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0044787

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

JUL 11 1996

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RECEIVED
EDMC

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352-0539

Dear Mr. Sherwood:

100-IU-1 OPERABLE UNIT

As requested by the U.S. Environmental Protection Agency (EPA), please find attached additional information on the remediation of the diesel-contaminated soil excavated at the 100-IU-1 Operable Unit (Riverland Railyard). To allow EPA to complete their review, the following is being provided:

- Attachment 1 - U.S. Department of Energy, Richland Operations Office (RL), letter to Messrs. S. M. Alexander, State of Washington, Department of Ecology (Ecology), and D. R. Sherwood, EPA, from Mr. G. I. Goldberg, same subject as above, dated March 22, 1996. Provided as an attachment to the March 22, 1996, letter is the "Report on diesel-Contaminated Soil from the 100-IU-1 Operable Unit (Riverland Railyard). This report contains three attachments: 1) Attachment 1-A is the sampling and analysis plan for the investigation of the soil that was conducted in May 1995; 2) Attachment 1-B is the data sheet used to document the field screening (including quality assurance) of the soil; and 3) Attachment 1-C is a memo summarizing the results of the fixed laboratory analyses of the soil samples.

- Attachment 2 - Summary of the Riverland soil site visit conducted on May 6, 1996, (attended by representatives from RL, EPA, and the Environmental Restoration Contractor), and the data log sheet (Attachment 2-A) used to document the field screening conducted during that visit.

- Attachment 3 - Data related to immunoassay and thermal gas chromatography laboratory analyses of the remediated soil that were performed in May, 1995. Attachment 3-A through 3-F are laboratory records.

RL requests concurrence from EPA that this additional information demonstrates that the soil meets remediation goals and may be used for backfill or in any other manner that does not threaten human health or the environment.

In 1993, soil contaminated with diesel fuel was excavated as part of the Expedited Response Action for the 100-IU-1 Operable Unit, taken to the 100-C Area for bioremediation, and later sampled and analyzed. In the referenced letter (Attachment 1) RL provided EPA and Ecology with background information, results of the soil analysis, and an evaluation of the data. The letter requested the concurrence of both EPA and Ecology, that the soil meets the goals for remediation. Following receipt of the letter, EPA requested a visit to the site, which was made on May 6, 1996.

Please document your concurrence by signing in the space provided below and return this letter to me by July 30, 1996. If you have any questions, please contact me at 376-9552.

Sincerely,

Glenn I. Goldberg, Project Manager
Remedial Actions Project

RAP:GIG

Enclosures: As stated

cc w/attachs:
C. E. Corriveau, BHI
D. A. Faulk, EPA
C. W. Hedel, CHI
J. R. James, BHI
L. A. Mihalic, CHI

cc w/o attachs:
P. R. Staats, Ecology

Concurrence:

_____
Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

028814

43410

MAR 22 1996

Mr. Steve M. Alexander
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336-6018

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352-0539

Dear Messrs. Alexander and Sherwood:

100-IU-1 OPERABLE UNIT (OU)

References: (1) DOE/RL-94-30, 1995, U.S. Department of Energy, Richland Operations Office, "Riverland Expedited Response Action Assessment," Richland, Washington.

(2) Publication 91-30, 1994, State of Washington, Department of Ecology, "Guidance for Remediation of Petroleum Contaminated Soils," Olympia, Washington.

Please find attached the "Report on Diesel-Contaminated Soil from the 100-IU-1 Operable Unit (Riverland Railyard)" which provides background information, results of the soil analysis, and an evaluation. The U.S. Department of Energy, Richland Operations Office, requests the concurrence of the U.S. Environmental Protection Agency and the State of Washington, Department of Ecology, that the soil meets the goals for remediation and may be used as fill material or in any manner that will not threaten human health or the environment.

In 1993, soil contaminated with diesel fuel was excavated as part of the Expedited Response Action for the 100-IU-1 OU and taken to the 100-C Area for bioremediation (Reference 1). Subsequent sampling and analysis performed in May 1995 indicate that the soil no longer exhibits diesel concentrations above the Model Toxics Control Act Method A standard of 200 parts per million, and that the soil meets the definition of "Class 1" soil as stated in Reference 2. "Class 1" soil may be used in any manner that does not threaten human health and the environment.

Please document your concurrence by signing in the space provided below and return this letter to me by April 4, 1996. If you have any questions, please contact me on 376-9552.

Sincerely,

Glenn I. Goldberg, Project Manager
Remedial Actions Project

RAP:GIG

Attachment

cc w/o attach:
G. R. Eidam, BHI
D. A. Faulk, EPA
J. R. James, BHI
L. A. Mihalik, CHI
P. R. Staats, Ecology

Concurrence:

_____ Date
Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency

_____ Date
Steve M. Alexander
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology

Attachment 1 - Report on Diesel-Contaminated Soil from the 100-IU-1 Operable Unit (Riverland Railyard)

ATTACHMENT 1
REPORT ON DIESEL-CONTAMINATED SOIL FROM THE 100-IU-1 OPERABLE UNIT
(Riverland Railyard)

Background

In September-October 1993, soil contaminated with diesel fuel was removed from the Riverland Railyard Maintenance Shop as part of the Expedited Response Action (ERA) for the 100-IU-1 Operable Unit (Reference 1). Diesel concentrations in the soil were in excess of 200 parts per million (ppm). The soil contamination appeared to have resulted from general maintenance activities. No underground storage tank was present. Approximately 329 m^3 (430 yds^3) of soil were hauled to the 100-C Area and placed on a circular concrete pad adjacent to the 190-C building for passive bioremediation. It was spread to a thickness of approximately 45.7 cm (18 in.) with a plastic barrier between the soil and concrete. Abundant cheatgrass currently grows on the soil surface.

In May 1995, a Sampling and Analysis Plan (SAP) (Attachment A) was prepared to determine an appropriate course of action for the soil. The SAP was prepared in general accordance with the *Guidance for Remediation of Petroleum Contaminated Soils* (Reference 2) with the exception of analytical method. For diesel-contaminated soil, the guidance specifies method WTPH-D, which involves methylene chloride extraction followed by gas chromatography. The SAP specified an alternative method consisting of thermal extraction followed by gas chromatography. The alternative method was selected based on turnaround time requested. The effectiveness of the alternative method is discussed in the evaluation.

On May 8, 1995, five soil samples were collected from the stockpiles. The samples were collected by digging a small pit with a shovel to a depth of approximately 15.2 cm (6 in.). Sampling locations are shown in Figure 1. Because the soil is primarily a sandy cobbly gravel, an effort was made to sample only the fine (sand-sized) material. Following onsite field analyses using an immunoassay test kit, the samples were hermetically sealed in 2-oz wide-mouth jars and taken to the Environmental Analytical Laboratory (EAL).

