTICAL RESULTS FOR SOIL SAMPLES

Analyte	Sample No. 1B	2B	3X	4X	5B	6B	7X	8X	9B	10B	11S
Barium	480	209	310	756	NT	NT	NT	NT	840	66.2	497
Cadmium	4.8	3.6	4.6	2.7	NT	NT	NT	NT	27.3	<1.1	10.8
Chromium	1090	35.5	810	858	NT	NT	NT	NT	67.4	19.9	65.8
Copper	313	528	1690	279	NT	NT	NT	NT	2440	21.6	1550
Lead	2690	409	2130	2380	NT	NT	NT	NT	2820	7.2	1790
Nickel	199	31.6	254	185	NT	NT	NT	NT	59.5	23.5	48.9
Zinc	4280	1270	8930	3330	NT	NT	NT	NT	8590	37.7	5450
TPH (diesel)	NT	NT	NT	NT	< 27	< 23	< 19	< 24	NT	NT	NT
TPH (motor oil)	NT	NT	NT	NT	62	58	270	24	NT	NT	NT

NT = Not Tested
All concentrations shown are in mg/kg

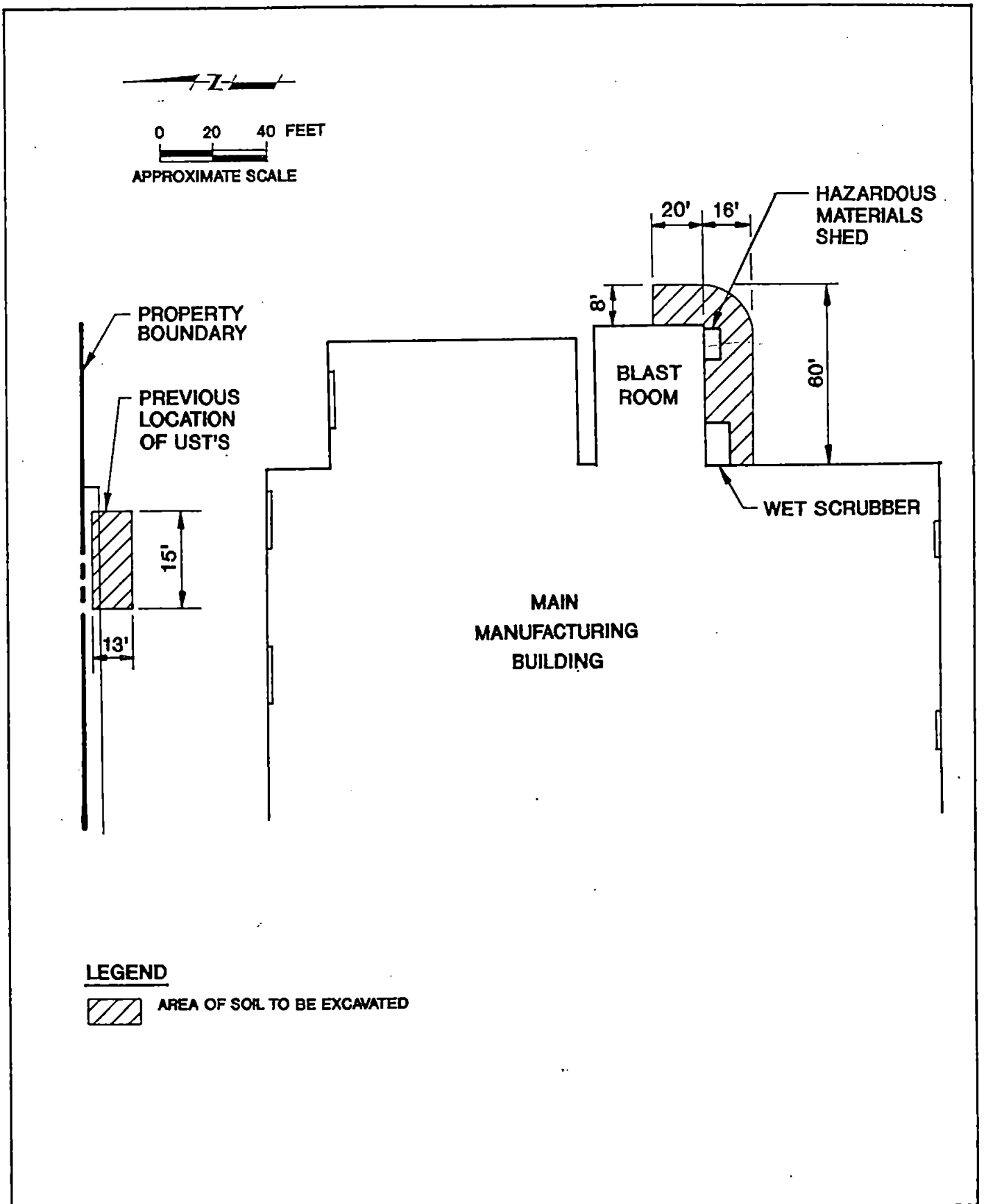


Harding Lawson Associates

VICINITY MAP

18250 68TH AVE. SOUTH
KENT, WASHINGTON

Figure 1



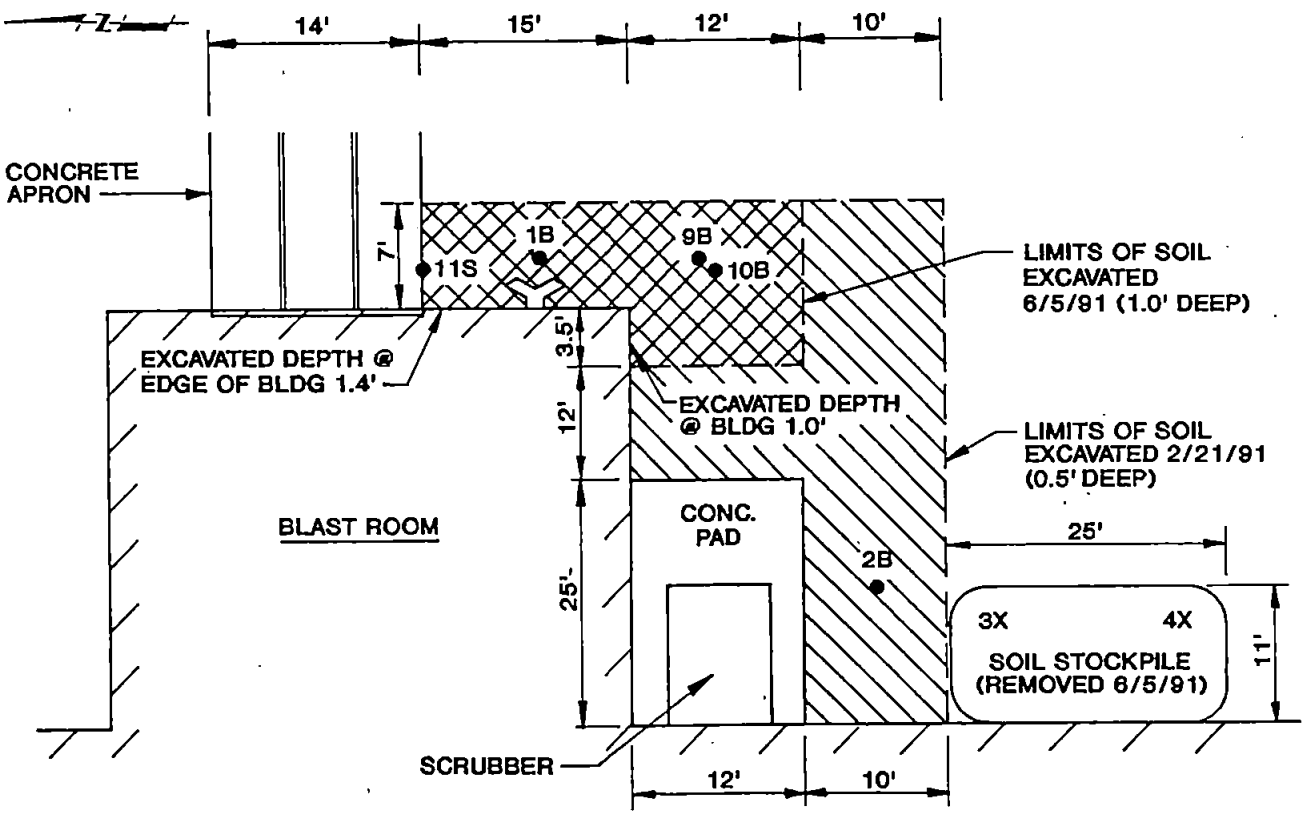
Harding Lawson Associates
Engineering and Environmental Services

PLANNED SOIL EXCAVATION AREAS

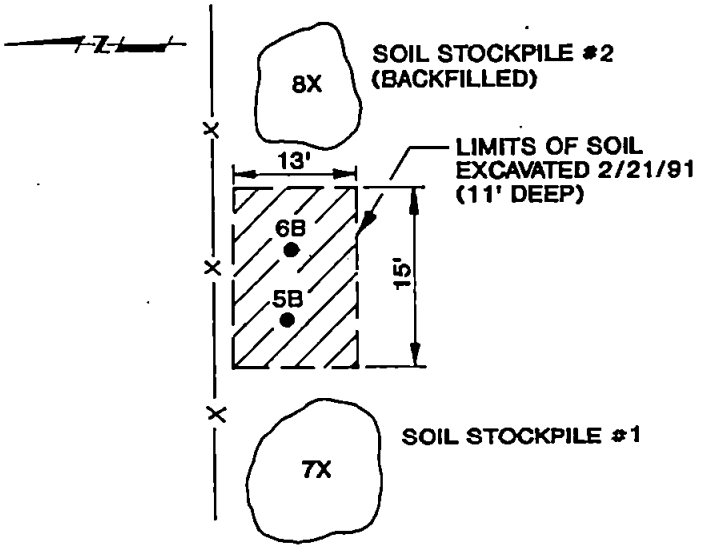
18250 68TH AVENUE SOUTH
KENT, WASHINGTON

FIGURE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PS	20184,003.09		7/91	



SCRUBBER AREA



FORMER UST LOCATION

LEGEND

● SAMPLING LOCATION

2B SOIL SAMPLE ID No.

Harding Lawson Associates
Engineering and Environmental Services

SOIL EXCAVATION & SAMPLING LOCATIONS

KENT, WASHINGTON

FIGURE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PS	20184.003.09		7/91	

APPENDIX A

PHASE II INVESTIGATION REPORT

January 14, 1991

20184,002.09

Mrs. Cathy Waldron
CAM Properties
18250 - 68 Avenue South
Kent, Washington 98032

Dear Mrs. Waldron:

Phase II Investigation Report
CAM Properties
18250 - 68 Avenue South
Kent, Washington

INTRODUCTION

This letter presents the findings of a Phase II investigation performed by Harding Lawson Associates (HLA) for CAM Properties at 18250 - 68 Avenue South in Kent, Washington. This investigation was performed in accordance with HLA's recommendations in our letter dated October 25, 1990. HLA previously completed a preliminary hazardous materials site assessment of the subject property, and the results are presented in our report dated November 1, 1990.

The objective of the Phase II investigation was to further evaluate the potential impact of two previous fuel underground storage tanks (USTs) removed in 1987, and the stained soil near the blast room and wet scrubber associated with the existing manufacturing facility on the property. The Phase II investigation was authorized by Mrs. Cathy Waldon of CAM Properties on November 9, 1990. HLA's scope of services included the following tasks:

- Drill and sample two borings at the previous location of the diesel and gasoline underground storage tanks. Collect one soil sample from each boring, and analyze for total petroleum hydrocarbons (TPH), and benzene, toluene, ethylbenzene, and xylene (BTEX).
- Collect soil samples at the surface and at depths up to 1 foot deep at three locations within the stained-soil area adjacent to the wet scrubber and blast room. Analyze soil samples for heavy metals and volatile organic compounds.
- Evaluate the data and prepare this report.

FIELD INVESTIGATION

Two soil borings (B1 and B2) were drilled to approximately 11.5 feet in depth, and sampled on November 15, 1990. In addition, soils were hand sampled at three locations (CAM 1 through CAM 3) adjacent to the blast room and wet scrubber. Boring and hand sampling locations are shown on Figure 1. The borings were drilled by HLA's subcontractor, Pacific Testing Laboratories (Seattle, Washington) with truck-mounted drilling equipment using 8-inch outside-diameter hollow-stem augers.

An HLA geologist observed the drilling and hand sampling activities, logged the soils encountered, and collected soil samples. Prior to drilling the two boreholes, the location of the previous fuel USTs and utility clearance was provided by Mr. Dale Pack of CAM Industries (tenant). Soil samples in each of the borings were collected at approximately 5-foot intervals using a split-barrel sampler. Soil from the sampler was observed for visible signs of petroleum contamination (e.g. discoloration, odor) and a representative portion was selected for chemical analysis. The selected soil sample (10- to 11.5-foot interval) was immediately placed in laboratory provided sample jars, sealed, labeled, and placed on ice in a field cooler. All sampling equipment (augers, split spoon) was steam cleaned between sample intervals and borings.

Hand sampling in the stained-soil area was performed using stainless steel trowels and scoops. Surface samples (0 to 3 inches) were collected first, and placed in laboratory provided jars, sealed, labeled, and placed immediately on ice in a field cooler. Deeper soil samples (6 to 9 inches) were obtained by excavating to a depth of 6 inches with a stainless steel scoop or shovel as appropriate. Observations of the depth of soil discoloration were noted during excavation. Soil samples from the deeper interval were collected and handled similar to the surface samples.

Upon completion of drilling, the boreholes were backfilled with bentonite chips, and capped with concrete. Cuttings from the boreholes were placed in drums provided by the facility, and left onsite pending disposal.

SUBSURFACE CONDITIONS

Soils encountered during drilling consisted of medium brown fine sand with occasional gravel, from the ground surface to approximately 6 feet below ground surface (bgs). Gray-brown silty clay/clayey silts extend from approximately 6 to 10 feet. Soils beneath the silty clay/clayey silt consisted of fine sand.

Groundwater was encountered in both borings at 7.5 feet bgs. Observations of the soils encountered did not reveal indications of visual staining, and petroleum odors were not

observed. Soils were screened with an organic vapor meter, and results did not indicate the presence of organic vapors from the soils or within the open borehole.

Surface soils in the area of the wet scrubber consisted of sandy gravel with minor amounts of silt that extended from the surface to a depth of approximately 6 inches. This gravel was underlain by light gray brown silty sand with some gravel. Observations during sampling indicated that the surficial gravel was stained a reddish-orange to a depth of 6 inches. The underlying sand was not observed to be stained. The areal extent of the discolored soil is shown on Figure 1.

A dense, solidified layer of black material was encountered at 2 to 3 inches bgs at the CAM 1 sampling location, and pieces of a similar material were encountered at the CAM 2 sampling site at the same depth.

LABORATORY ANALYSIS

The two soil samples from the borings (B1, B2) and the six soil samples from the hand sampling locations (CAM 1, CAM 2, and CAM 3) were submitted under chain-of-custody protocol to Pacific Northwest Environmental Laboratory, Inc. (PNEL) of Redmond, Washington for chemical analyses. The two samples from the borings were analyzed for TPH and BTEX. The six samples from the stained-soil area were analyzed for heavy metals and volatile organic compounds. The results of these chemical analyses are summarized in Table 1. A complete copy of the laboratory analytical report which includes the analytical methods utilized, and quality control data, is provided as Attachment A to this report.

Table 1 also provides proposed soil cleanup levels for industrial sites as presented in the July 18, 1990, proposed amendments to the Model Toxics Control Act Cleanup Regulation (MTCA).

DISCUSSION OF RESULTS

A discussion of the results of the Phase II investigation is presented in the following paragraphs.

Previous Fuel USTs

Analytical results for soil samples obtained in the previous location of fuel USTs located at the site indicate a very low concentration (7 parts per billion [ppb]) of total xylenes in sample B1, with all other constituents below method detection limits. Sample B2 was found to contain TPH (as motor oil) at a concentration of 580 parts per million (ppm). As shown in Table 1, the

concentration of total xylenes is significantly below the proposed MTCA cleanup level; however, the TPH concentration found in sample B2 is above the MTCA cleanup level of 200 ppm. Soil samples and cuttings from both borings did not contain visual indications (e.g. soil discoloration) of petroleum contamination nor were there noticeable petroleum odors during drilling and sampling. Based on these observations and the fact that sample B1 did not contain detectable concentrations of TPH, the extent of TPH found in soil sample B2 appears to be limited.

Wet Scrubber and Blast Room

Results of the soil samples obtained in the stained soil adjacent to the wet scrubber and blast room indicate the presence of toluene and total xylenes in the surface samples (0 to 3 inches bgs) at concentrations ranging from 6 to 18 ppb, and 6 to 17 ppb, respectively. Soil samples obtained from the 6- to 9-inch bgs interval did not contain any constituent above method detection limits. However, results also indicate the presence of volatile organic compounds (VOCs) in both the surface and deeper soil samples at trace levels including methylene chloride, acetone, chloroform, 2-butanone, benzene, ethylbenzene, toluene, and xylenes. In all cases, these VOCs were detected at below the method quantification limit, and are estimated concentrations. Acetone was also found in the laboratory blanks indicating that the presence of this compound is likely attributed to laboratory procedures. The detected concentrations of toluene and xylenes are significantly below the proposed MTCA cleanup levels shown in Table 1.

Except for cadmium, all other heavy metals analyzed were detected in both the surface and deeper soil samples. As shown in Table 1, the concentrations of the heavy metals decrease significantly with depth; in many cases, this decrease is up to an order of magnitude or greater. The exception to the trend of decreasing concentration with depth is the concentration of zinc in samples CAM-3S and CAM-3D, where concentration at depth is greater than that found in the surface sample.

Concentrations of chromium and lead in samples CAM-1S, CAM-2S, and CAM-3S exceed the proposed MTCA cleanup levels. The concentrations of these two compounds are below the proposed cleanup levels in the deeper soil samples (i.e., CAM-1D, CAM-2D, and CAM-3D).

