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

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:

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

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

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 yd^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 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 question, 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 toward 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

R.G. McCain

ATTACHMENT A

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

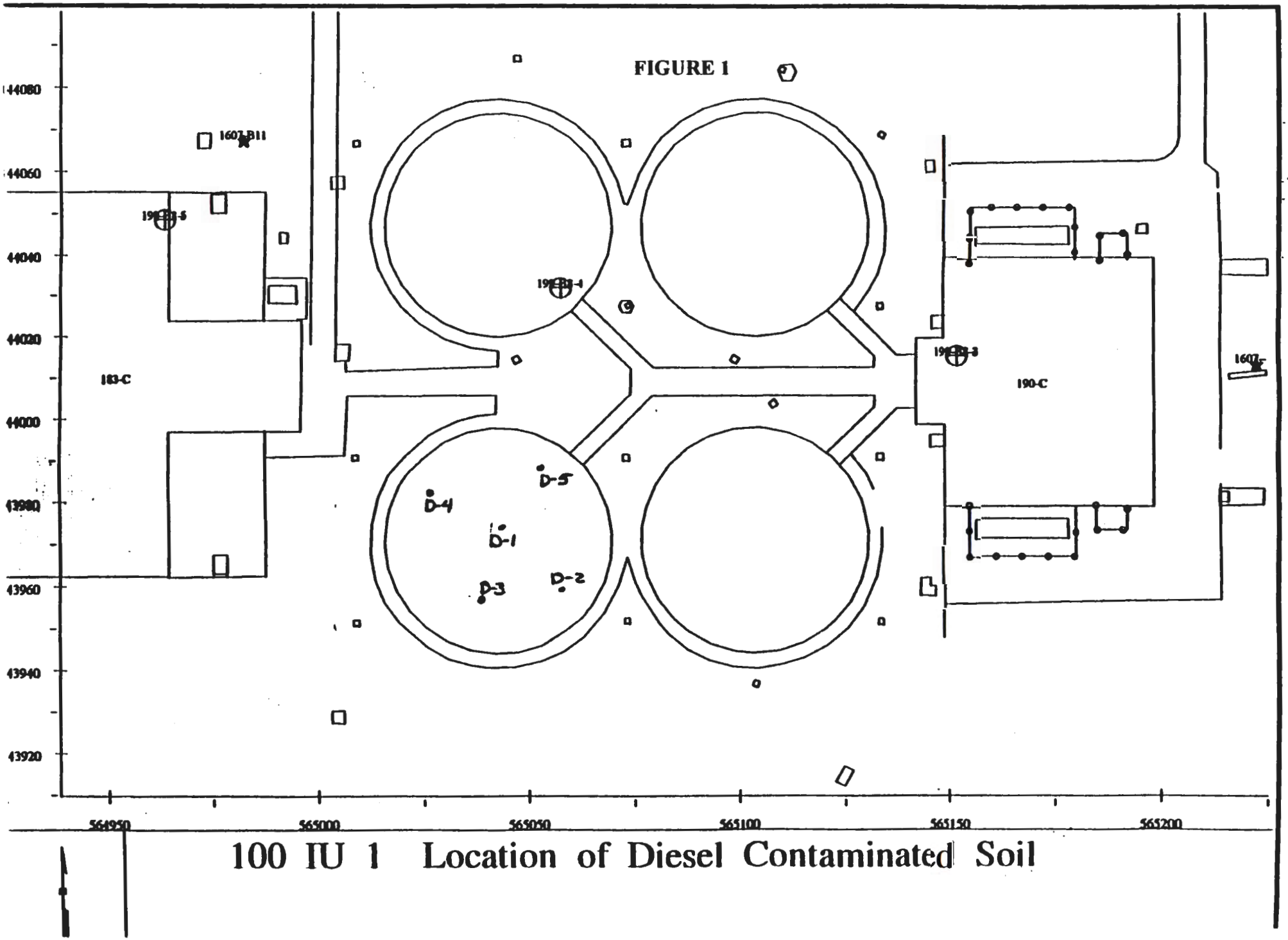
An internal memorandum will be prepared summarizing the sample results. The memorandum will include a sketch map showing sample locations. It will be submitted to the project manager upon completion of the field screening.

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 B

EnSys Immunoassay Test Data Sheet

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

EnSys Lot Number	Sample	Time		Soil Description	Test	Stds OD_{rel} S1:S2 S2:S1	use:	Samples Level OD_{rel}	Level OD_{rel}	Level OD_{rel}	Comments
		coll	extr								
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 ~~0.6~~ 0.41	200 0.46		< 20 ppm

Notes: _____

Samples Collected By: _____ Date: _____

Samples Analyzed By: _____ Date: _____

Environmental Restoration Contractor **ERC Team**

ATTACHMENT C

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
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