Results

The samples were analyzed immediately on site using the EnSys Petro RISC field immunoassay test kit. For diesel compounds, the detection limit of the EnSys kit is 15 ppm. The test used at 190-C was adjusted by the manufacturer to provide qualitative results at 20 ppm and 200 ppm. All results from the field immunoassay were below 20 ppm (Attachment B).

The samples were also analyzed at the EAL for diesel fuel contamination using Solid Phase Microextraction (SPME), a thermal desorption technique, and gas chromatography with a flame

ionization detector. The minimum detection limit for this procedure is 2 ppm. All five samples, as was a blank sample, were below the detection limit. A calibration sample of 53 ppm gave results of 54 ppm. Results are provided in Attachment C.

Evaluation

The remediation of the 100-IU-1 Operable Unit was conducted under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), to meet the relevant and appropriate cleanup standards of the *Model Toxics Control Act* (MTCA) (WAC 173-340). The *Guidance for Remediation of Petroleum Contaminated Soils* is a to-be-considered material under CERCLA.

The WAC 173-340-740(2) specifies a cleanup standard of 200 ppm for diesel-contaminated soils. The guidance identifies four end-use classifications of petroleum-contaminated soils. "Class 1" are those "treated or untreated soils that contain residual concentrations of contaminants at or below analytical reporting limits." Table V, "End Use Criteria for Petroleum-Contaminated Soils," specifies that for diesel contamination, "Class 1" soils are those soils below 25 ppm. "Class 1" soils may be used where they would not cause a threat to human health or the environment. Based on the results above, the U. S. Department of Energy, Richland Operations Office (DOE-RL) has determined that the soil removed from the 100-IU-1 Operable Unit meets the MTCA cleanup standard and the definition of a "Class 1" soil, and can be used in any manner that does not threaten human health or the environment.

The guidance specifies using method WTPH-D to analyze diesel-contaminated soil. The MTCA regulations state that analytical methods contained in the U. S. Environmental Protection Agency's (EPA) SW-846 may be used to determine compliance with the MTCA cleanup standards (WAC 173-340-830(4)(e)), and also allow for alternative methods (WAC 173-340-830(2)) on a site-specific basis. An alternative method was used for this analysis because of the turnaround time requested. For the sample measurements in questions, the results are expected to be reliable per the following considerations:

- The estimated analytical method detection limit of 2 ppm is significantly below the action level of 200 ppm and the "Class 1" designation level of 25 ppm

- The laboratory calibration standards run before the analyses indicate that the analytical system was detecting properly

- The method reporting is based on summation of all detection irrespective of identity; thus this would bias the method towards reporting higher than actual if detects are reported.

Based on this, DOE-RL has determined that the alternative analytical method provides data of sufficient quality to determine that cleanup standards have been met.

References: (1) DOE/RL-94-30, 1995, U. S. Department of Energy, Richland Operations Office, *Riverland Expedited Response Action Assessment*, Richland, Washington.

(2) Publication 91-30, 1994, Washington State Department of Ecology, *Guidance for Remediation of Petroleum Contaminated Soils*, Olympia, Washington.

Attachment: (A) Sampling and Analysis Plan Diesel Contaminated Soil 100-C Area

(B) EnSys Immunoassay Test Data Sheet

(C) Letter, D. R. Jordan, ERC, to R. G. McCain, ERC, "Riverland Railyard Sample Results" dated May 11, 1996

Attachment 1-A - Sampling and Analysis Plan Diesel Contaminated Soil 100-C Area

R.G. McCain April 28, 1995

SAMPLING AND ANALYSIS PLAN
DIESEL CONTAMINATED SOIL
100-C AREA

1 BACKGROUND

In September-October, 1993, soil contaminated with diesel fuel was removed from the Riverland Railroad Maintenance Shop are part of the Expedited Response Action (ERA) for the 100-IU-1 Operable Unit. Approximately 430 cubic yards of soil was hauled to the 100-C area, where is was spread out on a concrete pad adjacent to the 190-C building for bioremediation.

The soil is described as a sandy gravel / gravelly sand, with approximately 5 to 10 percent nonplastic fines. It is presently spread to a maximum depth of approximately 18 inches on top of a circular concrete pad. A plastic barrier was placed between the soil and the concrete. Abundant cheatgrass is growing on the soil surface.

2 OBJECTIVES

The purpose of the field screening effort is to evaluate the extent of any residual diesel contamination to determine if bioremediation of the soil has been completed. If evidence of total petroleum hydrocarbons (TPH) greater than 200 mg/Kg are detected, then the bioremediation effort will be continued. If concentrations are below 200 mg/Kg, then consideration will be given to sampling and laboratory analysis for final disposal of the soil.

3 ORGANIZATION AND RESPONSIBILITIES

The field screening will be carried out by the field screening group, with support from the environmental analytical laboratory.

4 SAMPLING REQUIREMENTS

4.1 Schedule

Because the data is needed to determine a course of action for the soil, the field screening effort will be carried out as soon as possible. It is anticipated that field screening will be

conducted during the week ending May 7, 1995.

4.2 Location and frequency of field screening.

Washington State Department of Ecology Guidance[1] suggests a minimum of five samples for 101 to 500 cubic yards. Since the pile is roughly circular, it will be divided into 90-degree quadrants. One sample will be collected from the center area, and one sample will be collected within each quadrant, at a point approximately 2/3 of the distance from the center to the perimeter. Additional samples may be collected at areas where there is discoloration, stunted vegetation, or other indications of potential soil contamination.

4.3 Parameters

Soil samples will be analyzed in the field immediately after collection using field immunoassay test kits manufactured by EnSys Environmental Products. The kits will be set up to detect TPH at 20 and 200 ppm respectively. Field screening results will be stated in as <20 ppm, 20 -200 ppm, and >200 ppm. In addition, the samples will be analyzed by the EAL, using thermal extraction and gas chromatography / mass spectroscopy to determine the total hydrocarbon content in the C_{12} to C_{24} (diesel) range. Hydrocarbon compounds greater than C_{24} will also be measured.

4.4 Sampling Methods

Soil samples will be collected by excavating to a depth of at least six inches with a shovel. The sample will be placed in a wide-mouth glass jar and carried to the mobile lab for on-site analysis. A 10-gram aliquot will be weighed out in the mobile lab and analyzed immediately using a field immunoassay test kit. The remainder of the sample will be placed in a cooler at 4°C and transmitted to the EAL by the end of the day.

Sample locations will be determined in the field using a Brunton compass and tape. Sample locations will be stated as coordinate offsets from markers established at the perimeter of the waste pile. The coordinates of the markers will be determined after the sampling effort.