Currently, cleanup standards do not exist for barium, copper, nickel, and zinc in soils. A previous draft (March 8, 1990) of the proposed MTCA cleanup regulation provided cleanup levels for copper and zinc of 500 ppm each. If these cleanup values were to be used, then samples CAM-1S, CAM-2S, CAM-3S, and CAM-3D would exceed the 500 ppm limit.

Based on the visual observations made during sampling, and the analytical results, it appears that the soils exceeding proposed cleanup levels for selected heavy metals are contained within the upper 6 inches of soil. Also, there appears to be a moderate correlation between the depth

of visual staining and depth at which soils contain metal concentrations exceeding cleanup levels.

Closure

We believe that this report provides you the information you require at this time. If you have any questions regarding this report, please do not hesitate to call.

Yours very truly,

HARDING LAWSON ASSOCIATES

Susan C. Walker
Staff Geologist

Daniel A. Balbiani, P.E.
Managing Principal Engineer

SCW/DAB:mlm\waldron2.ltr

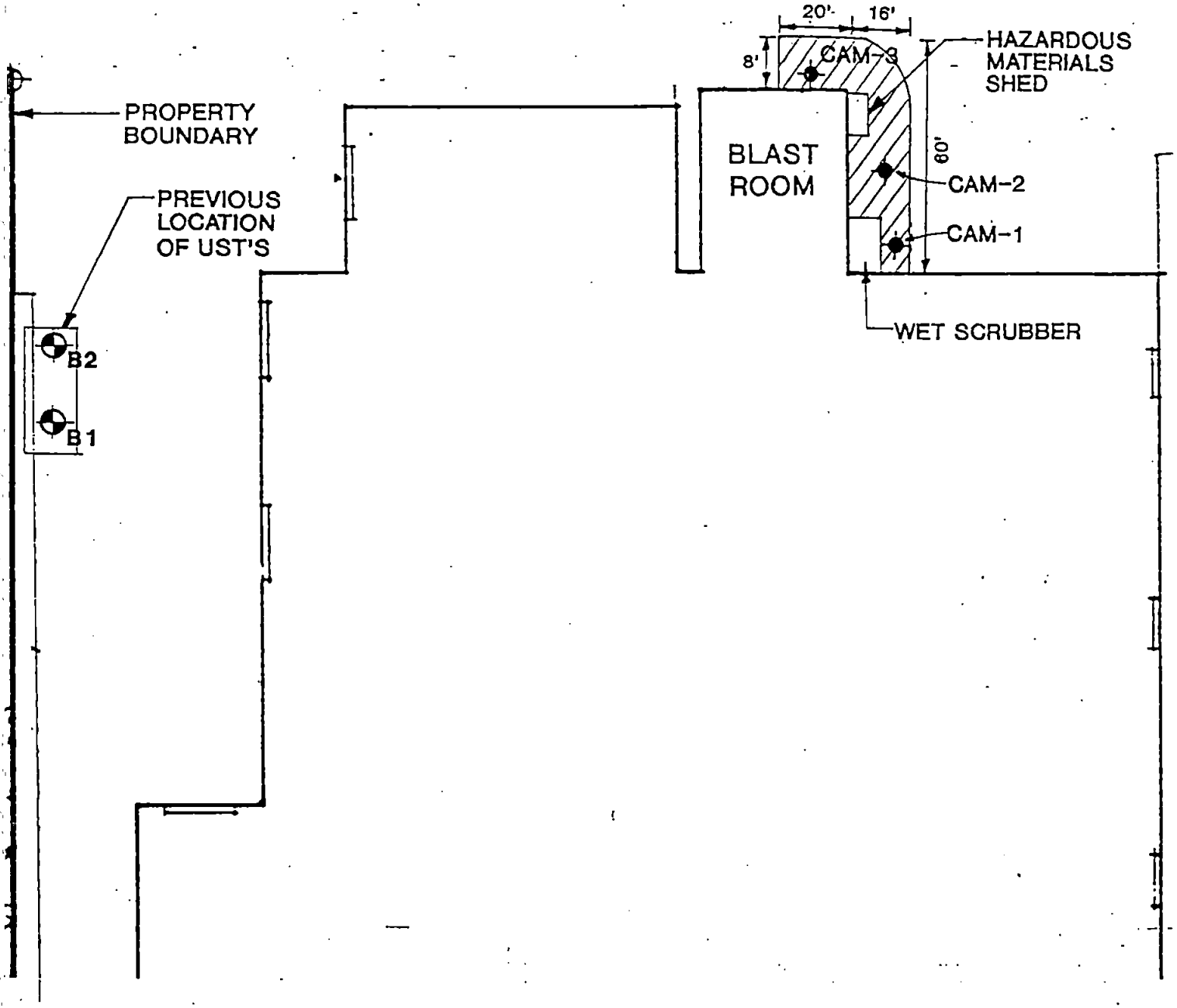
Attachment: A--Analytical Laboratory Report

TABLE I - SUMMARY OF ANALYTICAL RESULTS

ANALYTE	UNITS	CAM-1S (0-3")	CAM-1D (6-9")	CAM-2S (0-3")	CAM-2D (6-9")	CAM-3S (0-3")	CAM-3D (6-9")	B1 (10-11.5')	B2 (10-11.5')	Proposed MTCA Clean up Level for Industrial Sites
Methylene Chloride	ppb	3J	ND	4J	1J	ND	ND	NA	NA	500
Acetone	ppb	6BJ	4JB	5JB	ND	8JB	11B	NA	NA	--
Chloroform	ppb	ND	ND	ND	5J	ND	ND	NA	NA	--
2-Butanone	ppb	ND	ND	ND	ND	ND	2J	NA	NA	--
Benzene	ppb	3J	ND	1J	ND	2J	ND	ND	ND	500
Ethylbenzene	ppb	ND	ND	ND	ND	1J	ND	ND	ND	20,000
Toluene	ppb	18	3J	6	3J	3J	4J	5J	ND	40,000
Xylenes (total)	ppb	17	4J	5J	3J	6	5J	7	ND	20,000
Barium	ppm	4720	45.1	1,650	245	370	259	NA	NA	--
Cadmium	ppm	ND	ND	ND	ND	ND	ND	NA	NA	10
Chromium	ppm	1,640	61.6	1,280	223	1,170	39.3	NA	NA	500
Copper	ppm	1,000	122	615	213	746	667	NA	NA	--
Lead	ppm	4,160	73.7	3,210	680	1,000	686	NA	NA	1,000
Nickel	ppm	567	48.3	482	116	935	32.7	NA	NA	--
Zinc	ppm	19,700	241	14,700	1,550	446	2,250	NA	NA	--
TPH	ppm	NA	NA	NA	NA	NA	NA	ND	580	200

Notes:

ppb - parts per billion (ug/kg)
ppm - parts per million (mg/kg)
B - Indicates compound was found in the associated laboratory blank as well as the sample.
J - Indicates estimated value. Presence of compound meets laboratory identification criteria but is less than the sample quantitation limit but greater than zero.
NA - Compund not analyzed.
ND - Not detected.
-- - Proposed MTCA clean up level not available.



LEGEND

B1 BORING LOCATION

HAND SAMPLING LOCATION

AREA OF HEAVILY STAINED SOIL

N

0 20 40 FEET

Approximate Scale

Harding Lawson Associates

Engineering and Environmental Services

BORING LOCATION PLAN

18250 68TH AVENUE SOUTH
KENT, WASHINGTON

Figure 1

NATIONAL EXPRESS LABORATORIES, INC.

NATEX

Pacific Northwest Environmental Laboratory, Inc.
3820 159th Avenue, N.E.
Redmond, WA 98052
(206) 885-0083
FAX (206) 867-2214

November 28, 1990

Dan Balbiani
Harding Lawson Associates
1325 Fourth Avenue, Suite 1800
Seattle WA 98101

NARRATIVE FOR PNEL 2773

Enclosed are data summary sheets and supporting documentation for the samples received on November 15, 1990. The samples were received as follows:

FIELD ID	LAB ID	DATE COLLECTED
CAM 1S	2773-01	11-15-90
CAM 2S	2773-02	11-15-90
CAM 3S	2773-03	11-15-90
CAM 1D	2773-04	11-15-90
CAM 2D	2773-05	11-15-90
CAM 3D	2773-06	11-15-90
B1	2773-07	11-15-90
B2	2773-08	11-15-90
Trip Blank	2773-09	11-15-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of the samples.

Sample Receiving

There were no anomalies associated with the receipt of these samples.

Volatiles; BETX Analyses

The samples were analyzed according to the low level procedure. Sample 2773-01 showed a high recovery of d_8-toluene. Matrix spikes, also run on sample 2773-01, showed similar results, suggesting that the phenomenon may be attributed to the sample matrix. Samples 2773-07 and 2773-08 for BTEX analysis (by Method 8020) were also analyzed according to Method 8240.

TPH-GC Analysis

No anomalies to report with this case.

Metals Analysis

The following anomalies occurred in the analyses of these samples:

The matrix spike sample percent recoveries of Barium, Cadmium, Copper, and Nickel were outside of the established control limits of 75-125% for sample 2773-05.

The duplicate sample relative percent differences of Barium, Chromium, Copper, Lead, Nickel, and Zinc were outside the warning control limits of +/-20%, but was within +/-50% for sample 2773-05.

Inorganic Quality Control/Quality Assurance

Blank Analysis - a method blank is prepared with each batch of samples digested or extracted. The method blank defines the level of background (laboratory) contamination.

Duplicate Analysis - selected samples are prepared and analyzed in duplicate to define the precision of the results. These results have been summarized in the QC section of this report.

Matrix Spike Analysis - each of the analytes of interest are added to the selected samples prior to sample preparation. The results of matrix spike analyses define the accuracy of the results. These results have been summarized in the QC section of this report.

The ICP was calibrated on a blank and a standard for all parameters analyzed by this method. Calibration verification is conducted every two hours or every ten samples, whichever is more frequent.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

Randal G. Jenkins

\NAR-0504.773
Enclosures

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

METHOD REFERENCE

Gas Chromatograph/Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.
Total Petroleum Hydrocarbons (Gas Chromatography)	Extraction as per the California State Water Resources Control Board "Leaking Underground Fuel Tank (LUFT) Field Manual", April 1989 revision, followed by GC analysis, Modified Method 8015, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.
Acid Digestion of Sediments, Sludges and Solids	Method 3050, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.
Inductively Coupled Plasma Method	Method 6010, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.

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DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 1S
PNEL Sample ID:	2773-01	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5248
Column:	Cap.	% Moisture:	24

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl Chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	3	J
67-64-1	Acetone	6	BJ
75-15-0	Carbon Disulfide	7	U
75-35-4	1,1-Dichloroethene	7	U
75-34-3	1,1-Dichloroethane	7	U
540-59-0	1,2-Dichloroethene (total)	7	U
67-66-3	Chloroform	7	U
107-06-2	1,2-Dichloroethane	7	U
78-93-3	2-Butanone	13	U
71-55-6	1,1,1-Trichloroethane	7	U
56-23-5	Carbon Tetrachloride	7	U
108-05-4	Vinyl Acetate	13	U
75-27-4	Bromodichloromethane	7	U
78-87-5	1,2-Dichloropropane	7	U
10051-01-5	cis-1,3-Dichloropropene	7	U
79-01-6	Trichloroethene	7	U
124-48-1	Dibromochloromethane	7	U
78-00-5	1,1,2-Trichloroethane	7	U
71-43-2	Benzene	3	J
10061-02-6	trans-1,3-Dichloropropene	7	U
75-25-2	Bromoform	7	U
108-10-1	4-Methyl-2-Pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	7	U
78-34-5	1,1,2,2-Tetrachloroethane	7	U
108-88-3	Toluene	18	
108-90-7	Chlorobenzene	7	U
100-41-4	Ethylbenzene	3	J
100-42-5	Styrene	7	U
1330-20-7	Xylenes (total)	17	

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 2S
PNEL Sample ID:	2773-02	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-20-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5259
Column:	Cap.	% Moisture:	18

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	4	J
67-64-1	Acetone	5	JB
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10051-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
78-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	1	J
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
78-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	6	
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylenes (total)	5	J

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 3S
PNEL Sample ID:	2773-03	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5253
Column:	Cap.	% Moisture:	7

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	8	JB
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10051-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
78-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	2	J
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
78-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	1	J
100-42-5	Styrene	5	U
1330-20-7	Xylenes (total)	6	

PACIFIC NORTHWEST
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VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 1D
PNEL Sample ID:	2773-04	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5250
Column:	Cap.	% Moisture:	11

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	4	JB
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10051-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
78-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
78-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylenes (total)	4	J

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 2D
PNEL Sample ID:	2773-05	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5251
Column:	Cap.	% Moisture:	11

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	1	J
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	5	J
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10051-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
78-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
78-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylenes (total)	3	J

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	CAM 3D
PNEL Sample ID:	2773-06	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5252
Column:	Cap.	% Moisture:	10

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	11	B
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	2	J
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10051-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
78-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
78-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	4	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylenes (total)	5	J

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	Method Blank 1
PNEL Sample ID:	VBLKBL	Date Sample Received:	NA
Sample Matrix:	Soil	Date Sample Analyzed:	11-19-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5247
Column:	Cap.	% Moisture:	NA

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	5	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10051-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
78-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
78-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes (total)	5	U

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	Method Blank 2
PNEL Sample ID:	VBLKBM	Date Sample Received:	NA
Sample Matrix:	Soil	Date Sample Analyzed:	11-20-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5257
Column:	Cap.	% Moisture:	NA

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	6	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	3	J
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10051-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
78-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
78-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes (total)	5	U

PACIFIC NORTHWEST
ENVIRONMENTAL
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VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	Method Blank 3
PNEL Sample ID:	VBLKBN	Date Sample Received:	NA
Sample Matrix:	Soil	Date Sample Analyzed:	11-21-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5275
Column:	Cap.	% Moisture:	NA

CAS No.	Compound	Concentration Units: µg/kg	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10051-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
78-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
78-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylenes (total)	5	U

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE SURROGATE RECOVERY REPORT

Level: Low

Matrix: Soil

	LAB SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#		TOT OUT
01	2773-01	125 *	80	100		1
02	2773-02	109	79	97		0
03	2773-03	105	100	106		0
04	2773-04	102	98	99		0
05	2773-05	105	100	102		0
06	2773-06	102	98	103		0
07	2773-01MS	127 *	80	108		1
08	2773-01MSD	128 *	80	113		1
09	VBLKBL	102	106	102		0
10	VBLKBM	94	94	92		0
11	VBLKBN	103	101	101		0
12	2773-07	101	93	96		0
13	2773-08	93	97	101		0
14	VBLKBP	99	99	97		0
15						
16						
17						
18						
19						
20						
21						

	Soil QC Limits	Water QC Limits
S1 (TOL) = Toluene-d8	(81-117)	(88-110)
S2 (BFB) = Bromofluorobenzene	(74-121)	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(70-121)	(76-114)

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

V2-0504.733

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PNEL Sample ID.:	2773-01	Client No.:	68-900504
Client Sample ID.:	CAM 1S	Sample Matrix:	Soil
Date Sample Received:	11-15-90	Date Sample Analyzed:	11-19/21-90
Level:	Low		

Compound	SPIKE ADDED (µg/kg)	SAMPLE CONC. (µg/kg)	MS CONC. (µg/kg)	MS % REC#	SOIL QC LIMITS REC	WATER QC LIMITS REC
1,1-Dichloroethene	64.9	ND	58.7	90	59-172	61-145
Trichloroethene	64.9	ND	50.1	77	62-137	71-120
Benzene	64.9	2.8	64.7	95	66-142	76-127
Toluene	64.9	18.1	74.1	86	59-139	76-125
Chlorobenzene	64.9	ND	58.6	90	60-133	75-130

Compound	SPIKE ADDED (µg/kg)	MSD CONC. (µg/kg)	MSD % REC#	% RPD#	SOIL QC LIMITS RPD	SOIL QC LIMITS REC	WATER QC LIMITS RPD	WATER QC LIMITS REC
1,1-Dichloroethene	64.9	60.3	93	3	22	59-172	14	61-145
Trichloroethene	64.9	48.9	75	3	24	62-137	14	71-120
Benzene	64.9	64.7	95	0	21	66-142	11	76-127
Toluene	64.9	73.1	85	1	21	59-139	13	76-125
Chlorobenzene	34.9	57.9	89	1	21	60-133	13	75-130

\# Column to be used to flag recovery and RPD values with an asterisk.

* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

\V3-0504.733

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	B1
PNEL Sample ID:	2773-07	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-27-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5288
Column:	Cap.	% Moisture:	26

CAS No.	Compound	Concentration Units: µg/kg	Q
71-43-2	Benzene	7	U
108-88-3	Toluene	5	J
100-41-4	Ethylbenzene	7	U
1330-20-7	Xylenes (total)	7	

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	B2
PNEL Sample ID:	2773-08	Date Sample Received:	11-15-90
Sample Matrix:	Soil	Date Sample Analyzed:	11-27-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5289
Column:	Cap.	% Moisture:	27

CAS No.	Compound	Concentration Units: µg/kg	Q
71-43-2	Benzene	7	U
108-88-3	Toluene	7	U
100-41-4	Ethylbenzene	7	U
1330-20-7	Xylenes (total)	7	U

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

VOLATILE ORGANICS ANALYSIS DATA SHEET

Client No.:	68-900504	Client Sample ID:	Method Blank 4
PNEL Sample ID:	VBLKBP	Date Sample Received:	NA
Sample Matrix:	Soil	Date Sample Analyzed:	11-27-90
Sample Vol.:	5.0 g	Dilution Factor:	1.0
Level:	Low	Lab File ID:	B5287
Column:	Cap.	% Moisture:	NA

CAS No.	Compound	Concentration Units: µg/kg	Q
71-43-2	Benzene	5	U
108-88-3	Toluene	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

Client No: 68-900504

ORGANIC ANALYSIS REPORT

Client Sample ID	B1	B2	Blank
PNEL Sample ID	2773-07	2773-08	2773-MB
Matrix	Soil	Soil	Soil
Date Received	11-15-90	11-15-90	NA
Date Extracted	11-19-90	11-19-90	11-19-90
Date Analyzed	11-21-90	11-21-90	11-21-90
Units of Measure	µg/kg	µg/kg	µg/kg
Compound			
Total Petroleum Hydrocarbons			
As: Gasoline	11000 U	11000 U	8300 U
As: Diesel	11000 U	11000 U	8300 U
As: Motor Oil	22000 U	580000	8300 U

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PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-01	Client No.:	68-900504
Client Sample ID.:	CAM 1S	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	79.8

Analyte		mg/kg Concentration		Laboratory Method Blank mg/kg Concentration		M
Barium	(Ba)	4720		3.0	U	P
Cadmium	(Cd)	12.6	U	1.0	U	P
Chromium	(Cr)	1640		2.0	U	P
Copper	(Cu)	1000		1.0	U	P
Lead	(Pb)	4160		6.0	U	P
Nickel	(Ni)	567		4.0	U	P
Zinc	(Zn)	19700		1.6	U	P

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PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-02	Client No.:	68-900504
Client Sample ID.:	CAM 2S	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	83.5

Analyte		mg/kg Concentration		Laboratory Method Blank mg/kg Concentration		M
Barium	(Ba)	1650		3.0	U	P
Cadmium	(Cd)	12.2	U	1.0	U	P
Chromium	(Cr)	1280		2.0	U	P
Copper	(Cu)	615		1.0	U	P
Lead	(Pb)	3210		6.0	U	P
Nickel	(Ni)	482		4.0	U	P
Zinc	(Zn)	14700		1.6	U	P

\IAD2-0504.773

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-03	Client No.:	68-900504
Client Sample ID.:	CAM 3S	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	92.6

Analyte		mg/kg Concentration		Laboratory Method Blank mg/kg Concentration		M
Barium	(Ba)	370		3.0	U	P
Cadmium	(Cd)	9.4	U	1.0	U	P
Chromium	(Cr)	1170		2.0	U	P
Copper	(Cu)	746		1.0	U	P
Lead	(Pb)	1000		6.0	U	P
Nickel	(Ni)	935		4.0	U	P
Zinc	(Zn)	446		1.6	U	P

\IAD2-0504.773

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-04	Client No.:	68-900504
Client Sample ID.:	CAM 1D	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	88.4

Analyte		mg/kg Concentration		Laboratory Method Blank mg/kg Concentration		M
Barium	(Ba)	45.1		3.0	U	P
Cadmium	(Cd)	1.1	U	1.0	U	P
Chromium	(Cr)	61.6		2.0	U	P
Copper	(Cu)	122		1.0	U	P
Lead	(Pb)	73.7		6.0	U	P
Nickel	(Ni)	48.3		4.0	U	P
Zinc	(Zn)	241		1.6	U	P

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PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-05	Client No.:	68-900504
Client Sample ID.:	CAM 2D	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	89.1

Analyte		mg/kg Concentration		Laboratory Method Blank mg/kg Concentration		M
Barium	(Ba)	245		3.0	U	P
Cadmium	(Cd)	1.2	U	1.0	U	P
Chromium	(Cr)	223		2.0	U	P
Copper	(Cu)	213		1.0	U	P
Lead	(Pb)	680		6.0	U	P
Nickel	(Ni)	116		4.0	U	P
Zinc	(Zn)	1550		1.6	U	P

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PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC ANALYSIS DATA SHEET

PNEL Sample ID.:	2773-06	Client No.:	68-900504
Client Sample ID.:	CAM 3D	Sample Matrix:	Soil
Date Sample Received:	11-15-90	% Solids Content:	90.2

Analyte		*mg/kg Concentration*		*Laboratory Method Blank mg/kg Concentration*		*M*
Barium	(Ba)	259		3.0	U	P
Cadmium	(Cd)	1.1	U	1.0	U	P
Chromium	(Cr)	39.3		2.0	U	P
Copper	(Cu)	667		1.0	U	P
Lead	(Pb)	686		6.0	U	P
Nickel	(Ni)	32.7		4.0	U	P
Zinc	(Zn)	2260		1.6	U	P

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PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC DUPLICATE ANALYSIS DATA SHEET

PNEL Sample ID.: 2773-05
Client Sample ID.: CAM 2D
Date Sample Received: 11-15-90

Client No.: 68-900504
Sample Matrix: Soil

Analyte		mg/kg Duplicate Sample Concentration		mg/kg Original Sample Concentration		Relative Percent Difference
Barium	(Ba)	106		245		79.2
Cadmium	(Cd)	1.2	U	1.2	U	NC
Chromium	(Cr)	120		223		60.1
Copper	(Cu)	174		213		20.2
Lead	(Pb)	279		680		83.6
Nickel	(Ni)	55.7		116		70.2
Zinc	(Zn)	781		1550		66.0

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

INORGANIC MATRIX SPIKE ANALYSIS DATA SHEET

PNEL Sample ID.: 2773-05
Client Sample ID.: CAM 2D
Date Sample Received: 11-15-90

Client No.: 68-900504
Sample Matrix: Soil

Analyte		mg/kg Spike Sample Concentration	mg/kg Original Sample Concentration		mg/kg Spike Level	Percent Recovery
Barium	(Ba)	541	245		482	61.4
Cadmium	(Cd)	1.7	1.2	U	12.0	14.2
Chromium	(Cr)	167	223		48.2	NS
Copper	(Cu)	232	213		60.2	31.6
Lead	(Pb)	471	680		120	NS
Nickel	(Ni)	165	116		120	40.8
Zinc	(Zn)	922	1550		120	NS

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NATEX

Pacific Northwest Environmental Laboratory, Inc.

CHAIN-OF-CUSTODY / REQUEST FOR ANALYSIS

Laboratory Contact: Swan Walker or Dan Balbiani (Winter SW)

Send Lab Report To: Dan Balbiani

Client Name: Harding Lawson Assoc. (HLA)

Client Number:

Bill To: HLA
1325 4th Avenue, Suite 1800
Seattle, WA. 98101

PO No.:

Carrier No.:

Date Report Required: 2 week TAT (15 calender days)

Client Contact: Swan Walker or Dan Balbiani

Client Contact Phone: 206-622-0812

PNEL # 2773

	Sample Number	Sample Location and Description	Date Collected	Time Collected	Sample Matrix	Number of Containers	Analysis and Container: VOA's 8240	Heavy Metals Ba, Cd, Cr, Pb, Ni, Zn	TEPH 8015	BTEX 8020			Comments
01	CAM 1S	surface, near scrubber	11/15/90	0930	soil	2	X	X					
02	CAM 2S	surface, edge scrubber	11/15/90	0940	"	2	X	X					
03	CAM 3S	surface, near blast room	"	0950	"	2	X	X					
04	CAM 1D	6 in. deep, nr scrubber	"	1030	"	2	X	X					
05	CAM 2D	6 in. deep, edge scrubber	"	1045	"	2	X	X					
06	CAM 3D	6 in. deep, nr blast room	"	1100	"	2	X	X					
07	B1	WEST END EXCAVATION	"	1000	"	2			X	X			
08	B2	EAST END EXCAVATION	11/15/90	1100	soil	2			X	X			
09	Trip Blank				Water	2							

Special Instructions: Two week TAT

Possible Hazards: petroleum, VOAs, heavy metals

Was Preservative Used? No ☒ Yes ☐ What Kind? What Analysis?

1. Relinquished By: Swan C. Walker Date: 11/15/90 Time: 1400 Received By: Date: Time:
2. Relinquished By: Michele Baker Date: 11/15/90 Time: 1650 Received By: Regina Cook/PNEL Date: 11/15/90 Time: 16-52
3. Relinquished By: Date: Time: Received By: Date: Time:
4. Relinquished By: Date: Time: Received By: Date: Time:

APPENDIX B

ANALYTICAL DATA SHEETS

NATIONAL EXPRESS LABORATORIES, INC.

NATEX

Pacific Northwest Environmental Laboratory, Inc.
3820 159th Avenue, N.E.
Redmond, WA 98052
(206) 885-0083
FAX (206) 867-2214

February 27, 1991

Rich Reis
Harding Lawson Associates
1325 - 4th Avenue, Suite 1800
Seattle WA 98101

NARRATIVE FOR PNELI 2954

Enclosed are data summary sheets and supporting documentation for the samples received on February 22, 1991 of the CAM Properties project. The samples were received as follows:

FIELD ID	LAB ID	DATE COLLECTED
C-1B	2954-01	02-22-91
C-2B	2954-02	02-22-91
C-3X	2954-03	02-22-91
C-4X	2954-04	02-22-91
C-5B	2954-05	02-22-91
C-6B	2954-06	02-22-91
C-7X	2954-07	02-22-91
C-8X	2954-08	02-22-91
Trip Blank	2954-09	02-22-91

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Sample Receiving

The sample 2954-09 was received, but not recorded on the chain of custody. It also contained airbubbles in two of two vials for volatile analysis. The sample was placed on hold.

Rich Reis of Harding Lawson Associates was notified by memo of the above sample receiving anomaly.

TEPH Analysis

Analytical results are reported on a dry-weight basis.

All samples in this case were batched with QC samples reported in PNELI case #2952.

Metals Analysis

The ICP serial dilution for zinc was outside of established control limits.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

Rand G. Jenkins

Enclosures

METHOD REFERENCE

Total Petroleum Hydrocarbons (Gas Chromatography)	Extraction as per the California State Water Resources Control Board "Leaking Underground Fuel Tank (LUFT) Field Manual", April 1989 revision, followed by GC analysis, Modified Method 8015, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.
Inductively Coupled Plasma-Atomic Emission Spectrometric Method	Environmental Protection Agency, Contract Laboratory Program, Inorganic Statement of Work, Exhibit-D, February 1988.

NatEx Laboratories, Inc.
Pacific Northwest Environmental Laboratory, Inc.

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

B - Indicates that the reported value is less than the Contract Required Detection Limit(CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

E - The reported value is estimated because of the presence of interference. An explanatory note must be included under Comments on the Cover Page (if the problem applies to all samples) or on the specific FORM I-IN (if it is an isolated problem).

M - Duplicate injection precision not met.

N - Spiked sample recovery not within control limits.

S - The reported value was determined by the Method of Standard Additions (MSA).

W - Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance. (See Exhibit E.)

* - Duplicate analysis not within control limits.

+ - Correlation coefficient for the MSA is less than 0.995.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

ORGANIC ANALYSIS REPORT

Client Sample ID	C-5B	C-6B	C-7X	C-8X
PNELI Sample ID	2954-05	2954-06	2954-07	2954-08
Matrix	Soil	Soil	Soil	Soil
Date Received	02-22-91	02-22-91	02-22-91	02-22-91
Date Extracted	02-25-91	02-25-91	02-25-91	02-25-91
Date Analyzed	02-26-91	02-26-91	02-26-91	02-26-91
Units	µg/kg	µg/kg	µg/kg	µg/kg

Compound							
Total Extractable Petroleum Hydrocarbons Quantitated as:							
Diesel	27000	U	23000	U	19000	U	24000	U
Motor Oil	62000		58000		270000		24000	U
Surrogate Recovery							
% O-Terphenyl	101		108		108		99.3	

ORGANIC ANALYSIS REPORT

Client Sample ID	Method Blank
PNELI Sample ID	2954-MB
Matrix	Soil
Date Received	NA
Date Extracted	02-25-91
Date Analyzed	02-26-91
Units	µg/kg

Compound		
Total Extractable Petroleum Hydrocarbons Quantitated as:		
Diesel	17000	U
Motor Oil	17000	U
Surrogate Recovery		
% O-Terphenyl	109	

GC SPIKE RECOVERY DATA SHEET

Client Sample ID: NA
Sample Matrix: Soil
Units of Measure: µg/kg

PNELI Sample ID: 2952-01
Date Sample Received: 02-22-91
Date Sample Analyzed: 02-26-91

MATRIX SPIKE

Compound	Sample Conc.		MS Conc.	MS Spike Level	Percent Recovery
Diesel	250	U	87700	90500	96.9

MATRIX SPIKE DUPLICATE

Compound	Sample Conc.		MSD Conc.	MSD Spike Level	Percent Recovery	RPD
Diesel	250	U	97700	90500	108	10.8

INORGANIC ANALYSIS DATA SHEET

Client Sample ID: C-1B
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2954-01
Date Sample Received: 02-22-91

Analyte		Concentration	Method Blank Concentration		M
Barium	(Ba)	480	3.0	U	P
Cadmium	(Cd)	4.8	1.0	U	P
Chromium	(Cr)	1090	2.0	U	P
Copper	(Cu)	313	1.0	U	P
Lead	(Pb)	2690	6.0	U	P
Nickel	(Ni)	199	4.0	U	P
Zinc	(Zn)	4280	1.6	U	P

INORGANIC ANALYSIS DATA SHEET

Client Sample ID: C-2B
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2954-02
Date Sample Received: 02-22-91

Analyte		Concentration	Method Blank Concentration		M
Barium	(Ba)	209	3.0	U	P
Cadmium	(Cd)	3.6	1.0	U	P
Chromium	(Cr)	35.5	2.0	U	P
Copper	(Cu)	528	1.0	U	P
Lead	(Pb)	409	6.0	U	P
Nickel	(Ni)	31.6	4.0	U	P
Zinc	(Zn)	1270	1.6	U	P

INORGANIC ANALYSIS DATA SHEET

Client Sample ID: C-3X
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2954-03
Date Sample Received: 02-22-91

Analyte		Concentration	Method Blank Concentration		M
Barium	(Ba)	310	3.0	U	P
Cadmium	(Cd)	4.6	1.0	U	P
Chromium	(Cr)	810	2.0	U	P
Copper	(Cu)	1690	1.0	U	P
Lead	(Pb)	2130	6.0	U	P
Nickel	(Ni)	254	4.0	U	P
Zinc	(Zn)	8930	1.6	U	P

INORGANIC ANALYSIS DATA SHEET

Client Sample ID: C-4X
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2954-04
Date Sample Received: 02-22-91

Analyte		Concentration	Method Blank Concentration		M
Barium	(Ba)	756	3.0	U	P
Cadmium	(Cd)	2.7	1.0	U	P
Chromium	(Cr)	858	2.0	U	P
Copper	(Cu)	279	1.0	U	P
Lead	(Pb)	2380	6.0	U	P
Nickel	(Ni)	185	4.0	U	P
Zinc	(Zn)	3330	1.6	U	P

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\IAD1TAL

INORGANIC DUPLICATE ANALYSIS DATA SHEET

Client Sample ID: C-1B
PNELI Sample ID: 2954-01
Sample Matrix: Soil
Date Sample Received: 02-22-91
Units of Measure: mg/kg

Analyte		Duplicate Sample Concentration	Original Sample Concentration	Relative Percent Difference
Barium	(Ba)	408	480	16.2
Cadmium	(Cd)	3.9	4.8	20.7
Chromium	(Cr)	1040	1090	4.7
Copper	(Cu)	291	313	7.3
Lead	(Pb)	2690	2690	0
Nickel	(Ni)	177	199	11.7
Zinc	(Zn)	3990	4280	7.0

800000

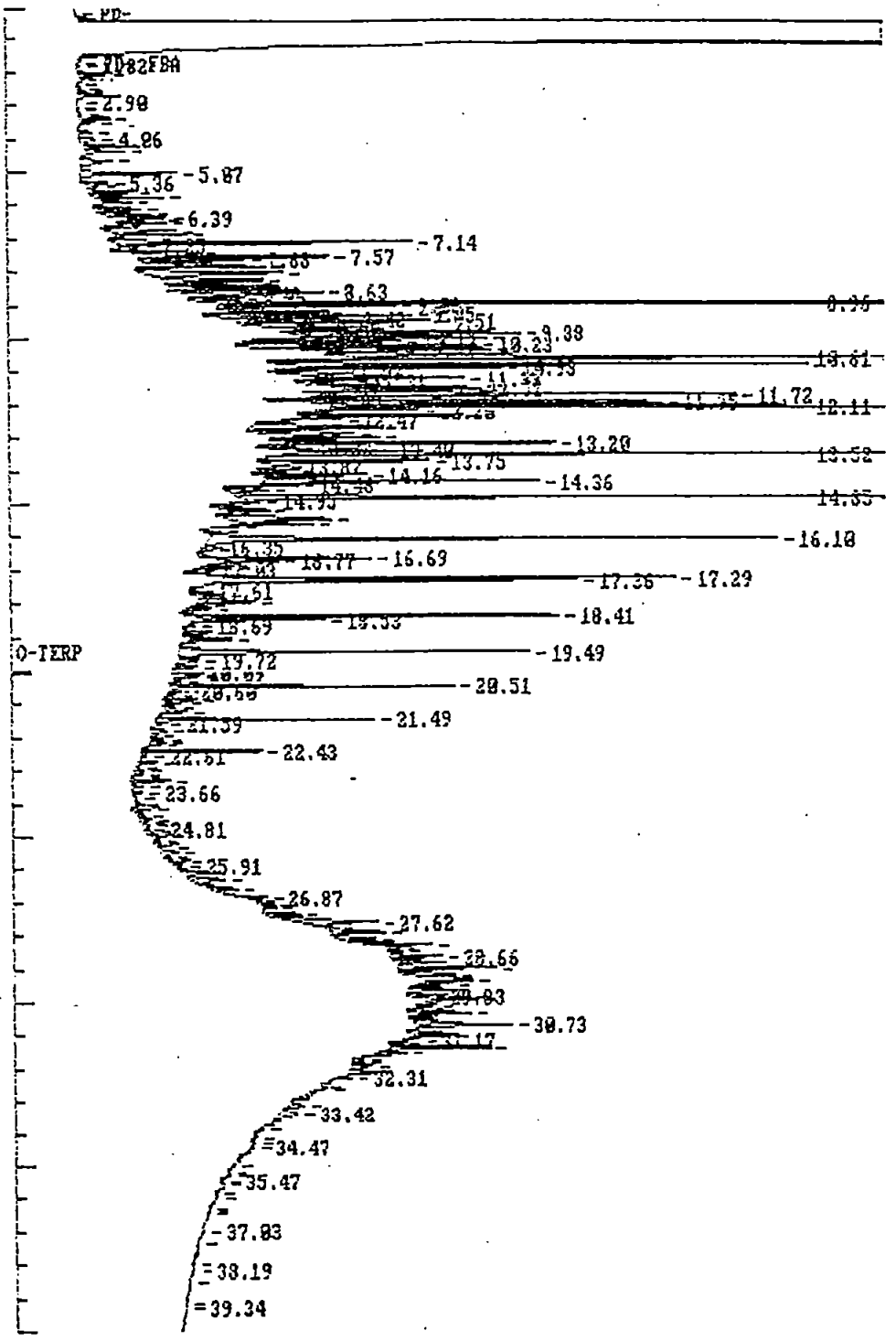
INORGANIC MATRIX SPIKE ANALYSIS DATA SHEET