5 FIELD SCREENING METHODS

Initially the soil will be screened at various locations using the hydrocarbon sheen test. This consists of placing a small quantity of soil into a black plastic gold pan and adding water. A hydrocarbon sheen on the water indicates the possible presence of petroleum hydrocarbons. The presence of a hydrocarbon sheen will be justification for collecting a sample for field screening.

Field immunoassay will be carried out in accordance with vendor instructions. 10 g of soil will be weighed out and extracted with 20 ml methanol. The extract will be filtered and transferred to antibody coated tubes along with buffer solution and enzyme conjugate. After a ten minute incubation period, the tubes will be rinsed and color development reagents added. After a 2 /12 minute color development period the stop solution will be added and the degree of color development compared to a standard. Since the field test is based on a competitive immunoassay in which analyte molecules compete for antibody binding sites with the enzyme conjugate, the degree of color development is inversely proportional to the concentration of the analyte. Serial dilution will be used to compare the sample against the standard at two levels. Each analytical batch will include two standards. The color density of the two standards will be compared with a differential photometer, and the darker of the two standards will be used for comparison. The difference in optical density between the two standards shall be less than 0.2. In order to be judged significant, any difference in optical density between a sample and a standard shall be greater than the difference between the two standards. Results will be reported in terms of three concentration ranges:

< 20 ppm:	Color density of first dilution is greater than the standard (positive differential)
20 - 200 ppm:	Color density of the first dilution is less than the standard (negative differential, but color density of the second dilution is greater than the standard.
>200 ppm:	Color density of the second dilution is less than the standard.

6 QUALITY ASSURANCE / QUALITY CONTROL

At least one duplicate sample and one blank will be analyzed with the field immunoassay test kit. Batches in which the difference in color density between the standards is greater than 0.2 will be repeated. Sample will be transmitted to the EAL for confirmatory analysis by thermal extraction / GC-MS.

7 DATA REPORTING

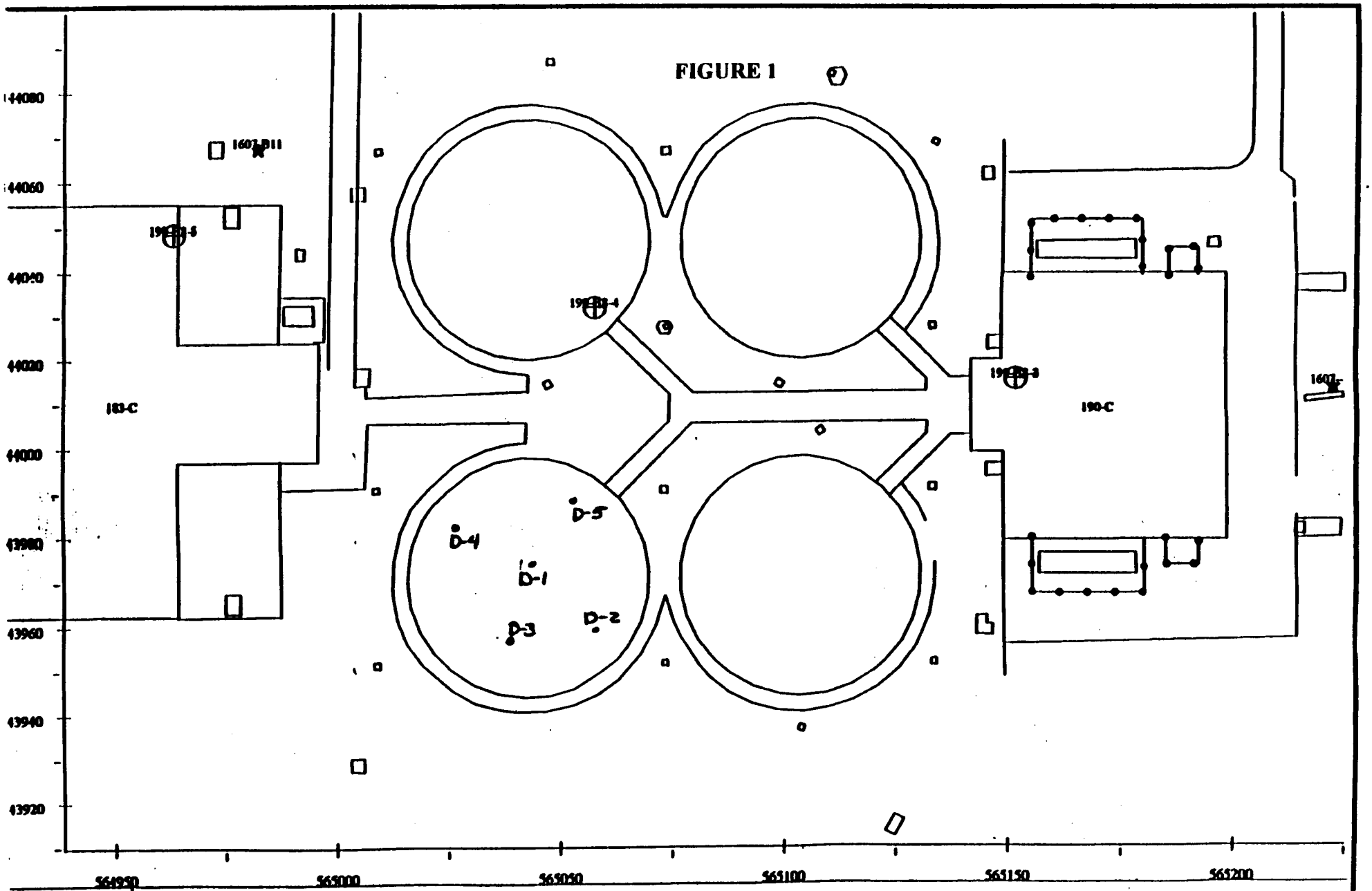
An internal memorandum will be prepared summarizing the sample results. The memorandum will include a sketch map showing sample locations. It will be submitted to the project manager upon completion of the field screening.

8 HEALTH AND SAFETY / WASTE HANDLING

Since the only contaminant in the soil is low levels of diesel fuel, personnel health and safety considerations are minimal. Field personnel will wear latex surgical gloves during sample collection and field screening. An eyewash will be available when the immunoassay field test kits are used. Spoil from the soil sampling will be placed back into the sample pit. Waste solution from the immunoassay test kits, consisting primarily of methanol in water, will be delivered to the EAL for disposal. Other wastes will be disposed of as nonhazardous solid waste.