Client Sample ID: C-1B
PNELI Sample ID: 2954-01
Sample Matrix: Soil
Date Sample Received: 02-22-91
Units of Measure: mg/kg

Analyte		Spike Sample Concentration	Original Sample Concentration	Spike Level	Percent Recovery
Barium	(Ba)	937	480	482	94.8
Cadmium	(Cd)	18.0	4.8	12.0	110
Chromium	(Cr)	1220	1090	48.2	NS
Copper	(Cu)	414	313	60.2	NS
Lead	(Pb)	3030	2690	120	NS
Nickel	(Ni)	333	199	120	112
Zinc	(Zn)	5040	4280	120	NS

Areas. times. and heights stored in: P:053-2.ATB
Data File = P:053-2.PTS Printed on 02-22-1991 at 16:30:03
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

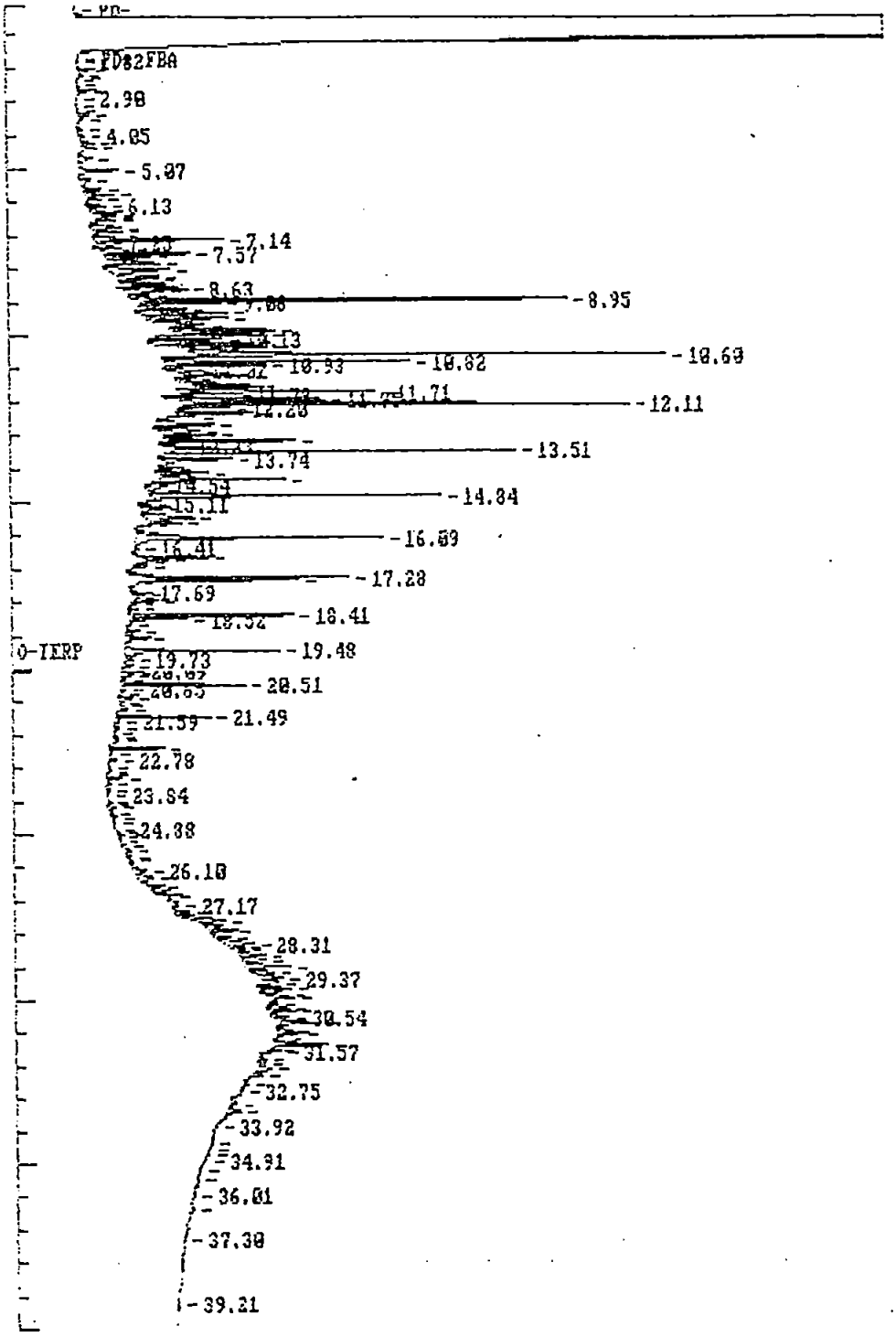
DIESEL/
MOTOR OIL
@ 2500 µg/mL
d 2/25



000010

Areas, times, and heights stored in: P:053-3.ATB
Data File = P:053-3.PTS Printed on 08-22-1991 at 17:15:32
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

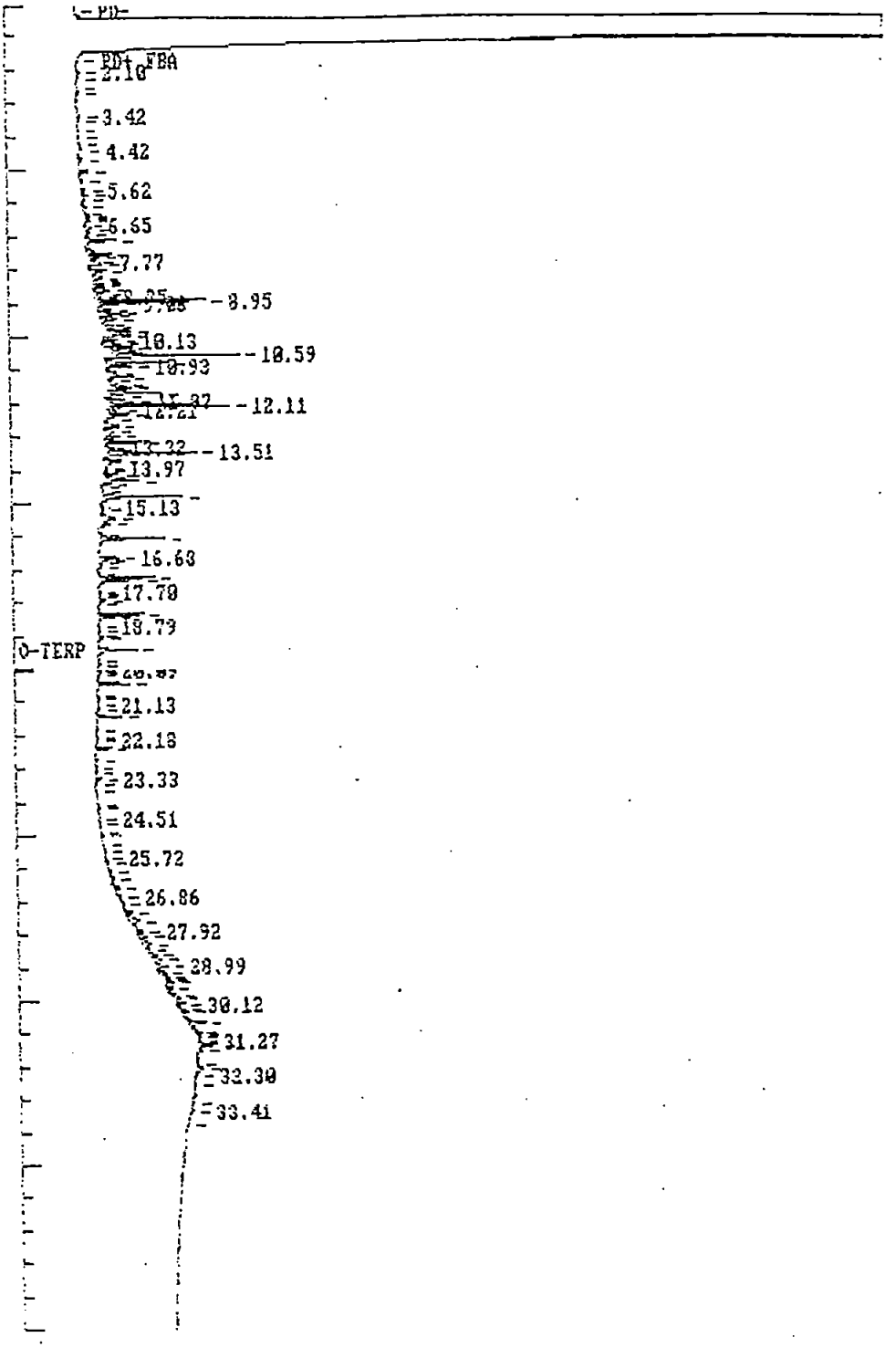
DIESEL/
MOTOROIL
STD. @
1000µg/mL
d 2/25



000011

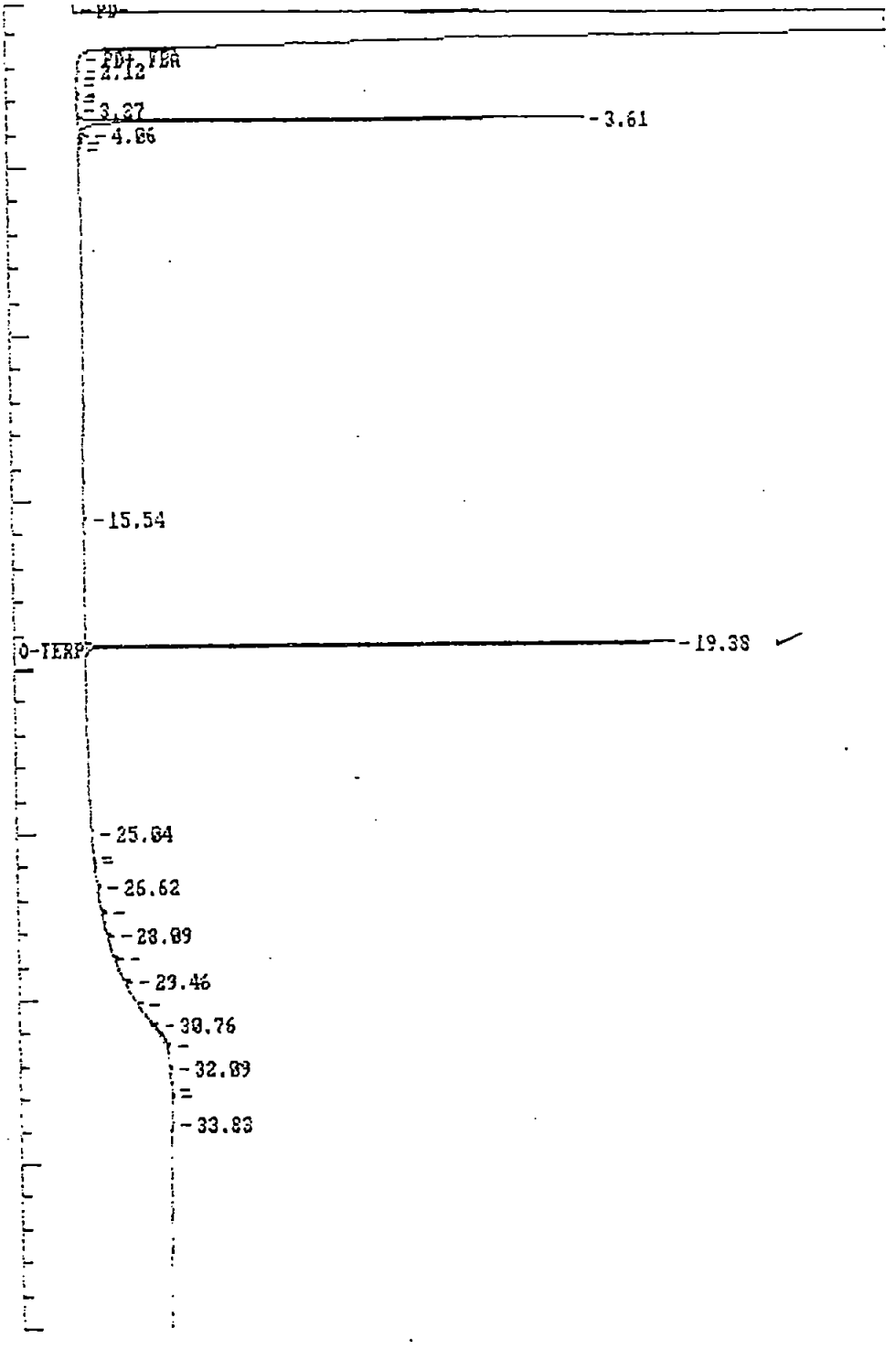
Areas, times, and heights stored in: P:053-4.ATS
Data File = P:053-4.PTS Printed on 02-28-1991 at 15:45:23
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

DIESEL/
MOTOR OIL
STD ②
250 µg/mL
2/25



Areas, times, and heights stored in: P:053-3.AIB
Data File = P:053-3.PTB Printed on 02-22-1991 at 10:55:18
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

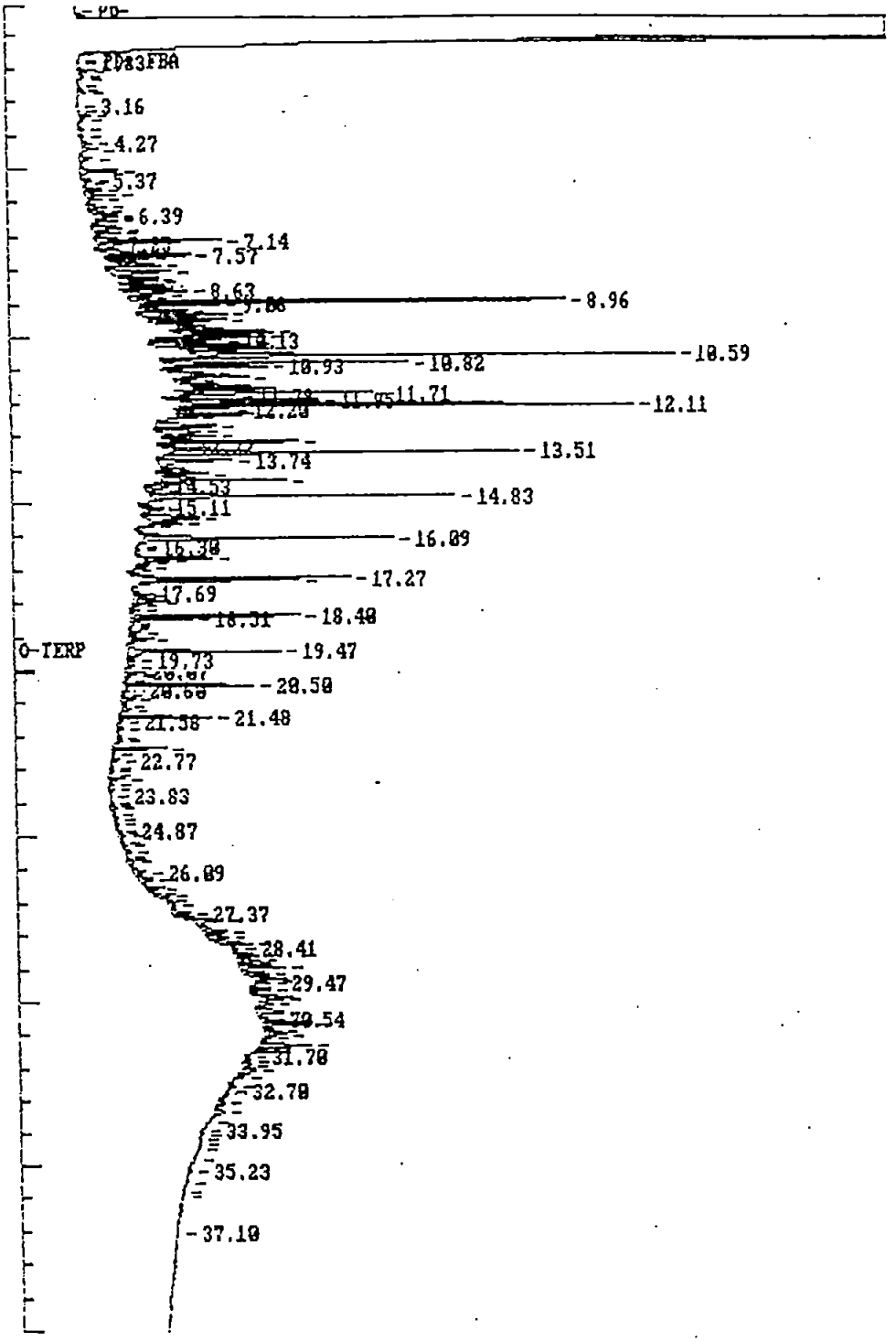
O-TERPHENYL
2
20 µg/mL
d 2/25



000013

Areas, times, and heights stored in: P:057-2.ATB
Data File = P:057-2.PTS Printed on 02-26-1991 at 09:55:24
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