9 REFERENCES

1. Ecology, 1991; Guidance for Remediation of Releases from Underground Storage Tanks; Washington State Department of Ecology, Toxics Cleanup Program, Olympia, WA, Publication 91-30, July, 1991



100 IU 1 Location of Diesel Contaminated Soil

Attachment 1-B - EnSys Immunoassay Test Data Sheet

EnSys Immunoassay Test
Data Sheet

Project 100-IU-1 Riverland Site 100-C Pad (Bioremediation Site)

EnSys Lot Number	Sample	Time		Soil Description	Test	Stds OD_{rel} S1:S2 S2:S1	use:	Samples			Comments
		coll	extr					Level OD_{rel}	Level OD_{rel}	Level OD_{rel}	
2337	100-C D-1	1 15 pm		brown sandy gravel	TPH (diesel)	0.00 +0.04	S1	20 ppm +0.58	200 ppm +0.67		< 20 ppm
2337	100-C D-2	1 30 pm		↓	↓	↓	↓	20 ppm +0.17	200 ppm +0.52		< 20 ppm
2337	100-C D-3	1 40		↓	↓	+0.09 −0.06	S4	20 ppm +0.10	200 ppm +0.39		< 20 ppm
2337	100-C D-4			↓	↓	↓	↓	20 ppm +0.34	200 ppm +0.18		< 20 ppm
2337	100-C D-5			↓	↓	↓	↓	20 ppm +0.20	200 ppm +0.35		< 20 ppm
	Blank			light brown silty sand	↓	↓	↓	20 ppm ~~0.4~~ 0.41	200 0.46		< 20 ppm

Notes:

Samples Collected By: Date:

Samples Analyzed By: Date:

Attachment 1-C - Riverland Railyard Sample Results

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? N
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8600

TO: R. G. McCain H6-02

DATE: May 11, 1995

COPIES: BHI Document Control H4-79

FROM: D. R. Jordan
Analytical Services
X2-10/372-2058

SUBJECT: **RIVERLAND RAILYARD SAMPLE RESULTS**

The EAL received 5 samples from R. G. McCain on May 8, 1995. The samples consisted of 5 soil samples from the Riverland Railyard site in the 100-IU-1 Operable Unit.

The samples were screened for diesel fuel contamination using Solid Phase Microextraction (SPME) and gas chromatography with a flame ionization detector. Results of this screen are listed below:

EAL ID #	Sample ID	Conc. (ug/g)
Blank	NA	ND*
CALCHK (53 ppm)		54
EAL00411	100-C-D1	ND
EAL00412	100-C-D2	ND
EAL00413	100-C-D3	ND
EAL00414	100-C-D4	ND
EAL00415	100-C-D5	ND

*Minimum Detection Limits for this procedure is about 2 ug/g.

CMJ:ksb

Attachment 2 - Summary of Riverland Soil Site Visit on May 6, 1996

ATTACHMENT 2
SUMMARY OF RIVERLAND SOIL SITE VISIT ON MAY 6, 1996

On May 6, 1996, representatives from the Environmental Protection Agency, the Department of Energy - Richland Operations Office, and the Environmental Restoration Contractor visited the 190-C pad on which the soil contaminated with diesel had been placed. The soil was dry and covered approximately two-thirds of the pad. It typically ranged in depth from about one to two feet, with a pile of soil approximately five feet thick towards the center of the pad.

The soil surface was visually inspected. The soil appeared to be a combination of fine sands, coarser gravels, and large cobbles. Cheat grass and other vegetation were present across the entire soil surface. In one location, small pieces of what appeared to be vitrified clay pipe were noted. No visual indications of diesel contamination were observed.

Five sites were selected at random for further evaluation. These sites were not surveyed, but their approximate location is indicated on the attached log sheet. An organic vapor analyzer (OVA) was set up and calibrated for both low-range response (9 parts per million) and mid-range response (96 parts per million). Using a hand shovel, a test hole approximately one-half to one foot in diameter was excavated at each site in a series of lifts. As each lift was excavated, the OVA was used to evaluate the soil at the bottom of the lift. Four of the sites were excavated to the bottom of the soil, when contact was made with either the concrete or the pad or the plastic that had originally been placed between the concrete and the soil. The fifth site was a shallow excavation (4 inches) into the side of the soil pile.

The OVA readings at all sites and for all lifts were below detection limits. There were no visual indications of diesel contamination at depth at any site, nor were any odors detected. The excavation holes were backfilled, a final calibration check of the OVA was made, and the visit was concluded.

Attachment 2-A - Data Log Sheet for May 6, 1996 Riverland Soil Site Visit

5/6/96

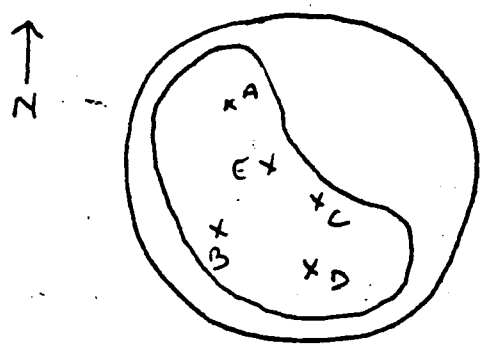
Duane Jacque

0900 Arrived at 100-B/C area near 183-C demolition site. Checked in with site Supervisor Mike Caldwell. Went to spoils pi

0910 Set up OVA 128. Battery OK Flame lit OK Warming up instrument

0935 Tested low-range response with ~~11~~ DDJ 9 ppm CH_4 gas standard. Reading 10.5 ppm

0938 Tested mid-range response with 96 ppm CH_4 gas standard. Reading 118 ppm. Instrument ready.



A - 8" - ND (baseline x 1 scale)
12" - ND
18" - ND

B - 4" - ND
8" - ND
12" - ND
18" - ND (to plastic)

C - 4" (into pile) - ND

D - 6" - ND
12" (to plastic)

E - 4" - ND
8" - ND

C - into 5' pile

E - near vitrified clay pipe pieces

Abundant cheatgrass over entire soil area.

1005 Checked instrument readings at end of soil survey. DDJ ~~11~~ 9 ppm CH_4 reading 9 ppm. 96 ppm CH_4 reading 93 ppm. Shut down instrument and packed up.

1010 Left site.

Duane Jacque

Attachment 3 - Laboratory Analytical Record Associated with May 1995 Remediated Soil from the 100-IU-1 Operable Unit (Riverland Railyard)

ATTACHMENT 3
LABORATORY ANALYTICAL RECORD ASSOCIATED WITH MAY 1995 REMEDIATED SOIL FROM THE 100-IU-1 OPERABLE UNIT
(Riverland Railyard)

This attachment provides data sheets and associated information for the immunoassay and thermal gas chromatography (GC) analyses of diesel-contaminated soil that was removed from the 100-IU-1 Operable Unit and remediated.

The following is an overview of the analyses and the 'confidence level' associated with the data.

Immunoassay analyses: The exhibits include:

Attachment 3-A: An interoffice memorandum describing methodology and findings

Attachment 3-B: The laboratory bench record and row data per method specifications

The following observations support the reliability of the immunoassay data:

- The immunoassay methodology is currently included in EPA standard methods (EPA SW 846) and is expected to provide reliable data as further detailed in the attached memorandum.
- The duplicate standard results add to the confidence in the reliability of the data.
- The bench records indicate that the measurements were per method specifications.

Thermal/GC analyses: The exhibits include:

Attachment 3-C: Laboratory report of results

Attachment 3-D: Chain of custody

Attachment 3-E: Method description

Attachment 3-F: Bench records and review data

The following analytical parameters/data support the reliability of the thermal/GC data:

- 3 calibration standards were run (5.3 parts per million [ppm], 10.6 ppm and 212 ppm).
- The lowest calibration standard (5.3 ppm) is above the estimated method detection level of 2 ppm.
- The lowest calibration standard (5.3 ppm) is significantly below the level of concern at 200 ppm.
- The laboratory included a surrogate showing over 40% recovery, thus sufficient recovery and low enough detection to ensure detection of concentrations above levels of concern.
- The chromatograph does not indicate significant interference or baseline problems.

Attachment 3-A - Methodology and Findings for May 1995 Immunoassay Analyses

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closure CODE N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8400

TO: Mathew C. Tyler, H4-90
Roberta E. Day, H4-89

DATE: May 11, 1995

COPIES: Dennis R. Jordan, X2-10
BHI Document Control H4-79, w/a

FROM: R.G. McCain/K. Lookabill-Stump
Field Screening
H6-02/376-0777

SUBJECT: **FIELD SCREENING RESULTS DIESEL CONTAMINATED SOIL 100-C AREA**

1 BACKGROUND

In September-October, 1993, soil contaminated with diesel fuel was removed from the Riverland Railroad Maintenance Shop are part of the Expedited Response Action (ERA) for the 100-IU-1 Operable Unit. The soil is described as a sandy gravel / gravelly sand, with approximately 5 to 10 percent nonplastic fines. Approximately 430 cubic yards of soil was hauled to the 100-C area, where it was spread out on a circular concrete pad adjacent to the 190-C building for bioremediation. It is presently spread to a maximum depth of approximately 18 inches with a plastic barrier between the soil and the concrete. Abundant cheatgrass is growing on the soil surface.

The purpose of the field screening effort was to determine residual diesel contamination in order to evaluate the progress of the bioremediation effort. Evidence of total petroleum hydrocarbons (TPH) concentrations greater than 200 ppm (mg/Kg) indicate that the bioremediation effort needs to be continued. Concentrations below 200 ppm indicate that the soil will likely meet Washington State cleanup standards for petroleum contaminated soil. For diesel contaminated soil, the required test is WTPH-D. This involves a methylene chloride extraction, with analysis by gas chromatography, using a flame ionization detector. Hydrocarbon compounds from dodecane (C_{12}) through tetracosane (C_{24}) are integrated as a group.

2 SAMPLE COLLECTION

Five samples from the diesel contaminated soil were collected by R.G. McCain and K.L. Lookabill-Stump on Monday, May 8, 1995. The samples were collected by digging a small pit with a shovel to a depth of approximately 6 inches. Since the soil is primarily a sandy cobble gravel, an effort was made to sample only the fine (sand range) material. The samples were placed in 2-oz widemouth jars and packed in a cooler for transmittal to the Environmental Analytical Laboratory.

Sample locations were determined by using a Brunton compass to sight to nearby building corners.

3 SAMPLE ANALYSIS

Samples were analyzed immediately on site using the EnSys Petro RISC field immunoassay test kit. This kit is based on antibody coated tubes, and provides a qualitative result relative to the selected concentration level. For diesel compounds, the detection limit of the EnSys kit is 15 ppm. The test used at 190-C was adjusted by the manufacturer to provide qualitative results at 20 ppm and 200 ppm, respectively. In this case, the adjustment was made by weighing out 7.5 grams of soil instead of 10 grams. This effectively changed the detection limit from 15 to 20 ppm.

Field immunoassay was carried out in accordance with vendor instructions. 7.5 g of soil was weighed out and extracted with 20 ml methanol. The extract was filtered, buffered, and transferred to antibody coated tubes along with an enzyme conjugate. During a 10 minute incubation period, analyte molecules compete with the enzyme conjugate for available antibody binding sites. After incubation, the tubes are rinsed and color development reagents added. After a 2.5 minute color development period, the degree of color development was compared to a standard. The degree of color development is inversely proportional to the concentration of the analyte, because of the competitive binding process. Serial dilution was used to compare the sample against the standard at two levels. Each analytical batch included duplicate standards. The color density of the two standards was first compared with a differential photometer, and the darker of the two standards was used for comparison. Results are shown on the attached data sheet. Because of the qualitative nature of the immunoassay, results fall into three categories:

< 20 ppm:	Color densities of both the sample and the serial dilution are greater than the standard (positive differential)
20 - 200 ppm:	Color density of the sample is less than the standard (negative differential, but color density of the serial dilution is greater than the standard.
>200 ppm:	Color densities of the both the sample and the serial dilution are less than the standard.

All results from the bioremediation site were less than 20 ppm. In addition, the samples were analyzed by the EAL, using thermal extraction and gas chromatography ~~/mass spectroscopy~~ to determine the total hydrocarbon content. Results from the thermal extraction analysis are summarized on the attached data sheet.

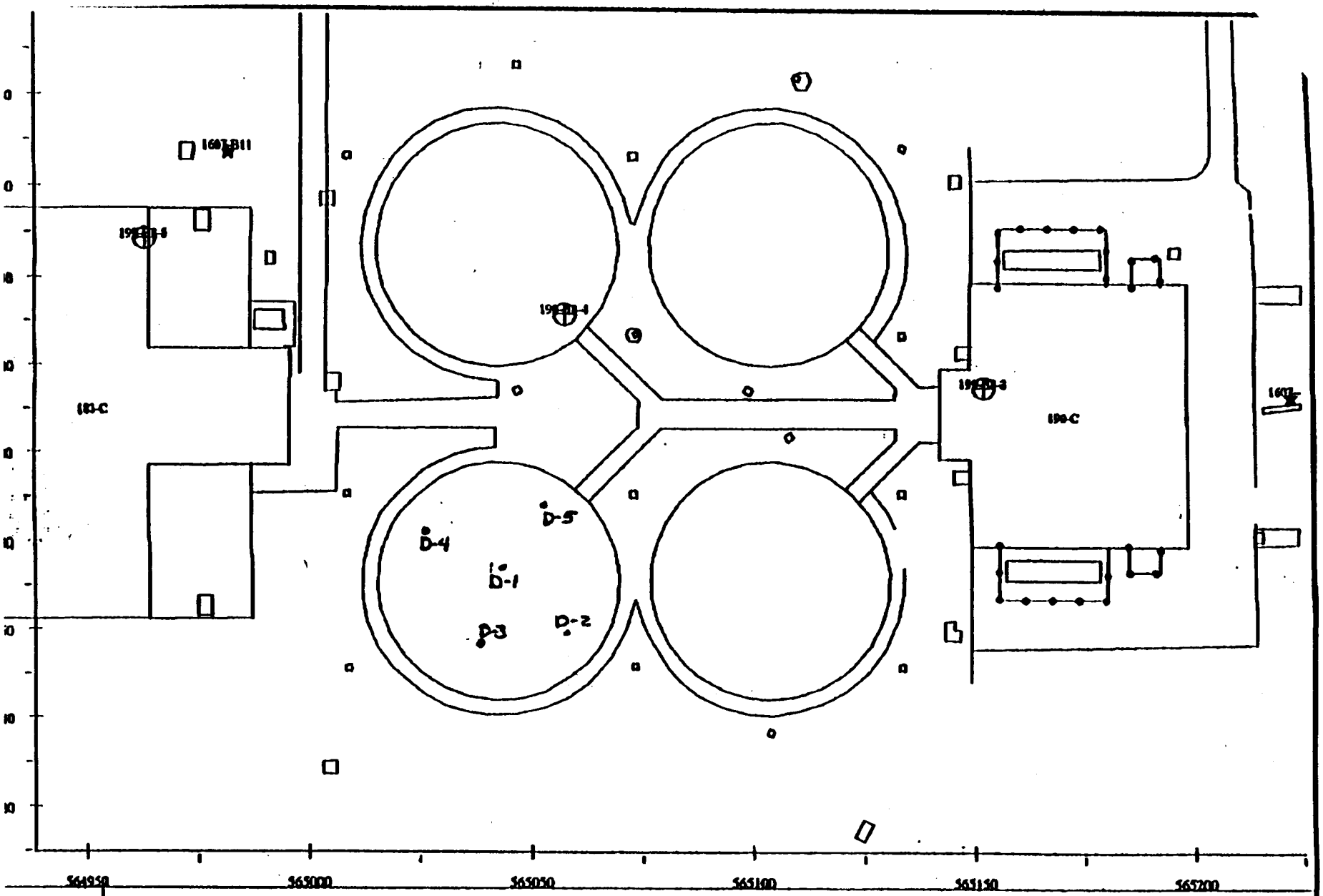
4 SUMMARY

Results of both the field immunoassay and the thermal extraction analysis carried out at the EAL indicate that bioremediation is substantially complete. Diesel concentrations in the soil appear to be well below 200 ppm, the Washington State cleanup level for diesel contaminated soil. These results must be

confirmed by WTPH-D to support final disposition.

RGM:ksb

Attachment: Field Screening Results



100 IU 1 Location of Diesel Contaminated Soil

tanks

LB_Peterson__04/28/95

Attachment 3-B - Laboratory Results for Immunoassay Analyses

EnSys Immunoassay Test
Data Sheet

Project 100-IU-1 Riverland Site 100-C Pad (Bioremediation S.F.)

EnSys Lot Number	Sample	Time		Soil Description	Test	Stds OD_{rel} S1:S2 S2:S1	use:	Samples			Comments
		coll	extr					Level OD_{rel}	Level OD_{rel}	Level OD_{rel}	
2337	100-C D-1	1 15 pm		brown sandy gravel	TPH (diesel)	0.00 +0.04	S1	20 ppm +0.58	200 ppm +0.67		< 20 ppm
2337	100-C D-2	1 30 pm						20 ppm +0.17	200 ppm +0.52		< 20 ppm
2337	100-C D-3	1 40				+0.09 −0.06	S4	20 ppm +0.10	200 ppm +0.39		< 20 ppm
2337	100-C D-4							20 ppm +0.34	200 ppm +0.18		< 20 ppm
2337	100-C D-5							20 ppm +0.20	200 ppm +0.35		< 20 ppm
	Blank			light brown silty sand				20 ppm ~~0.41~~ 0.41	200 0.46		< 20 ppm

Notes: _____

Samples Collected By: _____ Date: _____

Samples Analyzed By: _____ Date: _____

Attachment 3-C - Laboratory Report of Results for May 1995 Thermal/GC Analyses

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8400

TO: R. G. McCain H6-02

DATE: May 11, 1995

COPIES: BHI Document Control H4-79

FROM: D. R. Jordan
Analytical Services
X2-10/372-2058

SUBJECT: **RIVERLAND RAILYARD SAMPLE RESULTS**

The EAL received 5 samples from R. G. McCain on May 8, 1995. The samples consisted of 5 soil samples from the Riverland Railyard site in the 100-IU-1 Operable Unit.

The samples were screened for diesel fuel contamination using Solid Phase Microextraction (SPME) and gas chromatography with a flame ionization detector. Results of this screen are listed below:

EAL ID #	Sample ID	Conc. (ug/g)
Blank	NA	ND*
CALCHK (53 ppm)		54
EAL00411	100-C-D1	ND
EAL00412	100-C-D2	ND
EAL00413	100-C-D3	ND
EAL00414	100-C-D4	ND
EAL00415	100-C-D5	ND

*Minimum Detection Limits for this procedure is about 2 ug/g.

CMJ:ksb

Attachment 3-D - Chain of Custody for Thermal/GC Analyses

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 7

To Rick McCain | From Diane Call | Co. | Phone # 3-3915 | Co. | Dept. | Fax # 3-6640 | Fax # 372-9702

Date Received	Batch No.	EAL ID	Customer ID	Originator	Transmit Results To:			Analysis	Charge Code	Report Date
4-28-95	950501A (cont'd)	EAL00403	Vol. Hole Hydrocarbons Conc. 1	EPA thru WDOE	see previous			VOA	EG3BA	5-23-95
		EAL00404	Vol state HCs Conc. 2					VOA		5-23-95
		EAL00405	Polychlorinated Biphenyl Conc. 1					PCB		
		EAL00406	PCB Conc. 2					PCB		
		EAL00407	Pestirides Conc. 1					Pestiride		
		EAL00408	Pestirides Conc. 2					"		
		EAL00409	Pestirides Conc. 3					"		
		EAL00410	Pestirides Conc. 4					"		
5-8-95	950508A	EAL00411	100-C-D1	R. McCain / K. Lookabill-Stump				TPH (diesel fraction)	PB62A	complete
		EAL00412	100-C-D2			100-IU-1 (Riverland ERA)				complete
		EAL00413	100-C-D3							complete
		EAL00414	100-C-D4							complete
		EAL00415	100-C-D5							complete
5-10-95	950510A	EAL00416	B0FHC8	ID Jacques	same	100-FR-3	groundwater	VOA	PD3EA ~~PDE3A~~	complete
5-11-95	"	EAL00417	B0FHF1	ID Jacques	same	"		VOA		complete
5-15-95	950516A	EAL00418	B0FKL1	ID. Jacques	same	"		VOA		complete
5/19/95	950519A	EAL00419	B0FLS8	Ken Trapp	Mike Stankovich	2-9626	—	Anions	P35B1	5/19/95
"	"	EAL00420	B0FLS9	Ken Trapp	"	"	"	"	"	5/19/95
"	950519B	EAL00421	B0FKS4	ID. Jacques	Same	100-FR-3	groundwater	VOA	PD3EA ~~PDE3A~~	complete
5-24-95	950524A	EAL00422	CS-1	544-8168 Susan Winslow	373-4033 Scott Thoren	FAX 373-7[illegible] 190-D	Crushed concrete	GEA TOT-ACT	UB44D	reissued 8-[illegible] 6-5-95
"	"	EAL00423	CS-2	"	"	"	"	"	"	6-5-95

Attachment 3-E - Method Description for May 1995 Thermal/GC Analyses

From: Courtney M Jones at ~WHC178 5/2/95 4:20PM (1404 bytes: 1 ln)
: Richard G McCain at ~WHC198, Philip S (Stan) Gisler at ~WHC77
Subject: ThermEx for Diesel
---------- Message Contents ----------

Text item 1: Text_1

One method of analyzing soil samples for organic analytes is by thermally extracting the analytes from the soil, basically cooking them out. The Ruska ThermEx Thermal Extractor allows for such a technique. A small amount (50-100 mg) of sample is weighed into a crucible. The crucible is placed into a quartz pyrocell where it is heated to 330C. While the sample is being heated, helium gas is passed through it. This gas carries the extracted analytes to the head of a gas chromatograph where separation of the analytes and subsequent detection/quatitation occurs.

The EAL has a ThermEx Thermal Extractor attached to a Hewlett-Packard Gas Chromatograph (HP5890 Series II) with a Mass Selective Detector (HP5972). Current detection limits using this system for the detection of diesel fuel in soil is less than 10 mg/Kg (ppm). With a turnaround time of 48 hours (probably less than 24 hours actually), cost per sample is $190.

Attachment 3-F - Bench Records and Review Data for May 1995 Thermal/GC Analyses

L-1219 p. 4
Shoot Log GC/FID #1

Post-it® brand fax transmittal memo 7671 | # of pages ▸ 1
To Rick McCain | From Diane Coll
Co. | Co.
Dept. | Phone # 2-...

1/12/95 Calibrated instrument for Diesel Range Organics at 2 ppm, 20, 80, 120, 200 ppm levels. Ran a calibration check - OK. Ran a blank - OK. Then Run samples from the SFE for N-springs samples EAL00209 and EAL00210. Page 5 lists all of the shoot log information pertinent to these samples.

[signature] 1/12/95

5/2/95 Prepared fire diesel in soil samples w/ SPME. The lab is shut down due to a lack of an air permit, so "solventless" methods must be employed in order to run samples.
Soil samples are analyzed using SPME with a 100 um Polydimethylsiloxane coated fiber. Conditions are as follows:

1) 1 gm soil in 7 mL H_2O with 5 uL 2000 ppm o-terphenyl in acetone.
2) Stir soil with stirbar while fiber remains immerse in water 15 minutes.
3) GC injection port 250°C. Desorb 5 minutes.

Calibrated using 5.3 ppm, 10.6 ppm, and 21.2 ppm standards of actual diesel fuel.

Correlation Coeff = 0.997.

[signature]

5/3/95 Run samples that were screened by Therm Ex.

		Diesel	O-terphenyl (Surrogate) (10 ppm)
EAL00412	100-C-D2	-5.7 ppm	6.7 ppm
EAL00413	100-C-D3	Not found	4.2 ppm * Rerun!

[signature]

5/4/95 Run samples that were screened by Therm Ex. Rerun EAL00413 due to low recovery. Perhaps fiber was too warm. If good recoveries on first analysis will use 2 fibers alternating.

		Diesel	O-terphenyl (surrogate, 10 ppm)
EAL00413	100-C-D3	0	
EAL00CALCK01	53 ppm Std.	53 ppm	
Blank01	Soil blank	0	
EAL00411	100-C-D1	0	
EAL00414	100-C-D4	0	
EAL00415	100-C-D5	0	
OLDSAMP	N506	64 ppm	

* These are one week off from run date due to analyst error.

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\50510\~~EAL00415~~ N505.D
Operator : C M Jones
Instrument : HP GC\FID
Sample Name : ~~100-C-D5~~ N505
Run Time Bar Code:
Acquired on : 11 May 95 03:10 PM
Report Created on: 11 May 95 03:34 PM
Last Recalib on : 11 May 95 10:58 AM
Multiplier : 1

Page Number : 1
Vial Number : 1
Injection Number :
Sequence Line :
Instrument Method: SPMEDSL.MTH
Analysis Method : SPMEDSL.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\50510\EAL00415.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	3858363	VB +	0.000	1	64.236	Diesel
13.414	2603	BV	0.022	1	0.505	o-terphenyl

Data File Name : C:\HPCHEM\1\DATA\50510\EAL00415.D
Operator : C M Jones
Instrument : HP GC\FID
Sample Name : 100-C-D5
Run Time Bar Code:
Acquired on : 11 May 95 03:10 PM
Report Created on: 11 May 95 03:34 PM
Last Recalib on : 11 May 95 10:58 AM
Multiplier : 1

Page Number : 1
Vial Number : 1
Injection Number :
Sequence Line :
Instrument Method: SPMEDSL.MTH
Analysis Method : SPMEDSL.MTH
Sample Amount : 0
ISTD Amount :

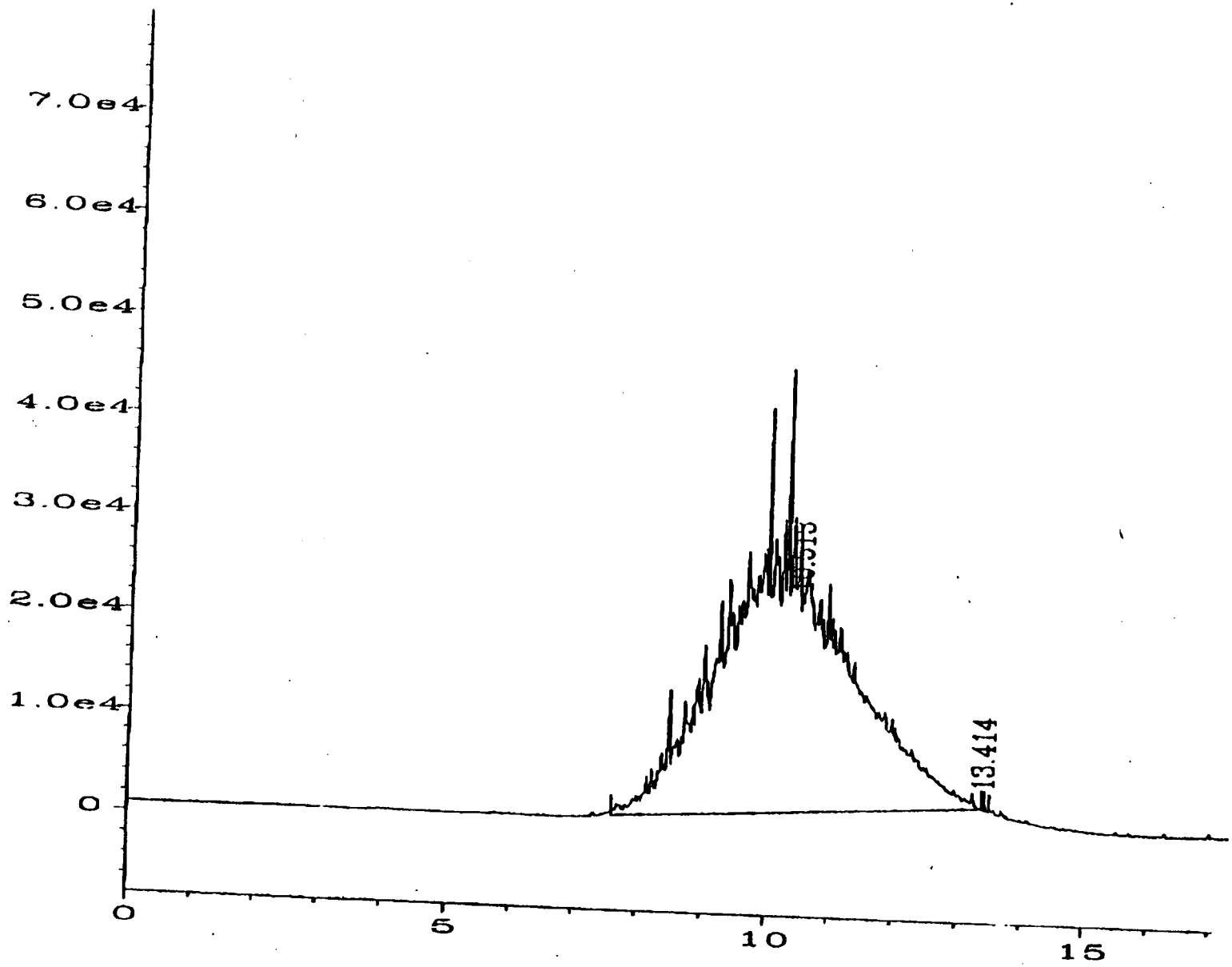
Sig. 1 in C:\HPCHEM\1\DATA\50510\CALCK01.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	* not found *			1		Diesel
13.415	* not found *			1		o-terphenyl

Not all calibrated peaks were found

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 7

To Rick McCain	From Diane Call
Co.	Co.
Dept.	Phone # 3-3915
Fax # 372-9702	Fax # 3-6640


7.0e4
6.0e4
5.0e4
4.0e4
3.0e4
2.0e4
1.0e4
0
0
5
10
15
13.414

External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\50510\EAL00411.D	Page Number	: 1
Operator	: C M Jones	Vial Number	: 1
Instrument	: HP GC\FID	Injection Number	:
Sample Name	: 100-C-D1	Sequence Line	:
Run Time Bar Code	:	Instrument Method	: SPMEDSL.M
Acquired on	: 11 May 95 12:53 PM	Analysis Method	: SPMEDSL.M
Report Created on	: 11 May 95 01:15 PM	Sample Amount	: 0
Last Recalib on	: 11 May 95 10:58 AM	ISTD Amount	:
Multiplier	: 1		

Sig. 1 in C:\HPCHEM\1\DATA\50510\EAL00411.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	25593	BB +	0.000	1	-2.050	Diesel
13.415	18052	BB	0.019	1	2.095	o-terphenyl

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\50509\EAL00412.D
Operator : C M Jones
Instrument : HP GC\FID
Sample Name : 100-C-D2
Run Time Bar Code:
Acquired on : 10 May 95 01:53 PM
Report Created on: 10 May 95 03:32 PM
Last Recalib on : 04 May 95 09:16 AM
Multiplier : 1

Page Number : 1
Vial Number : 1
Injection Number :
Sequence Line :
Instrument Method: SPMEDSL.MT
Analysis Method : SPMEDSL.MT
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\50509\EAL00412.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	13631	BB +	0.000	1	-5.685	Diesel
13.415	49571	MM	0.019	1	6.735	o-terphenyl

User Modified

(500 mg/mL)(.01 mL) = 53 ppm.

External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\50510\EAL00413.D		
Operator	: C M Jones	Page Number	: 1
Instrument	: HP GC\FID	Vial Number	: 1
Sample Name	: 100-C-D3	Injection Number	:
Run Time Bar Code	:	Sequence Line	:
Acquired on	: 11 May 95 09:40 AM	Instrument Method	: SPMEDSL.MTH
Report Created on	: 11 May 95 10:23 AM	Analysis Method	: SPMEDSL.MTH
Last Recalib on	: 04 May 95 09:16 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\50510\EAL00413.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	26823	BB +	0.000	1	-5.314	Diesel
13.415	43082	BB	0.019	1	5.853	o-terphenyl

External Standard Report

Data File Name : C:\HPCHEM\1\DATA\50510\EAL00414.D
Operator : C M Jones
Instrument : HP GC\FID
Sample Name : 100-C-D4
Run Time Bar Code:
Acquired on : 11 May 95 01:37 PM
Report Created on: 11 May 95 02:19 PM
Last Recalib on : 11 May 95 10:58 AM
Multiplier : 1

Page Number : 1
Vial Number : 1
Injection Number :
Sequence Line :
Instrument Method: SPMEDSL.MTH
Analysis Method : SPMEDSL.MTH
Sample Amount : 0
ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\50510\EAL00414.D

Ret Time	Area	Type	Width	Ref#	ug/g	Name
10.513	13694	BB +	0.000	1	-2.256	Diesel
13.415	5257	BB	0.030	1	0.778	o-terphenyl