DIESEL/
MOTOR OIL
STD. @
1000µg/mL
2/26

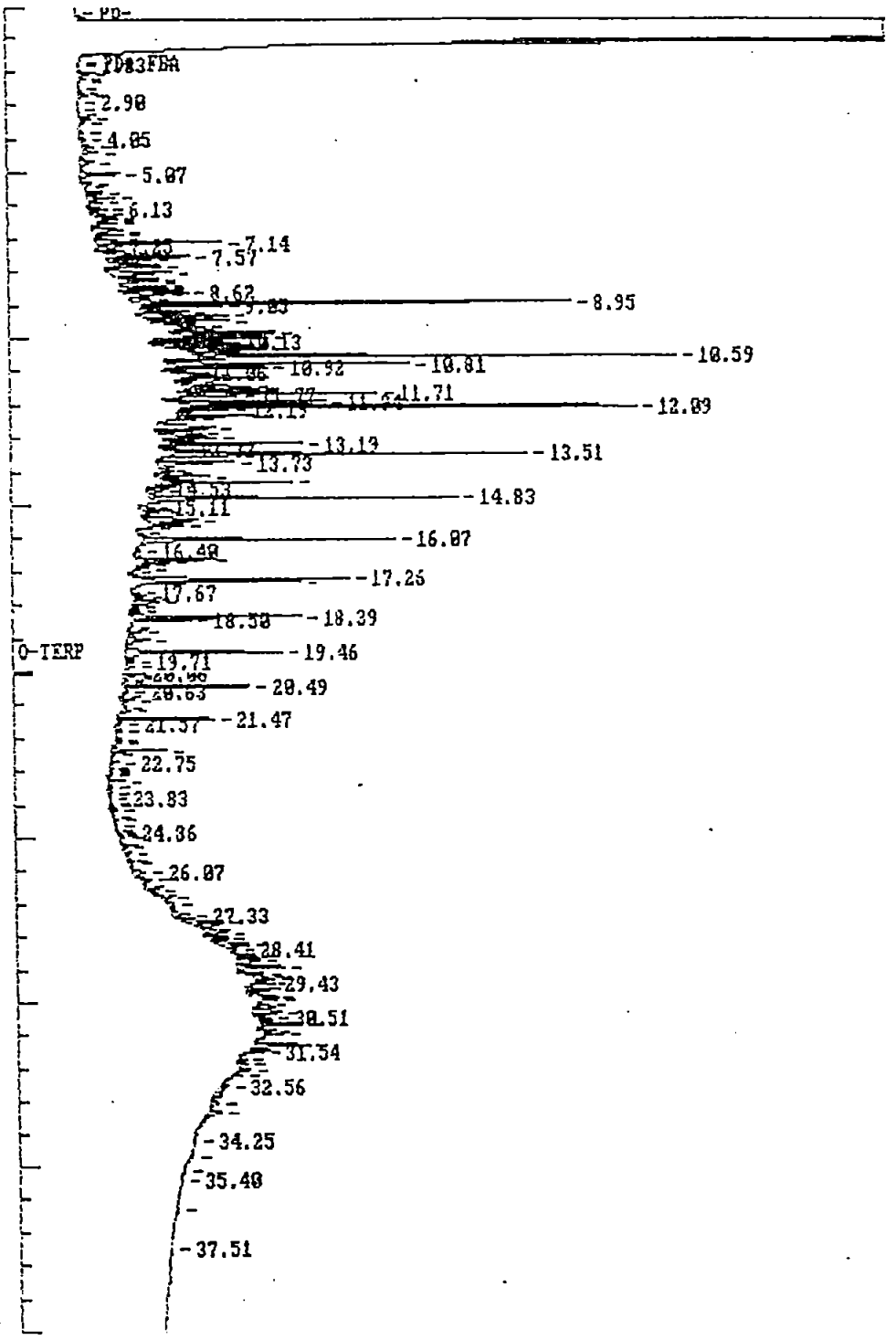


000014

Areas, times, and heights stored in: P:057-13.ATB
Data File = P:057-13.PTS Printed on 02-26-1991 at 20:14:45
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

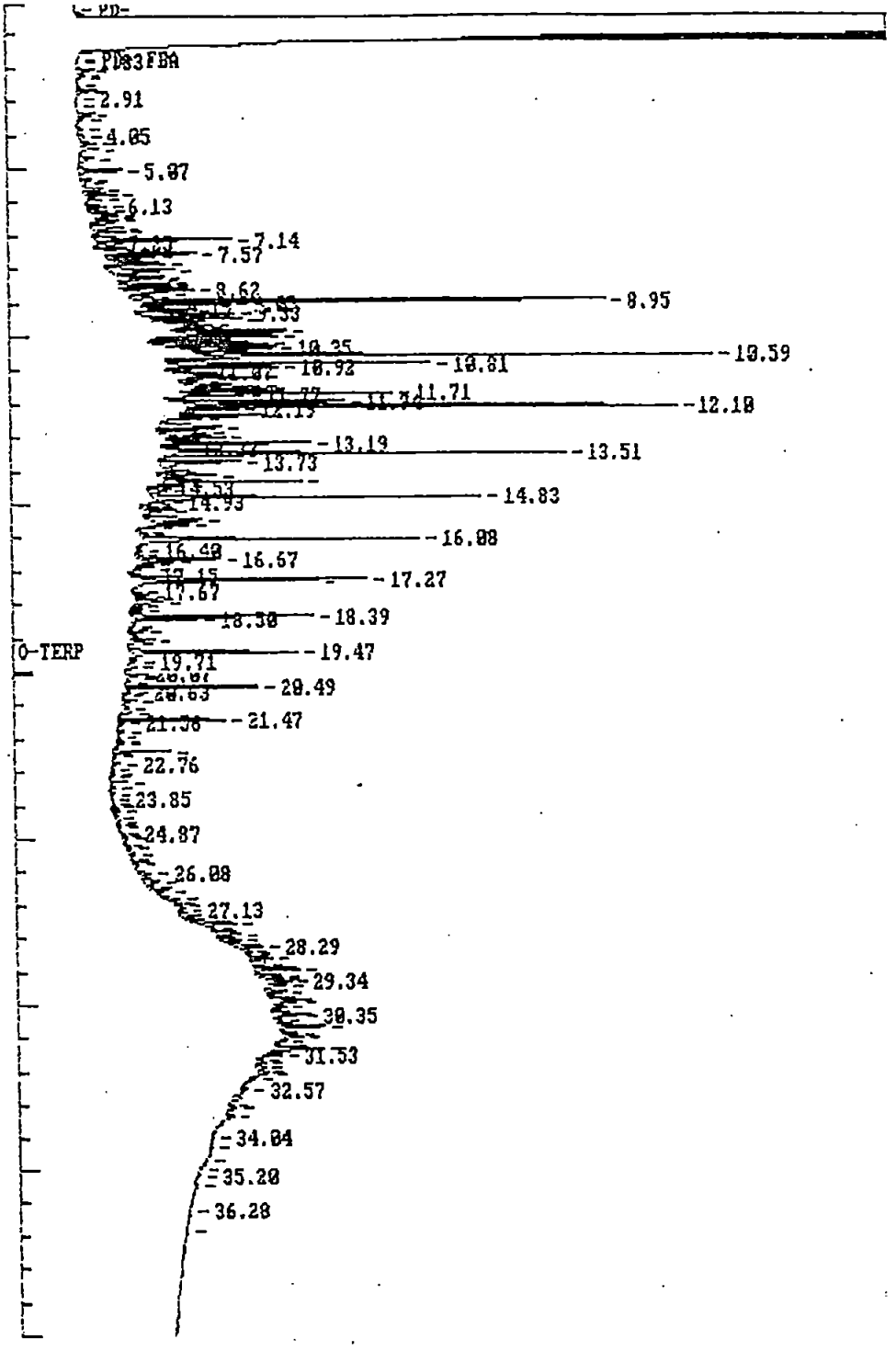
DIESEL/
MOTOR OIL
STD @
1000µg/mL

L 2/27



Areas, times, and heights stored in: P:057-19.ATB
Data File = P:057-19.PTS Printed on 02-27-1991 at 01:12:48
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

DIESEL/
MOTOR OIL
STD. ②
1000 µg/mL
2/27



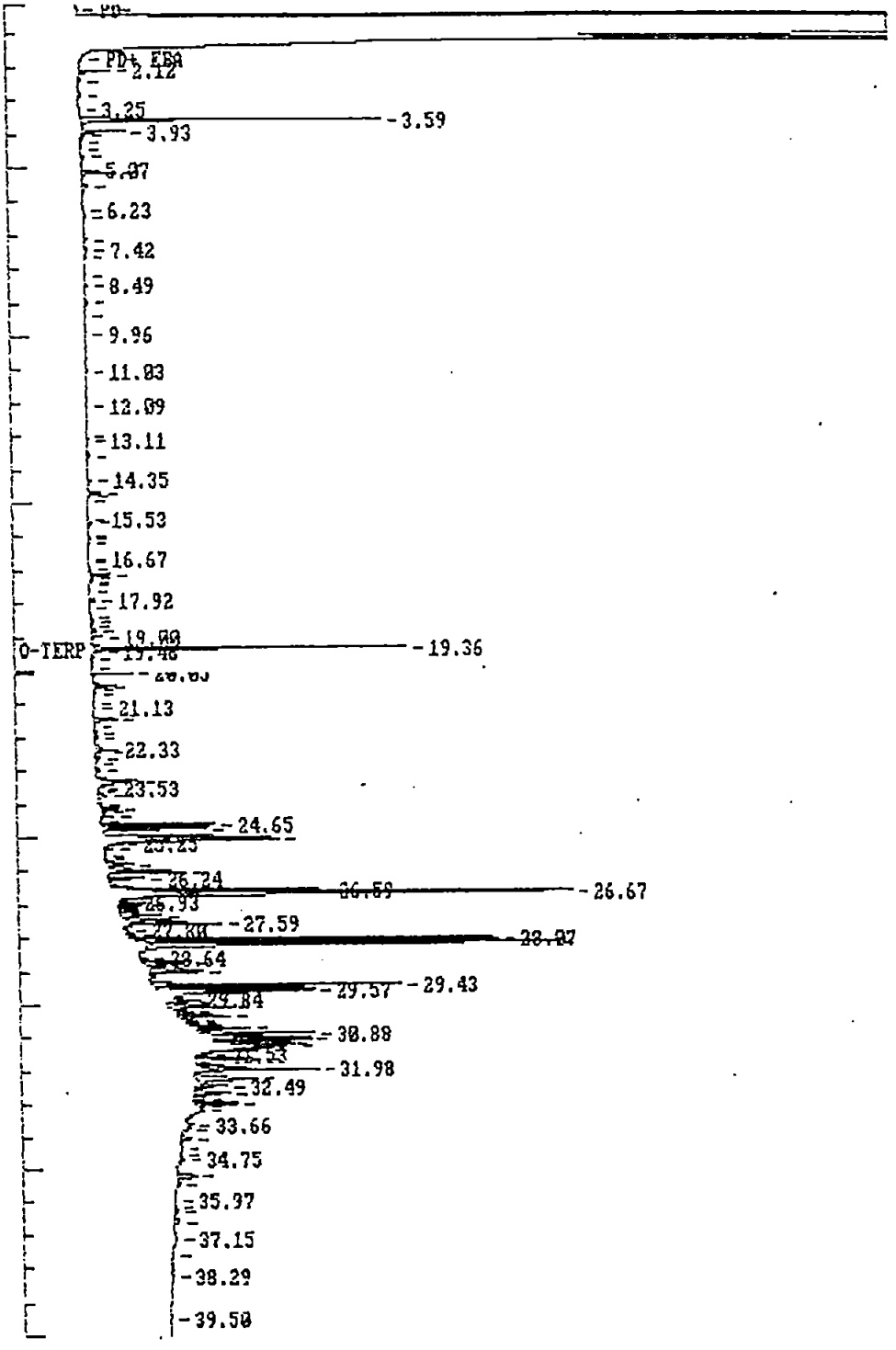
000016

Areas, times, and heights stored in: P:057-14.ATB
Data File = P:057-14.PTS Printed on 02-26-1991 at 21:04:38
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2954-05

100%.

d 2/27



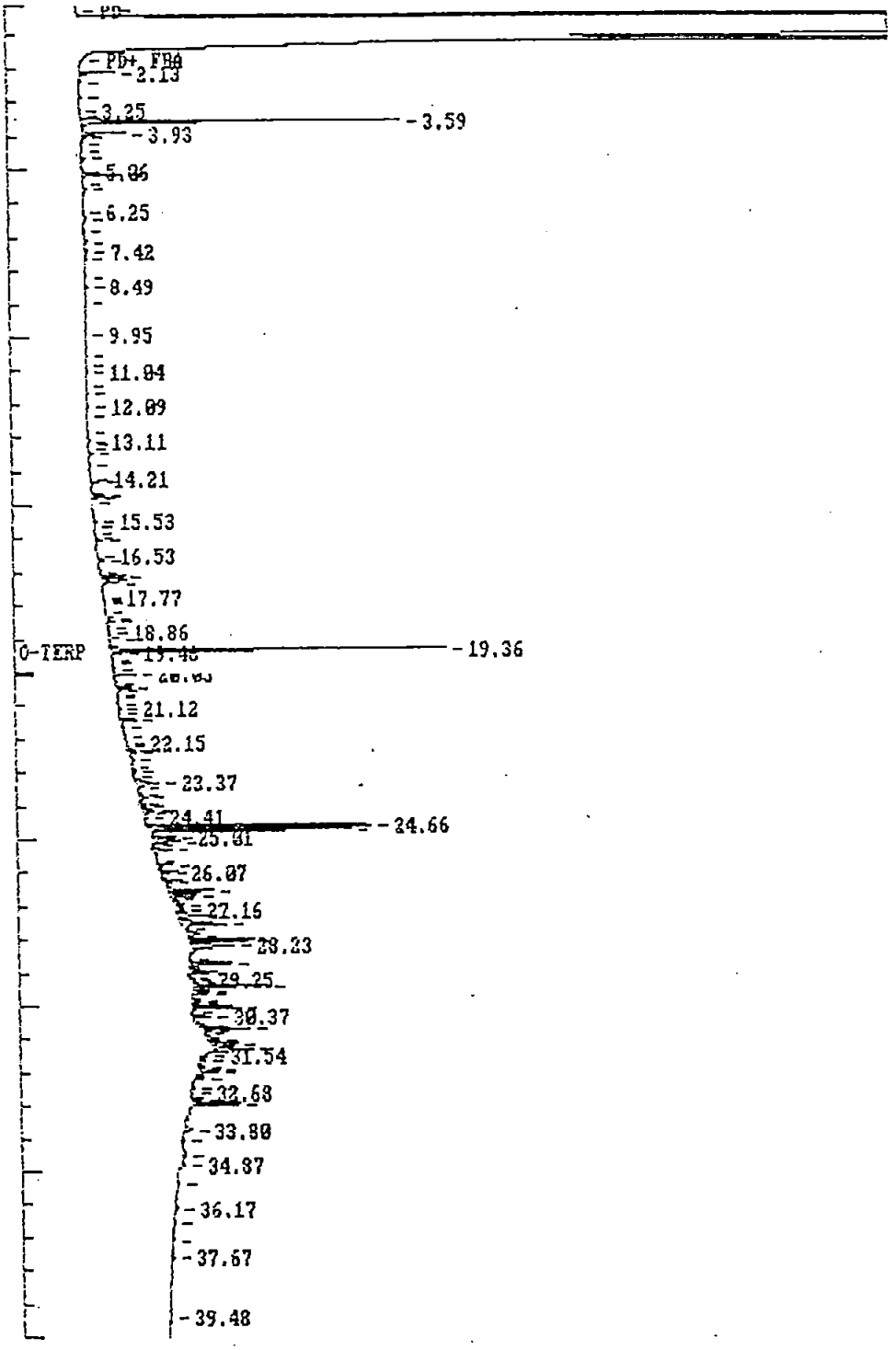
000017

Areas, times, and heights stored in: P:057-15.ATB
Data File = P:057-15.PTS Printed on 02-26-1991 at 21:54:33
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

29544-06

100%

2/27

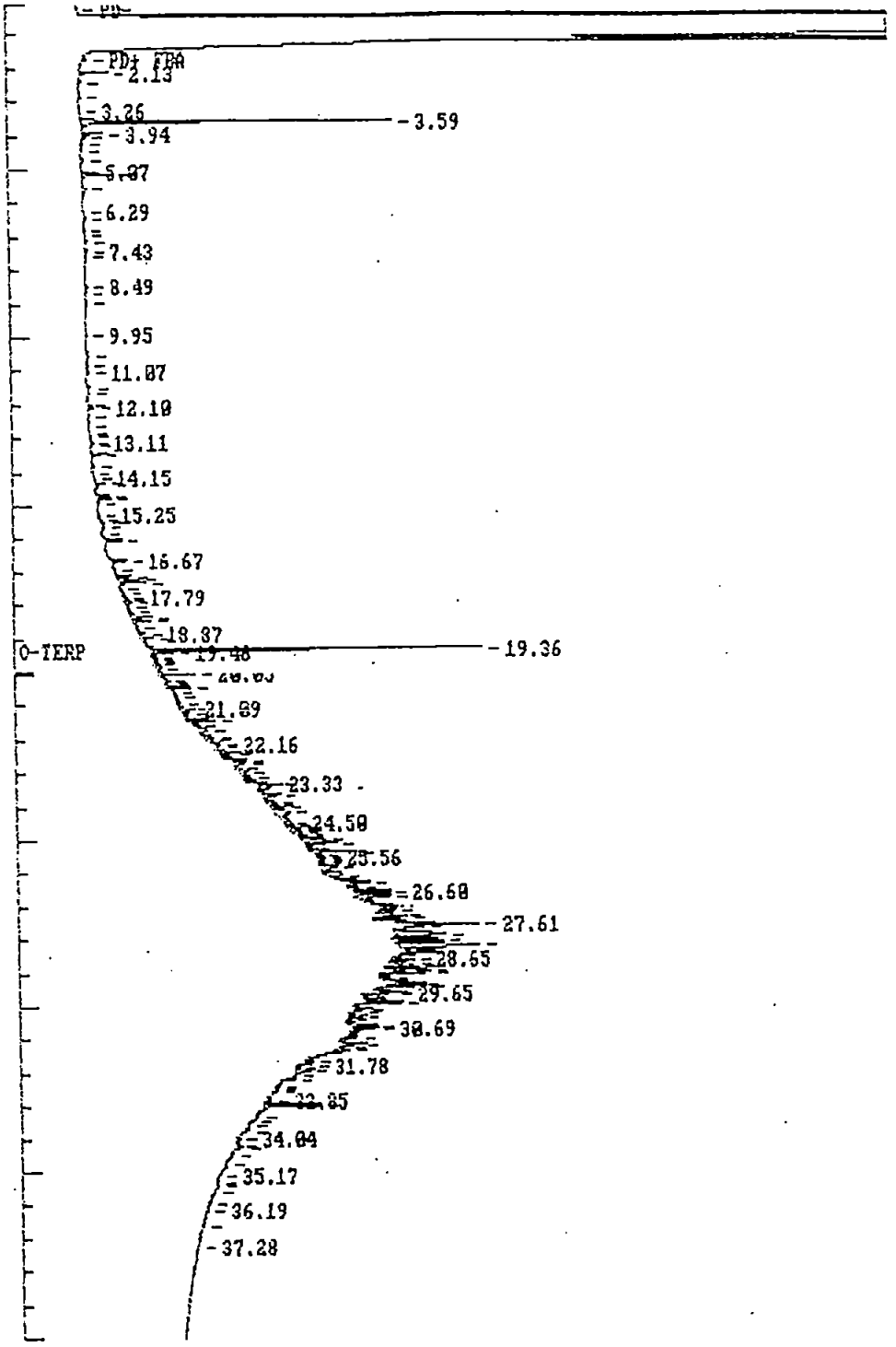


Areas, times, and heights stored in: P:057-16.ATB
Data File = P:057-16.PTS Printed on 02-26-1991 at 22:44:13
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2954-07

100%

2/27

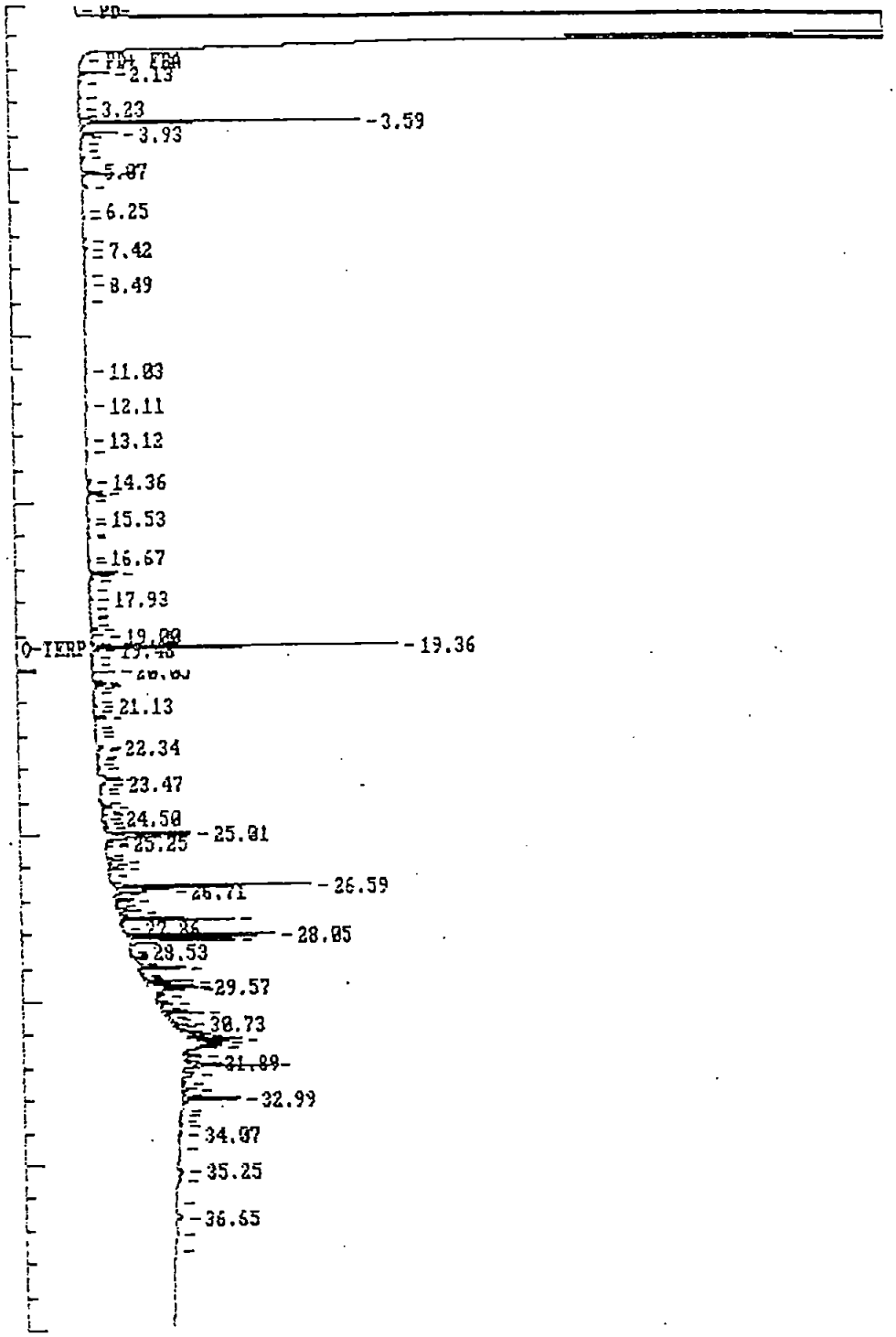


Areas, times, and heights stored in: P:057-17.ATB
Data File = P:057-17.PTS Printed on 02-26-1991 at 23:33:46
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2954-08

100%

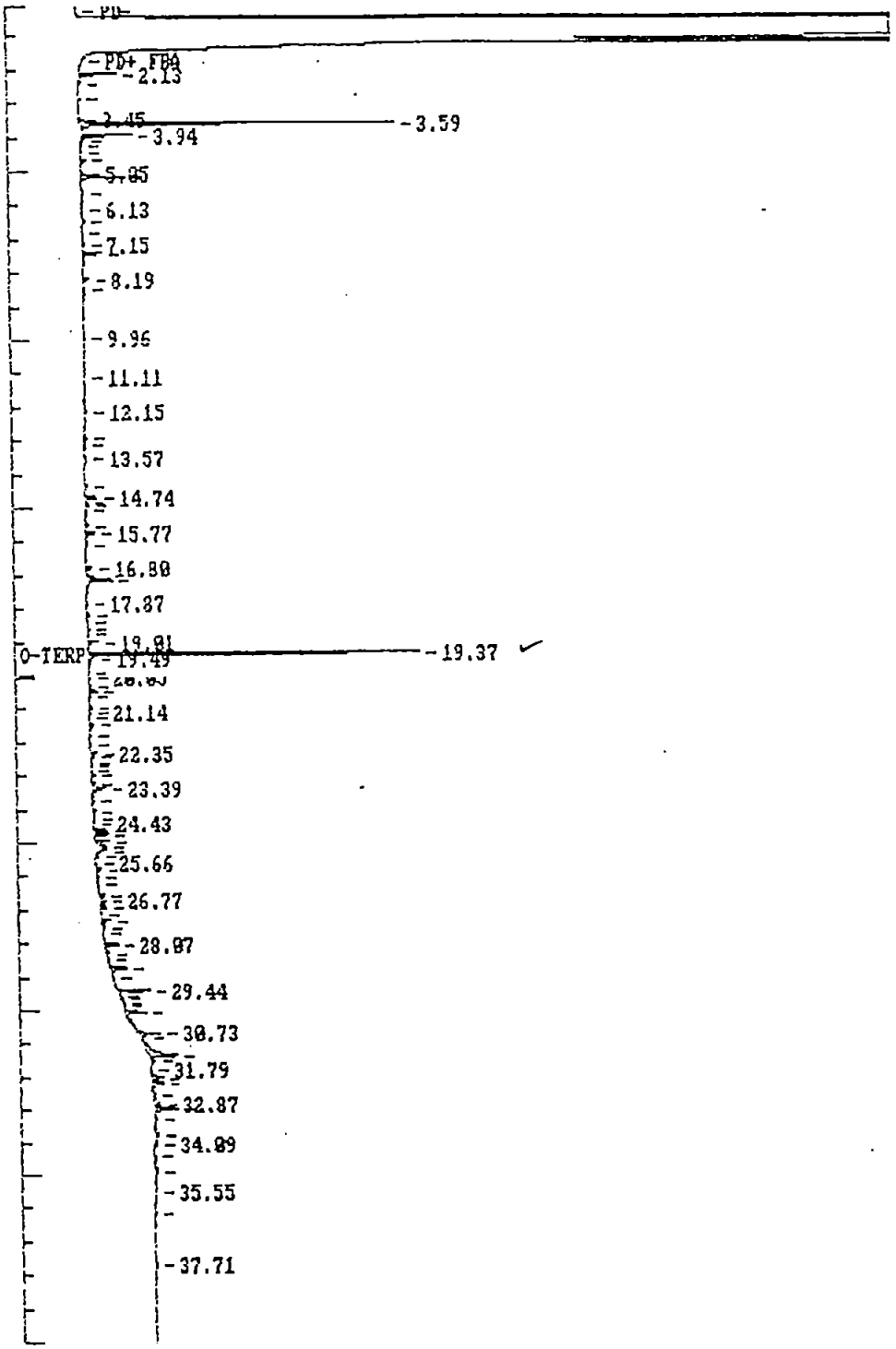
d 2/27



Areas. times. and heights stored in: P:057-3.ATB
Data File = P:057-3.PTS Printed on 02-26-1991 at 10:58:34
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2945-MB

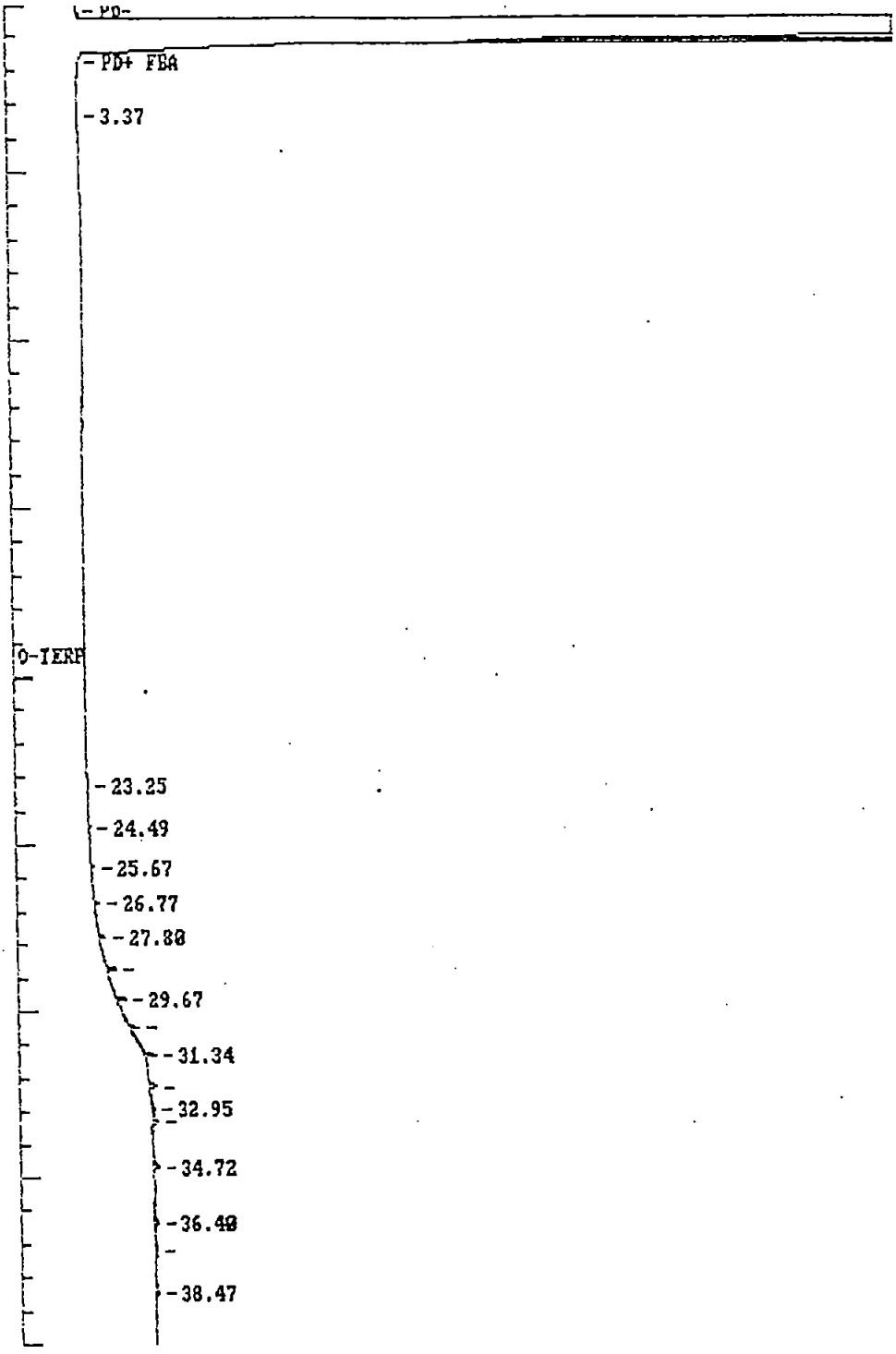
d 2/26



Areas. times. and heights stored in: P:057-1.ATB
Data File = P:057-1.PTS Printed on 02-26-1991 at 09:06:18
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

CH2CL2
SOLVENT
BLANK

d 2/26



2952-01 Processed: 02-26-1991 13:43:03, segment 5, cycle 5
RAW DATA SAVED IN FILE P:057-5.PTS

****** EXTERNAL STANDARD TABLE ******

********** 02-26-1991 13:43:11 Version 5.1.5 **********
* Sample Name: 2952-01 Data File: P:057-5 *
* Date: 02-26-1991 12:55:01 Method: P:TPH053 02-26-1991 08:10:02 # 252 *
* Interface: 4 Cycle#: 5 Operator DR Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 4 Threshold: .4 Area Threshold: 800 *
****

Starting Delay: 0.00 Ending retention time: 40.00
Area reject: 0 One sample per 0.400 sec.
Amount injected: 1.00 Dilution factor: 1.00
Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in UG/ML	NORMALIZED CONC	AREA	AREA/ HEIGHT	HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
95	19.367	O-TERPHENYL	108% ✓	10.8023	100.0000%	390229	140174 2.8 1	0	0	2.7682E-05

TOTAL AMOUNT = 10.8023

SPIKE AMT = $\frac{(1.0\,mL)(20\,\mu g/mL)}{2.0\,mL} = 10\,\mu g/mL$

R.L. = $250\,\mu g/mL \times \frac{2.0\,mL\ V_f}{0.03\,kg} \times \frac{1}{.737} = 23{,}000\,\mu g/kg$

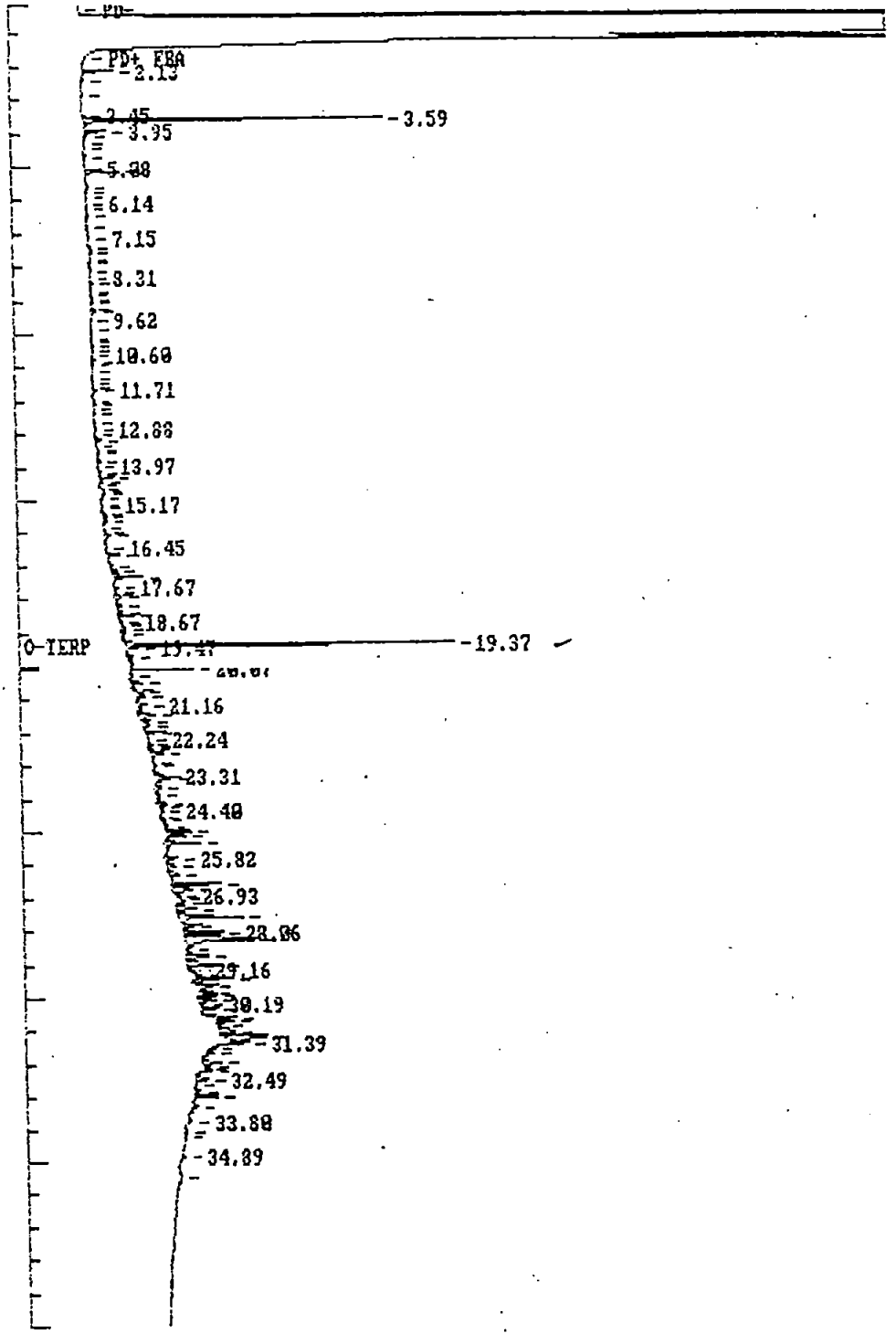
000023

2/24

Areas, times, and heights stored in: P:057-5.ATB
Data File = P:057-5.PTS Printed on 02-26-1991 at 13:43:16
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2952-01

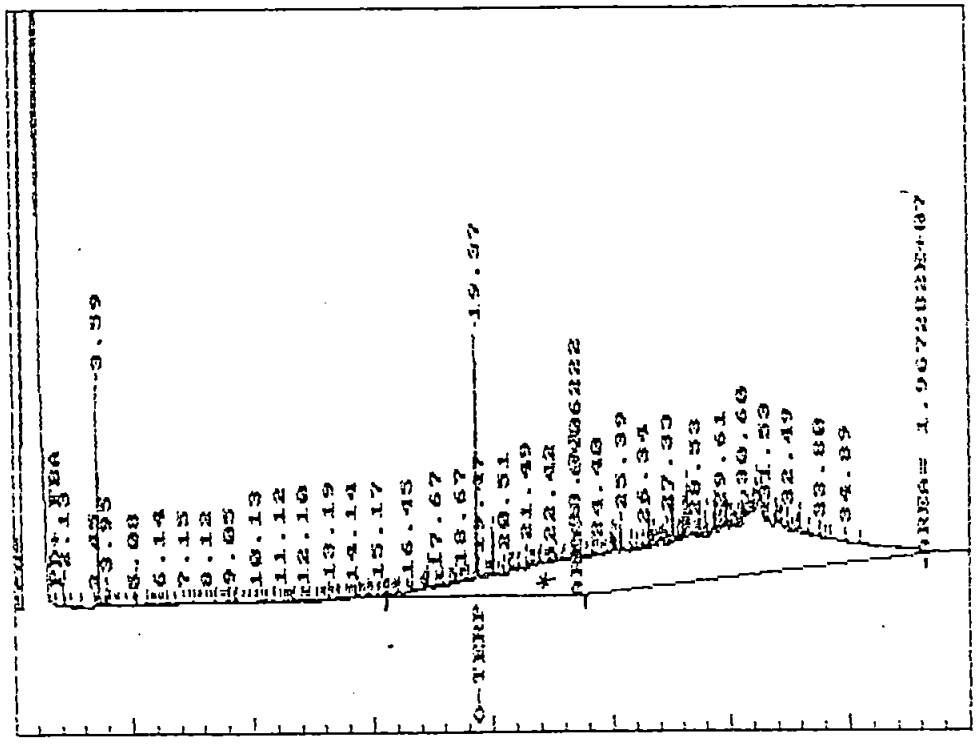
2/26



000024

START TIME= 15.197 START HEIGHT= 24066
STOP TIME= 23.741 STOP HEIGHT= 24066
AREA = 6406222 -
START TIME= 23.741 START HEIGHT= 24066
STOP TIME= 38.361 STOP HEIGHT= 47596
AREA = 1.967282E+07
Plot of data file: P:057-5.PTS
Date: 02-26-1991 Time: 16:31:57
Samole Name: 2952-01 ✓ 100% ✓
Start Time= 0.01Stop Time = 40.01Min. Scale= 18184Max. Scale= 366184

PRODUCT INTGRN OF 2952-01



AREA: (6,406,222) + (1.967282E+07) − (390229) = 25,688,813 ✓

µg/mL
(MOTOR OIL) = (25,688,813)(6.2960E-05) + (-5.6116E+02) = 1056.2 µg/mL ✓

$$TPH = 1056.2\frac{\mu g}{mL} * \frac{2.0\,mL\,VF}{0.03\,kg} * \frac{1}{.737} * \frac{100\%}{100\%} = 95{,}541\,\mu g/kg \rightarrow 96{,}000\,\mu g/kg$$ ✓

000025

*THIS AREA (-DRP) IS ~6610 WHICH IS LESS THAN DIESEL R.L. @ 250µg/mL. THEREFORE, MS/MSD CALCULATIONS ON THIS SPL WILL BE PERFORMED AS IF NO INTERFERENCE WERE PRESENT.

2/26

2/26

2952-01MS Processed: 02-26-1991 14:29:32. segment 6, cycle 6
RAW DATA SAVED IN FILE P:057-6.PTS

****** EXTERNAL STANDARD TABLE ******

********** 02-26-1991 14:29:40 Version 5.1.5 **********

* Sample Name: 2952-01MS Data File: P:057-6 *
* Date: 02-26-1991 13:44:43 Method: P:TPH053 02-26-1991 08:10:02 # 252 *
* Interface: 4 Cycle#: 6 Operator DR Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 4 Threshold: .4 Area Threshold: 800 *

Starting Delay: 0.00 Ending retention time: 40.00
Area reject: 0 One sample per 0.400 sec.
Amount injected: 1.00 Dilution factor: 1.00
Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in UG/ML	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT	BL	REF PEAK	% DELTA RET TIME	CONC/AREA
133	19.367	O-TERPHENYL 98.2%	9.8240	100.0000%	354890	136262	2.6	I	0	0	2.7682E-05

TOTAL AMOUNT = 9.8240

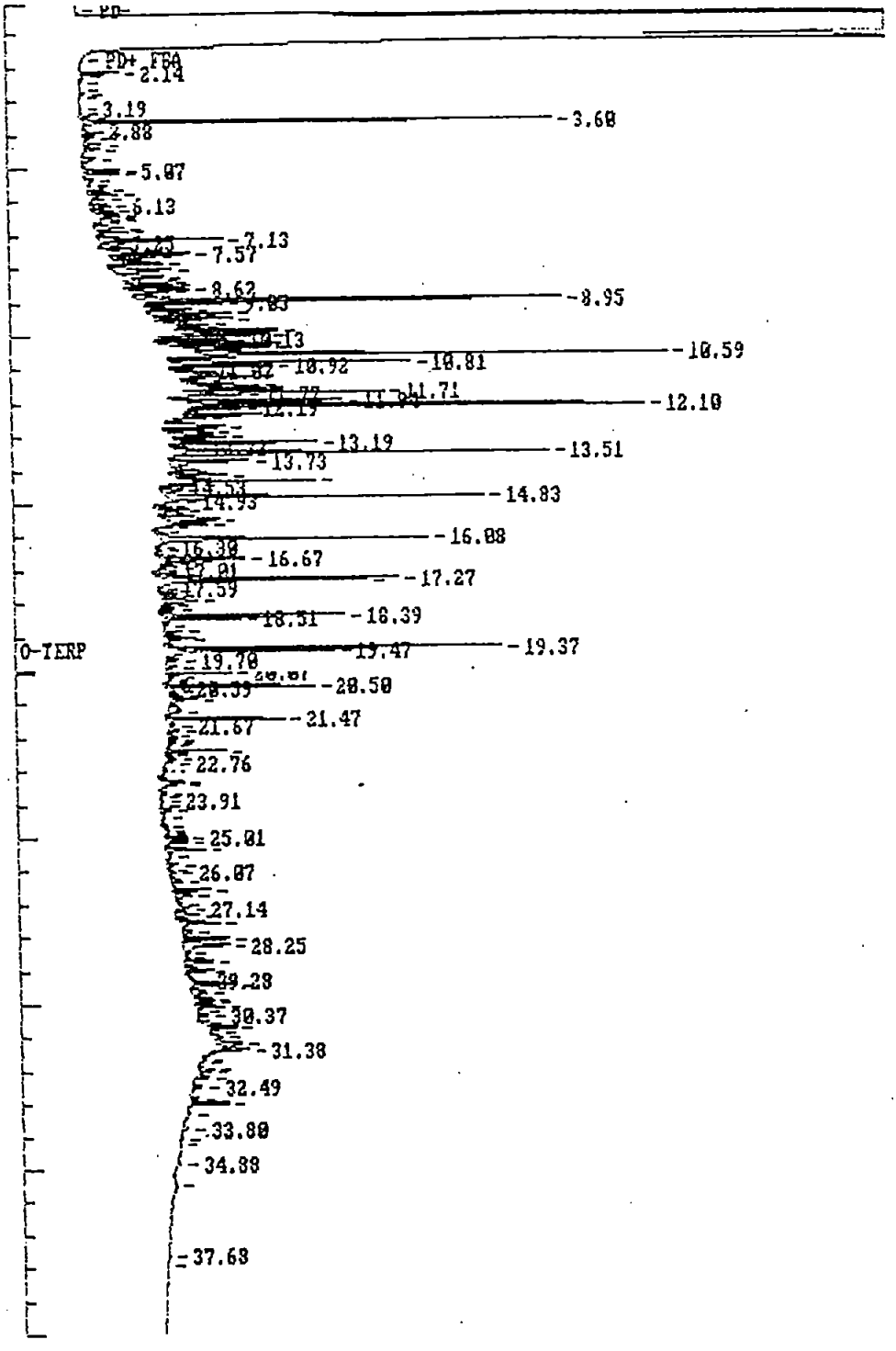
000026

2/20

Areas, times, and heights stored in: P:057-6.ATB
Data File = P:057-6.PTS Printed on 02-26-1991 at 14:29:45
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2952-01MS

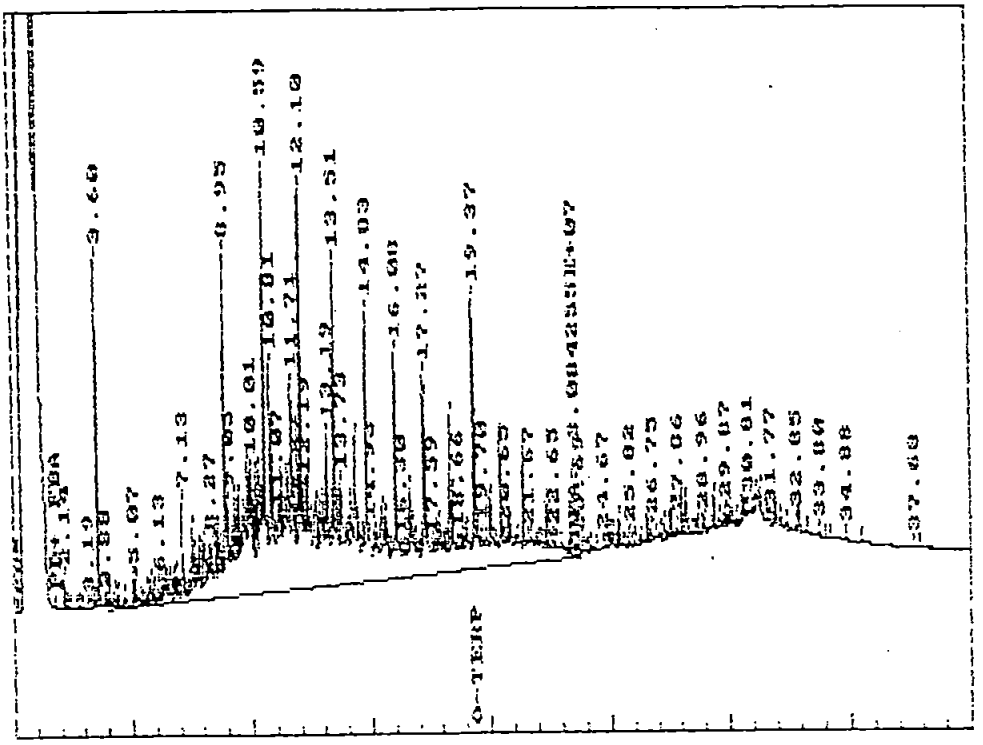
d 2/26



000027

START TIME= 3.931 START HEIGHT= 18069
STOP TIME= 23.741 STOP HEIGHT= 46010
AREA = 3.084255E+07
Plot of data file: P:057-6.PTS
Date: 02-26-1991 Time: 16:33:57
Samole Name: 2952-01MS
Start Time= 0.01Stop Time = 40.01Min. Scale= 18069Max. Scale= 368069

PROD. INTGRN OF 2952-01MS



0+p 2

AREA = (3.084255E+07) − (354890) = 30,487,660

$$\underset{(\text{DIESEL})}{\mu g/mL} = (30{,}487{,}660)(3.6417E\text{-}05) + (-1.4029E+02) = 969.98\ \mu g/mL$$

$$TPH = 969.98\frac{ug}{mL} * \frac{2.0\,mL\ Vf}{0.03\,Kg} * \frac{1}{.737} = 87{,}741\ ug/kg = 87{,}700\ \mu g/kg$$

$$SPIKE = \frac{(1.0\,mL)(2000\,\mu g/mL)}{(.03\,kg)(.737)} = 90{,}457\ ug/kg = 90{,}500\ \mu g/kg$$

%R = 96.9%

000028

2/20

2952-01MSD Processed: 02-26-1991 15:17:18, segment 7, cycle 7
RAW DATA SAVED IN FILE P:057-7.PTS

****** EXTERNAL STANDARD TABLE ******

********** 02-26-1991 15:17:26 Version 5.1.5 **********
* Sample Name: 2952-01MSD Data File: P:057-7 *
* Date: 02-26-1991 14:34:39 Method: P:TPH052 02-26-1991 08:10:02 # 252 *
* Interface: 4 Cycle#: 7 Operator DR Channel#: 0 Vial#: N.A. *
* Starting Peak Width: 4 Threshold: .4 Area Threshold: 800 *
****

Starting Delay: 0.00 Ending retention time: 40.00
Area reject: 0 One sample per 0.400 sec.
Amount injected: 1.00 Dilution factor: 1.00
Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in UG/ML		NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT	BL	REF PEAK	% DELTA RET TIME	CONC/AREA
138	19.367	O-TERPHENYL (O)		10.1270	100.0000%	365834	139507	2.6	1	0	0	2.7682E-05

TOTAL AMOUNT = 10.1270

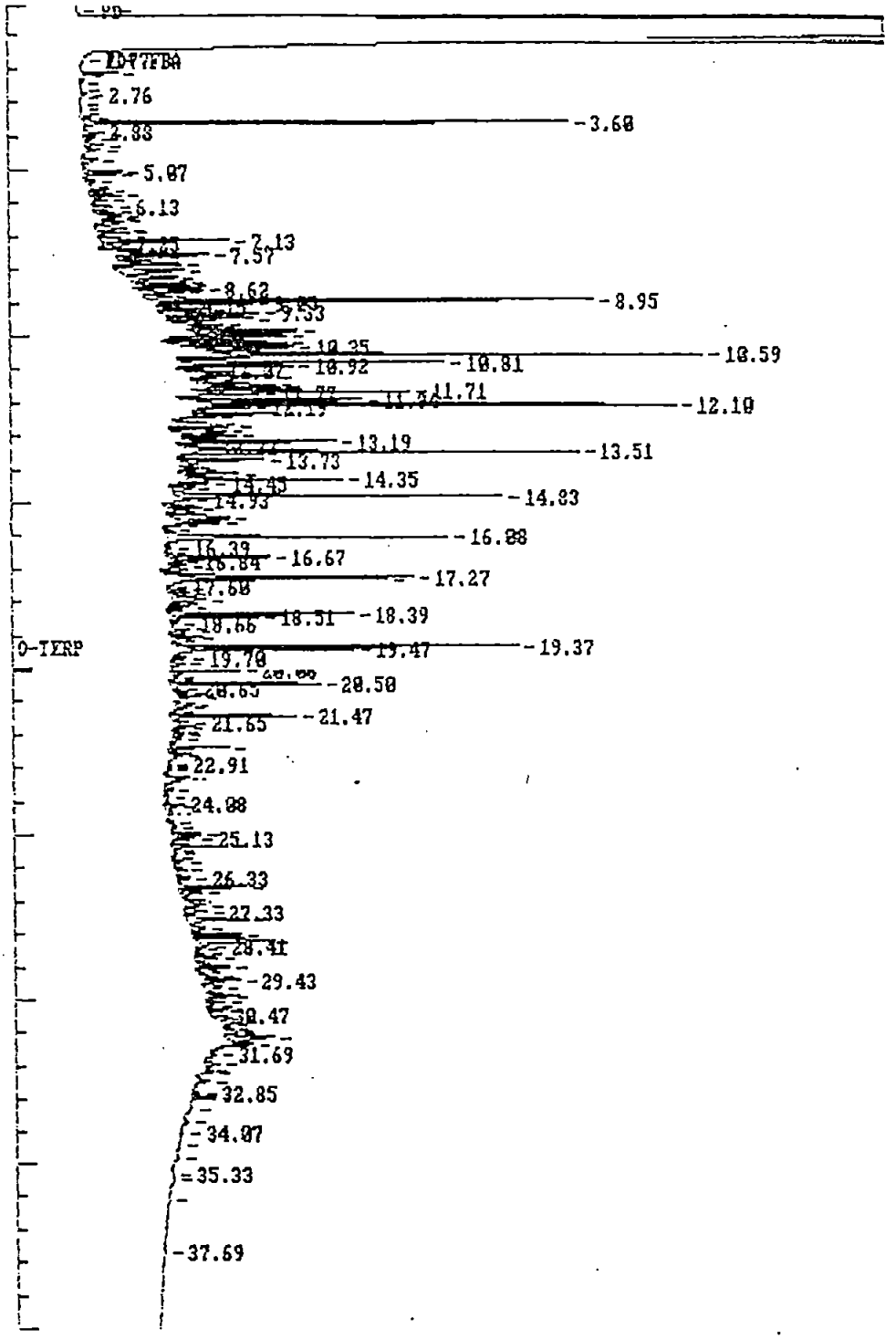
000029

2/20

Areas, times, and heights stored in: P:057-7.ATB
Data File = P:057-7.PTS Printed on 02-26-1991 at 15:17:31
Start time: 0.00 min. Stop time: 40.00 min. Offset: 0 mv.
Full Range: 350 millivolts

2952-01MSD

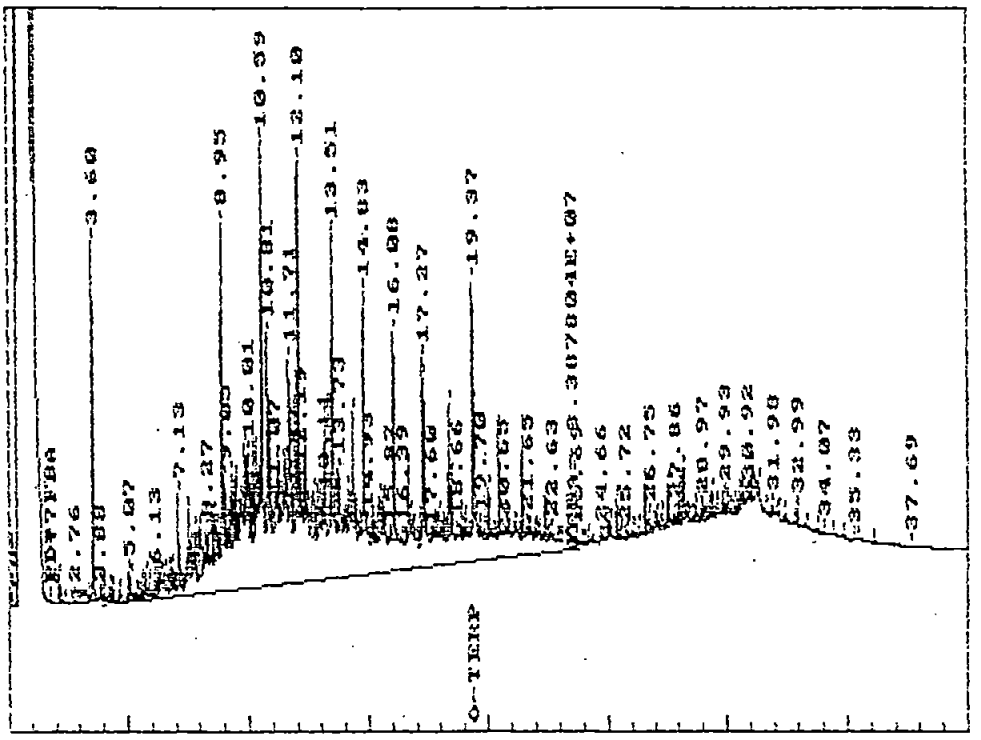
2/26



000030

START TIME= 3.931 START HEIGHT= 18125
STOP TIME= 23.741 STOP HEIGHT= 50478
AREA = 3.387804E+07
Plot of data file: P:057-7.PTS
Date: 02-25-1991 Time: 16:35:37
Samole Name: 2952-01MSD ✓
Start Time= 0.01Stop Time = 40.01Min. Scale= 18125Max. Scale= 368125

PRODUCT INTEGRN OF 2952-01MSD



otp2

AREA = (3.387804E+07) - (345834) = 33,512,206

µg/mL

(DIESEL) = (33,512,206)(3.6417E-05) + (-1.4029E+02) = 1080.1 µg/mL

$$TPH = 1080.1 \frac{\mu g}{mL} * \frac{2.0\ mL\ s\ V_f}{0.03\ kg} * \frac{1}{.737} = 97,705 \mu g/kg = 97,700 \mu g/kg$$

SPIKE = 90,500 µg/kg

%R = 108% ✓

RPD = 10.8 ✓

000031

2/26

rdination late
1325 Fourth Avenue, Suite 1800
Seattle, WA 98101
(206) 622-0812
(206) 292-8619 Telecopy

CHAIN OF CUSTODY FORM

Lab: NAEX

Samplers: SCOTT YANCEY

Job Number: 20184.002.09

Name/Location: CAM PROPERTIES/KENT WA.

Project Manager: DAN BALBIANI

Recorder: Scott R Yancey (Signature Required)

PNEL 2954

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH
48			X		X					C-1B	91	02	22	0900						X	
48			X		X					C-2B	91	02	22	0900						X	
48			X		X					C-3X	91	02	22	0900						X	
48			X		X					C-4X	91	02	22	0900						X	
48			X		X					C-5B	91	02	22	0930							X
48			X		X					C-6B	91	02	22	0930							X
48			X		X					C-7X	91	02	22	0930							X
48			X		X					C-8X	91	02	22	0930							X
								TRIP BLANK CAC 2-22-91													

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Scott R Yancey	RECEIVED BY: (Signature) Amy Clayton/PNEL	DATE/TIME 2-22-91 5 PM
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) Scott R Yancey 2/22 DATE/TIME	RECEIVED FOR LAB BY: (Signature) Amy Clayton PNEL	DATE/TIME 2-22-91 5 PM
METHOD OF SHIPMENT		

000032

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

65

NATIONAL EXPRESS LABORATORIES, INC.

NATEX

cific Northwest Environmental Laboratory, Inc.
3820 159th Avenue, N.E.
Redmond, WA 98052
(206) 885-0083
FAX (206) 867-2214

March 11, 1991

Rich Reis
Harding Lawson Associates
1325 - 4th Avenue, Suite 1800
Seattle WA 98101

NARRATIVE FOR PNELI 2976

Enclosed are data summary sheets and supporting documentation for the samples received on March 6, 1991. The samples were received as follows:

FIELD ID	LAB ID	DATE COLLECTED
C-9B	2976-01	03-05-91

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Sample Receiving

The inside temperature of the sample receiving cooler was 14 degrees Celsius upon sample receipt. The sample was analyzed as originally requested.

Rich Reis of Harding Lawson Associates was notified by memo of the above sample receiving anomaly.

Heavy Metals Analysis

Analytical results are reported on a dry-weight basis.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

Randal G. Jenkins

Enclosures

cc: Scott Yancey

METHOD REFERENCE

Inductively Coupled Plasma-Atomic Emission Spectrometric Method	Environmental Protection Agency, Contract Laboratory Program, Inorganic Statement of Work, Exhibit-D, February 1988.
Percent Solids Determination Procedure	Environmental Protection Agency, Contract Laboratory Program, Inorganic Statement of Work, Exhibit-D, February 1988.

NatEx Laboratories, Inc.
Pacific Northwest Environmental Laboratory, Inc.

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

B - Indicates that the reported value is less than the Contract Required Detection Limit(CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

E - The reported value is estimated because of the presence of interference. An explanatory note must be included under Comments on the Cover Page (if the problem applies to all samples) or on the specific FORM I-IN (if it is an isolated problem).

M - Duplicate injection precision not met.

N - Spiked sample recovery not within control limits.

S - The reported value was determined by the Method of Standard Additions (MSA).

W - Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance. (See Exhibit E.)

* - Duplicate analysis not within control limits.

+ - Correlation coefficient for the MSA is less than 0.995.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

NatEx Laboratories, Inc.
Pacific Northwest Environmental Laboratory, Inc.

\IAD1TAL

INORGANIC ANALYSIS DATA SHEET

Client Sample ID: C-9B
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2976-01
Date Sample Received: 03-06-91

Analyte		Concentration	Method Blank Concentration		M
Barium	(Ba)	840	3.0	U	P
Cadmium	(Cd)	27.3	1.0	U	P
Chromium	(Cr)	67.4	2.0	U	P
Copper	(Cu)	2440	1.0	U	P
Lead	(Pb)	2820	6.0	U	P
Nickel	(Ni)	59.5	4.0	U	P
Zinc	(Zn)	8590	1.6	U	P

NatEx Laboratories, Inc.
Pacific Northwest Environmental Laboratory, Inc.

\IAD1TAL

INORGANIC DUPLICATE ANALYSIS DATA SHEET

Client Sample ID: C-9B
PNELI Sample ID: 2976-01
Sample Matrix: Soil
Date Sample Received: 03-06-91
Units of Measure: mg/kg

Analyte		Duplicate Sample Concentration	Original Sample Concentration	Relative Percent Difference
Barium	(Ba)	917	840	8.8
Cadmium	(Cd)	28.7	27.3	5.0
Chromium	(Cr)	78.3	67.4	15.0
Copper	(Cu)	2530	2440	3.6
Lead	(Pb)	3120	2820	10.1
Nickel	(Ni)	62.6	59.5	5.1
Zinc	(Zn)	9360	8590	8.6

INORGANIC MATRIX SPIKE ANALYSIS DATA SHEET

Client Sample ID: C-9B
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 2976-01
Date Sample Received: 03-06-91

Analyte		Spike Sample Concentration	Original Sample Concentration	Spike Level	Percent Recovery
Barium	(Ba)	1300	840	422	109
Cadmium	(Cd)	36.7	27.3	10.5	89.5
Chromium	(Cr)	106	67.4	42.2	91.5
Copper	(Cu)	2480	2440	52.8	NS
Lead	(Pb)	3070	2820	106	NS
Nickel	(Ni)	149	59.5	106	84.4
Zinc	(Zn)	9010	8590	106	NS

NATIONAL EXPRESS LABORATORIES, INC.

NAtEx

Pacific Northwest Environmental Laboratory, Inc.

CHAIN-OF-CUSTODY, RELEASE FOR ANALYSIS

Client Name HARDING LAWSON ASSOC. (HLA)

Client Number

Bill To HLA

1325 4TH AVE, SUITE 1800

SEATTLE, WA. 98101

PO No.

Carrier No.

PNEL 2976

Laboratory Contact SUSAN WINTER

Send Lab Report To RICH REIS

Date Report Required 7 DAY TAT

Client Contact SCOTT YANCEY OR RICH REIS

Client Contact Phone 206 622-0817

	Sample Number	Sample Location and Description	Date Collected	Time Collected	Sample Matrix	Number of Containers	Analysis and Container: Heavy Metals Ba, Cd, Cr, Cu, Pb, Zn						Comments
01	C-93	SURFACE, NEAR SCRUBBER	3/5/91	1400	SOIL	1	X						

Special Instructions 7 DAY TAT

Possible Hazards HEAVY METALS

Was Preservative Used? No [X] Yes [ ] What Kind? What Analysis?

1. Relinquished By SCOTT YANCEY Date 3/5/91 Time 1630 Received By Amy Clayton/PNEL Date 3-6-91 Time 9:00 (10-3-6-91)
2. Relinquished By Date Time Received By Date Time
3. Relinquished By Date Time Received By Date Time
4. Relinquished By Date Time Received By Date Time

NATIONAL EXPRESS LABORATORIES, INC.

NATEX

:ific Northwest Environmental Laboratory, Inc.
3820 159th Avenue, N.E.
Redmond, WA 98052
(206) 885-0083
FAX (206) 867-2214

June 26, 1991

Rich Reis
Harding Lawson Associates
1325 Fourth Ave., Suite 1800
Seattle, Wa. 98101

NARRATIVE FOR PNELI 3205

Enclosed are data summary sheets and supporting documentation for the samples received on June 6, 1991 of the Cam Industries project. The samples were received as follows:

CLIENT ID	PNELI ID	DATE COLLECTED
CAM-10B	3205-01	06-05-91
CAM-11S	3205-02	06-05-91

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Sample Receiving

There were no anomalies associated with the receipt of these samples.

Metals by Inductively Coupled Plasma-Atomic Emission	Environmental Protection Agency, Contract Laboratory Program, Inorganic Statement of Work, Exhibit-D, February 1988.

All samples in this case were batched with QC samples previously reported in PNELI Case 3178. All comments concerning QC results and sample analyses are summarized here.

There were no anomalies associated with the preparation and/or analysis of these samples.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

Rand G. Jenkins

Enclosures

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

Organics Data Qualifiers .....

A - This flag indicates that a TIC is a suspected aldol-condensation product.
B - Indicates compound was found in the associated blank as well as in the sample.
C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.
D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
M - Indicates value is taken from a medium level analysis.
ND- Not detected. Detection limit shown in parentheses.
NQ- Not quantitated as...
U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.
X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.
* - Indicates spiked compounds used for MS/MSD analysis.

Inorganics Data Qualifiers .....

NA- Relative percent difference calculation is not applicable to analytes when not detected.
NC- Not calculated when analyte is not detected.
NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.
U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
B - Indicates that the reported value is less than the Contract Required Detection Limit(CRDL) but greater than or equal to the Instrument Detection Limit (IDL).
E - The reported value is estimated because of the presence of interference. An explanatory note must be included under Comments on the Cover Page (if the problem applies to all samples) or on the specific FORM-I (if it is an isolated problem).
M - Duplicate injection precision not met.
N - Spike sample recovery not within control limits.
S - The reported value was determined by the Method of Standard Additions (MSA).
W - Post-digestion spike for furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance. (See Exhibit E.)
* - Duplicate analysis not within control limits.
+ - Correlation coefficient for the MSA is less than 0.995.

Inorganics Method Qualifiers .....

CV- Manual Cold Vapor AA
F - FURNACE AA
P - ICP

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Pacific Northwest Environmental Laboratory, Inc.

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METALS ANALYSIS

Client Sample ID: CAM-10B
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 3205-01
Date Sample Received: 06-06-91
% Solids Content: 91.9

Analyte		Concentration		Method Blank Concentration		M	Date Analyzed
Barium	(Ba)	66.2		3.0	U	P	06-12-91
Cadmium	(Cd)	1.1	U	1.0	U	P	06-12-91
Chromium	(Cr)	19.9		2.0	U	P	06-12-91
Copper	(Cu)	21.6		1.0	U	P	06-12-91
Lead	(Pb)	7.2		6.0	U	P	06-12-91
Nickel	(Ni)	23.5		4.0	U	P	06-12-91
Zinc	(Zn)	37.7		1.6	U	P	06-12-91

Client Sample ID: CAM-11S
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 3205-02
Date Sample Received: 06-06-9
% Solids Content: 94.6

Analyte		Concentration	Method Blank Concentration		M	Date Analyzed
Barium	(Ba)	497	3.0	U	P	06-12-91
Cadmium	(Cd)	10.8	1.0	U	P	06-12-91
Chromium	(Cr)	65.8	2.0	U	P	06-12-91
Copper	(Cu)	1550	1.0	U	P	06-12-91
Lead	(Pb)	1790	6.0	U	P	06-12-91
Nickel	(Ni)	48.9	4.0	U	P	06-12-91
Zinc	(Zn)	5450	1.6	U	P	06-12-91

NatEx Laboratories, Inc.
Pacific Northwest Environmental Laboratory, Inc.

\CM

METALS QC SUMMARY

Client Sample ID: NA
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 3178-01
Date Sample Received: 05-22-91
% Solids Content: 92.0

Analyte		Duplicate Sample Concentration		Original Sample Concentration		Relative Percent Difference
Barium	(Ba)	26.0		29.2		11.6
Cadmium	(Cd)	1.1	U	1.1	U	NC
Chromium	(Cr)	19.7		18.8		4.7
Copper	(Cu)	8.3		8.1		2.4
Lead	(Pb)	7.0		6.4		NC
Nickel	(Ni)	35.1		34.9		0.57
Zinc	(Zn)	26.4		26.6		0.75

Client Sample ID: NA
Sample Matrix: Soil
Units of Measure: mg/kg

PNELI Sample ID: 3178-01
Date Sample Received: 05-22-91

Analyte		Spike Sample Concentration	Original Sample Concentration		Spike Level	Percent Recovery
Barium	(Ba)	445	29.2		435	95.6
Cadmium	(Cd)	9.8	1.1	U	10.9	89.9
Chromium	(Cr)	62.2	18.8		43.5	99.8
Copper	(Cu)	59.1	8.1		54.3	93.9
Lead	(Pb)	106	6.4	U	109	97.2
Nickel	(Ni)	136	34.9		109	92.8
Zinc	(Zn)	118	26.6		109	89.5

NATEX

Pacific Northwest Environmental Laboratory, Inc.

CHAIN-OF-CUSTODY / REQUEST FOR ANALYSIS

Client Name: HARDING LAWSON ASSOCIATES

Client Number:

Bill To: HARDING LAWSON ASSOCIATES
1325 FOURTH AVE, SUITE 1800
SEATTLE, WA. 98101

PO No.:

Carrier No.: PINEL 3205

Laboratory Contact: SUSAN WATER

Send Lab Report To: RICH REIS
HARDING LAWSON ASSOCIATES

Date Report Required:

Client Contact: SCOTT YANKEY / RICH REIS

Client Contact Phone: (206) 627-0817

	Sample Number	Sample Location and Description	Date Collected	Time Collected	Sample Matrix	Number of Containers	Analysis and Container: TOTAL METALS CA, CU, ZN PP AA						Comments
01	CAM-103	SURFACE	6/5/91	1315		1	X						
02	CAM-115	SURFACE @ CONC. PAD	6/5/91	1330		1	X						

Special Instructions:

Possible Hazards: HEAVY METALS

Was Preservative Used? No [X] Yes [ ] What Kind? What Analysis?

1. Relinquished By: SCOTT YANKEY Date: 6/5/91 Time: 1600 Received By: Date: Time:
2. Relinquished By: Federal Express Date: 6/06/91 Time: 9:30 Received By: Tracy Clayton/PNEL Date: 6/06/91 Time: 9:30
3. Relinquished By: Date: Time: Received By: Date: Time:
4. Relinquished By: Date: Time: Received By: Date: Time: