PORT OF OAKLAND

September 19, 1996

Mr. Barney Chan
Alameda County Health Care Services Agency
Environmental Protection Division
1131 Harbor Bay Parkway, #250
Alameda, CA 94502-6577

SUBJECT: DISPOSITION OF SOILS DURING REMOVAL OF FORMER TANKS MF-23 AND MF-24 (UNITED AIRLINES TAXIWAY SITE), METROPOLITAN OAKLAND INTERNATIONAL AIRPORT, 1100 AIRPORT DRIVE, OAKLAND, CALIFORNIA (StID #1049)

Dear Mr. Chan:

As per your request during our meeting yesterday, we are providing the enclosed documentation for disposition of soils during removal of former Tanks MF-23 and MF-24 (United Airlines Taxiway Site), Metropolitan Oakland International Airport, 1100 Airport Drive, Oakland, California. The enclosed document (excludes Appendices) provides a summary of disposition of soils at the former "Bioremediation Site" located at the North Field of Metropolitan Oakland International Airport. The specific portion to be referenced has been flagged and highlighted.

As we discussed during the meeting, this site is to be closed by the County with a letter of no further interest. To facilitate closure, the Port of Oakland (Port) intends to appropriately abandon/destroy the three monitoring wells at the subject site.

Concurrently, the Port would like to appropriately abandon/destroy the monitoring wells located at Hangar 9 (former Tanks LF-19 and LF-20, StID #4219). Please let us know when abandonment procedures can proceed to facilitate the closure process.

If you have any questions or need additional information, please

530 Water Street ■ Jack London's Waterfront ■ P.O. Box 2064 ■ Oakland, California 94604-2064
Telephone (510) 272-1100 ■ Fax (510) 272-1172 ■ TDD (510) 763-5703 ■ Cable address, PORTOFOAK, Oakland

call me at 272-1118. Thank you for your on-going assistance and support on this project.

Sincerely,

Jeffrey L. Rubin, REA, CPSS
Associate Environmental Scientist
Environmental Health & Safety Compliance

Enclosure

cc:
Neil Werner - EH & SC (w/o encl)
Mark O'Brien - EH & SC (w/o encl)
Jeff Hess - ITSI (encl)

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Summary of the Source, Treatment, and Disposition of Soils Port of Oakland Bioremediation Site

May 16, 1996

Prepared for

The Port of Oakland
530 Water Street
Oakland, California

Prepared by

Uribe & Associates
Palo Alto and Oakland, California
(415) 325-9195

U&A Project 187-01

2 Project Background

The Port established the Bioremediation Site for the treatment of non-hazardous hydrocarbon-contaminated soils associated primarily with the removal of underground tanks on Port property. The site was operated according to the *Operations Manual* (Revised by Uribe & Assoc., 1994), which was approved by the Alameda County Department of Environmental Health (1994). Site operation was initially approved the Regional Water Quality Control Board in 1990 (September, 1990). The *Operations Manual* contained the treatment standards that were to be met before the soils could be reused as fill on Port property. These standards are discussed in section 4.2.

The soils treated at the facility were sampled several times. Before being brought to the site, soils were sampled for hazardous characteristics. After treatment was believed to be complete, the Port's remediation contractor collected composite samples for screening analysis. If sampling results indicated that soils had been adequately treated, the Port's environmental consultant collected discrete soil samples at a frequency specified in the *Operations Manual* to evaluate the whether the soils could be reused on Port property. When the Port decided to close down the site in 1995, it became apparent that some of the soils would not be sufficiently treated to meet the standards for reuse and would have to be disposed of at a permitted facility. These soils were sampled according to criteria specified by BFI Landfill, which was the selected disposal facility. The various types of sampling are described below.

3 Pre-Acceptance Soil Sampling

Before being brought to the Bioremediation site, soils were sampled for hazardous characteristics (ignitability, reactivity, corrosivity, and toxicity) according to Title 22 requirements. Only non-hazardous soils were accepted; if found to be hazardous, soils were disposed of at a permitted facility.

Summary of the Source, Treatment, and Disposition of Soils Port of Oakland Bioremediation Site

1 Introduction

This report summarizes the sources, treatment, and disposition of soils treated at the Port of Oakland (Port) Bioremediation Site since it began operation in 1990. This report is submitted in conformance with the requirements of the site *Operations Manual for the Port of Oakland Bioremediation Site* (Revised by Uribe & Assoc., 1994; page 6, bullet item 7), which requires the Port to submit records of the volume and type of waste handled at the Bioremediation Site. This is the final report for this facility, because the Port has closed down site operations, and no more soils will be accepted for treatment. The report is organized as follows:

- Section 2 describes the project background and outlines the types of sampling that have been conducted on the soils being treated.
- Section 3 describes the sampling conducted on soils before they were accepted at the site.
- Section 4 describes the sampling conducted to assess the treatment status of the soils.
- Section 5 describes the off-site disposal of the soils that were not fully bioremediated.
- Section 6 contains Table 1, which summarizes the disposition of soils treated at the site throughout its operation.
- Section 7 describes the soil source, treatment, sampling, and disposition of the soils accepted at the site since 1992.
- Section 8 lists the analytical methods used to analyze the soil samples, as well as the abbreviations used in the tables in section 7.
- Section 9 contains references.

Summary of the Source, Treatment, and Disposition of Soils
Port of Oakland Bioremediation Site

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Appendices: Sampling Results

Summary of the Source, Treatment, and Disposition of Soils Port of Oakland Bioremediation Site

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4 Soil Sampling to Assess Treatment Status

4.1 Soil Sampling

After treatment was believed to be complete, the Port's remediation contractor sampled the soils at a frequency of one four-point composite per 100 cubic yards (cy). The sampling results were compared to the site treatment standards (discussed in section 4.2). If the results were higher than the treatment standards, the soils were allowed to bioremediate further and were resampled at a later date.

If the screening results were lower than the treatment standards, the soils were sampled by the Port's environmental contractor at a frequency of one discrete sample per 20 cy, which is the frequency specified in the *Operations Manual* to assess whether soils are ready for reuse. Sample locations were selected using a systematic random approach, as specified in Appendix B of the *Operations Manual*. Note that for the June 1995 sampling event only, samples were collected at a frequency of one discrete sample per 50 cy. The one-time lower sampling density was permitted by the County[1] because the stockpiles sampled in June 1995 had been previously sampled at a density of one sample per 20 cubic yards of soil.

As approved by the County[2], samples analyzed by EPA Method 8015 were extracted with hexane and triple-rinsed with silica gel to remove non-petroleum hydrocarbons. This approach was used because the soils were mixed with compost for treatment, and the natural organic compounds might have resulted in anomalously high analytical results.

Sampling results are summarized for each soil source in section 7. The analytical methods used to analyze the soil samples are listed in section 8. Laboratory analytical results are arranged by sampling date following the end of the text.

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1 Approved by Jennifer Eberle, Alameda County Health Agency, Department of Environmental Health, in a telephone conversation with S. Knott of U&A on June 15, 1995.

2 Approved by Jennifer Eberle, Alameda County Health Agency, Department of Environmental Health, in telephone conversations with S. Knott of U&A on August 25 and 26, 1995.

4.2 Assessment of Status of Treatment

The site treatment standards, contained in the *Operations Manual*, were as follows:

- BTEX: 1 mg/kg each of benzene, toluene, ethyl benzene, and xylenes
- TPH as gasoline: 10 mg/kg
- TPH as diesel: 50 mg/kg
- TPH as motor oil: 100 mg/kg
- Oil & Grease: 100 mg/kg

For most soil piles, results were compared to the cleanup levels on an individual sample basis. However, with the County's concurrence[3], upper bound confidence intervals were compared to the cleanup levels for some soil piles in which a small number of samples exceeded the cleanup level, but the mean value for the soil pile was well below the cleanup level. Confidence intervals were one-tailed, 90 percent upper confidence limits that were calculated as specified in Chapter 9 of SW-846.

5 Off-Site Disposal of Some Soils

Not all of the soils brought to the Bioremediation Site for treatment had completed treatment when the Port decided to close down site bioremediation activities in 1995. These soils were disposed of at BFI Landfill at Vasco Road. Before disposal, the soils were sampled according to criteria specified by BFI. After BFI approved the soils for acceptance, the soils were transported to the landfill by Dillard Environmental Services. During the removal of the soils from the site, representatives of both the Port and Uribe & Associates (U&A) were on site to maintain site control. U&A conducted air monitoring with a photo-ionization detector (PID) immediately downwind of soil removal activities, unless safety conditions dictated otherwise. PID readings were almost consistently non detect. Three out of 212 readings had low levels of detection (3.6 ppm maximum); these readings were taken near the exhaust of the operating equipment. U&A also recorded wind speed and direction on a Novalynx weather machine throughout soil removal operations.

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[3] Approved by Jennifer Eberle, Alameda County Health Agency, Department of Environmental Health, in a telephone conversation with S. Knott of U&A on January 19, 1996.

6 Summary of Disposition of Soils

The sources, treatment, and disposition of soils treated at the Bioremediation Site since it began operation in April 1991 are summarized in Table 1, which starts on the following page. Section 7 summarizes sampling results for each soil source received at the site since 1992. Earlier sampling results are contained in the reports referenced in Table 1.

Table 1: Summary of Disposition of Soils Treated at the Port of Oakland Bioremediation Site

Source	Pre-Acceptance Sampling Maximum Contaminant Concentrations Detected	Pre-Acceptance Sampling Waste Characterization Analyses Performed	Date of Placement at Treatment Site/Contractor	Soil Volume Accepted (cy)	Remediation Contractor	Date Treatment Started	Date of Verification Samples	Volume and Date of Soil Removal/ Contractor	Fill Location	Date and Source of Final Soil Disposition Documentation
Removal of UST PF04 from 1755 Embarcadero[1]	O&G = 380 mg/kg	Oil and grease, 8015M, 8240, 8270, Title 26 Metals, Bioassay, Flashpoint	8/20/90 / MPH, Inc.	84	BATM	4/5/91	8/9/91	84 cy, 8/29/91 / BATM	Hassler and Oakport	11/4/91, BASELINE
Removal of USTs EF11, EF12, EF13, EF14 from APL, 1395 Middle Harbor Road[2]	Diesel = 420 mg/kg O&G = 94 mg/kg Acetone = 130 ppb 2-butanone = 65 ppb Ethyl benzene = 35 ppb Xylenes = 310 ppb	Oil and grease, 8015M, Bioassay, pH, Flashpoint, 8240, Title 26 Metals	9/13/90 / IT Corp.	332	BATM	4/5/91	6/19/91 8/9/91 8/14/91 10/1/91	180 cy, 8/29/91 / BATM; 152 cy, 10/18/91 / BATM	Hassler and Oakport; Median at Doolittle, Hegenberger, Earhart, and Airport Drive	11/4/91, BASELINE
Removal of USTs MF23 and MF24 from United Airlines[3]	Jet fuel = 3,300 mg/kg Benzene = 0.38 mg/kg Xylenes = 0.48 mg/kg Ethyl benzene = 1.9 mg/kg	Jet fuel, 8240, Title 26 Metals, Bioassay, pH, Flashpoint	6/11-17/91 / Ramcon	1,530	BATM	8/17/91	11/21/91 1/1/92 4/1/92	930 cy, 12/13/91 / Gallagher and Burke; 560 cy, 6/1/92 / Gallagher and Burke	Median at Doolittle, Hegenberger, Earhart, and Airport Drive	8/14/92, BASELINE
Retrofit of UST MF35 from United Airlines[3]	Diesel = 13,000 mg/kg Xylenes = 9.4 mg/kg	8015M, 8240, DOHS, LUFT, Title 26 Metals, Bioassay, pH, Flashpoint	8/2/91 / Aqua Science Engineers	2.5	BATM	8/17/91	[4]	[4]	[4]	[4]
Repair and retrofit of UST MF36 from United Airlines[3]	Gasoline = 950 mg/kg (composite) Gasoline = 6,600 mg/kg (discrete)[5]	8015M, Flashpoint	8/2/91 / Aqua Science Engineers	2.5	BATM	8/17/91	[4]	[4]	[4]	[4]
Removal of UST GF02 from 251 5th Avenue[6]	Gasoline = 1.2 mg/kg Total lead = 14 mg/kg	DOHS LUFT, 8020, 8240, Title 26 Metals, Bioassay, pH, Flashpoint	Unknown / Tankprotect Engineering	2.5	BATM	[4]	[4]	[4]	[4]	[4]
Removal of UST GF03 from 351 Embarcadero[7]	Diesel = 58 mg/kg Total lead = 160 mg/kg Soluble lead = 3.3 mg/kg	DOHS LUFT, 8020, 8240, Title 26 Metals, Bioassay, pH, Flashpoint	Unknown / Tankprotect Engineering	2.5	BATM	[4]	[4]	[4]	[4]	[4]

Table 1, Continued: Summary of Disposition of Soils Treated at the Port of Oakland Bioremediation Site

Source	Pre-Acceptance Sampling Maximum Contaminant Concentrations Detected	Pre-Acceptance Sampling Waste Characterization Analyses Performed	Date of Placement at Treatment Site/Contractor	Soil Volume Accepted (cy)	Remediation Contractor	Date Treatment Started	Date of Verification Samples	Volume and Date of Soil Removal/ Contractor	Fill Location	Date and Source of Final Soil Disposition Documentation
Removal of USTs LF19 and LF20 from 7683 Earhart Road[8]	Gasoline = 77 mg/kg	8015M, 8240, Title 26 Metals, Bioassay, pH, Flashpoint	12/91 / VCI	650	BATM	3/18/92	7/13/92 9/2/92	360 cy, 10/6/92 / RESNA[9]	Terminus of Earhart Road; Blimp pad	2/2/93, BASELINE
Excavation of soil from 7th and Terminal (former Powerine Oil Co. Site)[10]	Diesel = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	8015, 8240, 8270, Title 26 metals, Bioassay, pH, Flashpoint, Corrosivity	12/16-18/92 / RESNA	3,400 (Cells A - D)	RESNA and BATM	6/14/93 A, B, C Retreated 9&10/94	2/95 5/95 6/95 10/95 11/95 12/95	30 cy, 12/30/95 / Dillard 5,253 cy to be used at Port properties.	BFI Landfill on Vasco Road Current location of the Bioremediation Site.	This report
Removal of USTs MF25 and MF26 from 1100 Airport Drive (United Airlines)[11]	O&G = 10,000 mg/kg Gasoline = 2,400 mg/kg Total lead = 4 mg/kg Total PNAs = 3.417 mg/kg BTEX, Solvents[12]	8015, 5520E, 8240, Title 26 metals, Bioassay, pH, Flashpoint, 8310	10/7/92 / RESNA	700 (Cell E)	RESNA and BATM	6/14/93 500 cy Retreated 11/94	5/95 10/95 12/95	590 cy, 1/6/96 & 1/7/96 Dillard 350 cy to be used at Port properties.	BFI Landfill on Vasco Road Current location of the Bioremediation Site.	This report
Removal of USTs EF06, EF07, EF08, and EF10 from APL, 1395 Middle Harbor Road[13]	O&G = 2,400 mg/kg Diesel = 1,100 mg/kg Total lead = 19 mg/kg Gasoline = 270 mg/kg BTEX[14] Total PNAs = 13.7 mg/kg	5520E, 8015, 8010, 8020, 8310, 8240, 8270, Title 26 metals, Bioassay	9/92 / BATM	350 (Cell F)	RESNA and BATM	6/14/93 Retreated 10&11/94	1-2/95 5/95 10/95 12/95	444 cy, 1/6/96 & 1/7/96 Dillard 235 cy to be used at Port properties.	BFI Landfill on Vasco Road Current location of the Bioremediation Site.	This report
Removal of USTs FF09, FF04, FF05, and FF06 from 245 and 255 Second Street (Amtrak Station)[15]	Gasoline = 1,200 mg/kg Boiler Fuel = 33 mg/kg Benzene = 14 mg/kg Toluene = 28 mg/kg Ethyl benzene = 34 mg/kg Xylenes = 67 mg/kg Total lead = 41 mg/kg Total PNAs = 0.283 mg/kg	8240, 8310 (PNAs), Title 26 Metals, pH, Flashpoint, Bioassay	8/14 & 17/93 / RESNA	1,000[16] (Cell G, Stockpile 2)[19]	RESNA and BATM	6/14/93[17] G Retreated 10/94	5/95 10/95 12/95	179 cy, 4/13/96 & 4/20/96 Dillard 1,188 cy to be used at Port properties.	BFI Landfill on Vasco Road Current location of the Bioremediation Site.	This report and Baseline, 1996b

Table 1, Continued: Summary of Disposition of Soils Treated at the Port of Oakland Bioremediation Site

Source	Pre-Acceptance Sampling Maximum Contaminant Concentrations Detected	Pre-Acceptance Sampling Waste Characterization Analyses Performed	Date of Placement at Treatment Site/Contractor	Soil Volume Accepted (cy)	Remediation Contractor	Date Treatment Started	Date of Verification Samples	Volume and Date of Soil Removal/ Contractor	Fill Location	Date & Source of Final Soil Disposition Documentation
Investigation/remediation of diesel spill at 370 8th Avenue (Keep on Trucking)[18]	Diesel = 36,000 mg/kg Total lead = 33 mg/kg Total PNAs = 14.3 mg/kg	8015, 8240, 8270, 8020, Title 26 metals, Bioassay, pH, Flashpoint	4/29-30/93 / RESNA	500 (Cell H)	RESNA and BATM	6/14/93 Retreated 10/94	10/95	539 cy, 12/30/95 / Dillard 5,253 cy to be used at Port properties.	BFI Landfill on Vasco Road Current location of the Bioremediation Site.	This report
Removal of USTs BF-07, BF-08, and BF-09 from 1195 Maritime Street (Stevedoring Services)	Diesel = 150 mg/kg Gasoline = 140 mg/kg Benzene = 0.360 mg/kg Toluene = 1.5 mg/kg Ethyl benzene = 0.900 mg/kg Xylenes = 7.7 mg/kg Total lead = 56 mg/kg	DOHS LUFT, 7420, 8270, 8020, 8240, Title 26 Metals, Bioassay, pH, Flashpoint	9/19 - 12/1/93	2,200 (Stockpile 1)	BATM	No treatment	11/95 12/96 1/96	2,200 cy, 3/2,10/96 / Dillard	BFI Landfill on Vasco Road	This report and Baseline, 1996a

NOTES: VCI = Veri's Construction Inc. BATM = Bay Area Tank and Marine PNAs = Polynuclear aromatic hydrocarbons UST = Underground storage tank O&G = Oil and grease

1 BASELINE Job No. S9134.11.
2 BASELINE Job No. S9134.40.
3 BASELINE Job No. S9134.36.
4 Soils mixed with on-site native soils by RESNA for cell construction/site expansion.
5 Soil aerated on-site for four weeks before being transported to bioremediation site.
6 BASELINE Job No. S9134.23.
7 BASELINE Job No. S9134.20.
8 BASELINE Job No. S9134.48.
9 290 cy of soil mixed with on-site native soils by RESNA for cell construction/site expansion.
10 Geomatrix Consultants, 1993, *Soil Excavation Report and Proposed Work Plan, Former Powerine Oil Company Site*, March.
11 Uribe & Associates, 1992, *Report of Removal of Inactive Tanks MF-25 and MF-26, 1100 Airport Drive, Oakland*, May.
12 Soils aerated at source site prior to placement at bioremediation site; post-aeration contaminant levels unknown.
13 Geomatrix Consultants, 1992, letter to Mr. John Swanson, Bay Area Air Quality Management District, 29 January. Geomatrix Consultants, 1992, transmittal of analytical results to Mr. Jon Amdur, Port of Oakland, 17 July.
14 BTEX concentrations reduced to below laboratory detection limits (0.03 to 0.04 mg/kg) as a result of soil aeration performed prior to placement at bioremediation site.
15 Uribe & Associates, 1993, *Report of Corrective Plan Implementation for Removal of Four Underground Storage Tanks at Proposed Amtrak Passenger Rail Station Site*, 29 June.
16 Includes 20 cubic yards containing boiler fuel.
17 Treatment started on only the portion of the soils in Cell G (~500 cy). Remaining soils in Stockpile 2 were not treated.
18 Uribe & Associates, 1993, *Report of Investigation and Remediation of Contaminated Soil Resulting from the Diesel Spill at Keep on Trucking*, 1 July.
19 In the July 1994, Uribe & Associates *Operations Manual, Port of Oakland Bioremediation Site*, this stockpile was referred to as Stockpile 1. The stockpiles have since been moved and renamed.

7 Description of Soil Source, Treatment, and Disposition of Soils Accepted Since 1992

7.1 Introduction

This section describes the soil source, treatment, sampling, and disposition of soils accepted at the Bioremediation Site since 1992. For each source, two tables are provided: one table summarizes the analyses performed on samples collected from the soil pile, and the other summarizes the analytical results. (The abbreviations of the sampling methods are defined in section 8.) The information covers soils that arrived at the site from September 1992 through December 1993, the latest date that soils were accepted for treatment. Laboratory analytical reports for the soil sampling described below are provided following the text of the report. The laboratory reports are arranged by sampling date.

7.2 Soil Pile A

Source: Excavation of approximately 3,400 cy of soil associated with two to four gasoline and diesel tanks at the former Powerine Oil Company site located at Seventh and Terminal. Soil Pile A contained approximately 1,123 cy of this soil.

Treatment: Soil was brought to the Bioremediation Site in December 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. This soil was retreated in September and October 1994. Soil was sampled to assess the progress of treatment in February 1995, June 1995, and October 1995. Based on the sampling results, approximately 24 cy contained TPH as oil above the Port's cleanup levels for re-use.

Disposition of Soils: On December 30, 1995, 30 cy of soil was transported to the BFI Landfill at Vasco Road for disposal. The remainder of the soils in Soil Pile A meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile A:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x			x	x	x	x	x
2/95[2]	x			x								
6/95[2]	x											
10/95[3]	x						x					

Notes for Soil Pile A:
1 Pre-acceptance sampling
2 Post-treatment sampling
3 Characterization for off-site disposal (one sample only)

Summary of Sampling Results for Soil Pile A:

December 1992 Initial Maximum Concentrations	Feb. 1995 Analytical Results (1/20 cy) (mg/kg)	June 1995 Analytical Results (1/50 cy) (mg/kg)	October 1995 Analytical Results (1/24 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	TPH-D = avg. 38/ max. 94 TPH-O = avg. 291/max. 520 Gasoline = avg. 0.9/max. 4.7 BTEX = avg. 0.017/max. 0.130	1,050 cy passes cleanup levels: TPH-D = avg. 12/ max. 48 TPH-O = avg. 56/ max. 100 150 cy exceeds cleanup levels: TPH-D = avg. 54/max. 55 TPH-O = avg. 205/max. 290	126 cy passes cleanup levels: TPH-D = avg. 6.2/max. 23 TPH-O = avg. 35/max. 44 One sample representing 24 cy exceeds Port cleanup levels. (Sample 1A-11B-2) TPH-D = 23 mg/kg TPH-O = 160 mg/kg TTLC Pb = 23 mg/kg

7.3 Soil Pile AB

Source: In October 1994, the soil piles were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* Approximately 475 cy of potentially impacted soils scraped from beneath treatment Cells A and B were grouped into stockpile AB.

Treatment: Soil Pile AB was treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. Soil was sampled to assess the progress of treatment in February 1995 and June 1995. Based on the sampling results, the soil in Soil Pile AB passed the Port's cleanup levels for re-use.

Disposition of Soils: The soils in Soil Pile AB meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile AB:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
2/95[1]	x			x								
6/95[1]	x											

Notes:
1 Post-treatment sampling

Summary of Sampling Results for Soil Pile AB:

December 1992 Initial Maximum Concentrations	Feb. 1995 Analytical Results (1/20 cy) (mg/kg)	June 1995 Analytical Results (1/50 cy) (mg/kg)
Presumed to be same as A, or may contain petroleum hydrocarbons associated with road base or asphalt.[4]	Diesel = avg. 15/ max. 38 Oil = avg. 171/max. 380 Gasoline = avg. 1.25/max. 1.7 BTEX = ND (0.005)	TPH-O = avg. 24/ max. 45

[4] This area of the site was formerly used as a parking lot, as shown in a photograph from the early 1960s.

7.4 Soil Pile ABC

Source: In October 1994, the soil piles were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* Approximately 555 cy of potentially impacted soils scraped from beneath treatment Cells A, B, and C were grouped into stockpile ABC.

Treatment: Soil Pile ABC was treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. Soil was sampled to assess the progress of treatment in February 1995 and June 1995. Based on the sampling results, the soil in Soil Pile ABC passed the Port's cleanup levels for re-use.

Disposition of Soils: The soils in Soil Pile ABC meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile ABC:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
2/95[1]	x			x								
6/95[1]	x											

Notes:
1 Post-treatment sampling

Summary of Sampling Results for Soil Pile ABC:

December 1992 Initial Maximum Concentrations	Feb. 1995 Analytical Results (1/20 cy) (mg/kg)	June 1995 Analytical Results (1/50 cy) (mg/kg)
Presumed to be same as A, or may contain petroleum hydrocarbons associated with road base or asphalt.[5]	Diesel = avg. 18/ max. 31 Oil = avg. 286/max. 520 Gasoline = detected in one sample at. 0.4 BTEX = ND (0.005)	Oil = avg. 17/ max. 31

[5] This area of the site was formerly used as a parking lot, as shown in a photograph from the early 1960s.

7.5 Soil Piles B1, B2, and B3

Source: Excavation of soil associated with two to four gasoline and diesel tanks at the former Powerine Oil Company site located at Seventh and Terminal. Soil Pile B contained approximately 1,123 cy of this soil; this soil pile was subsequently reconfigured into soil piles B1, B2, and B3.

Treatment: Soil was brought to the Bioremediation Site in December 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. In October 1994, the treatment cells were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* The soils from Cell B were split up and grouped in soil piles identified as B1, B2, and B3. These soil piles were treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. Soil was sampled to assess the progress of treatment in February 1995, May 1995, June 1995, and October 1995. Based on the sampling results, the soil in Soil Piles B1, B2, and B3, passed the Port's cleanup levels for re-use.

Disposition of Soils: The soils in Soil Piles B1, B2, and B3 meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site. Soil Piles B1, B2, and B3 have a combined volume of approximately 1,315 cy.

Analyses Run on Soil Piles B1 and B3:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x		x	x	x	x	x	x
2/95[2]	x			x								
6/95[2]	x											

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Analyses Run on Soil Pile B2:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x		x	x	x	x	x	x
5/95[2]	x			x								
10/95[2]	x						x					

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil Pile B1 (218 cy):

December 1992 Initial Maximum Concentrations	Feb. 1995 Analytical Results (1/20 cy) (mg/kg)	June 1995 Analytical Results (1/50 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	Diesel = avg. 62/ max. 100 Oil = avg. 459/max. 750 Gasoline = ND (0.3) BTEX = ND (0.005)	Diesel = avg. 4/ max. 6 Oil = avg. 35/ max. 55

Summary of Sampling Results for Soil Pile B2 (605 cy):

December 1992 Initial Maximum Concentrations	May 1995 Analytical Results (1/20 cy) (mg/kg)	October 1995 Analytical Results - 181 cy (1/20 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	BTEX = avg. 0.044/ max. 0.094 Gasoline = avg. 1.7/ max. 6 Diesel = avg. 17/ max. 51 Oil = avg. 49/ max. 170 181 cy contained Diesel and/or Oil in excess of cleanup levels	Diesel = avg. 9/ max. 13 Oil = avg. 61/ max. 93 TTLC Pb = 23 mg/kg

Summary of Sampling Results for Soil Pile B3 (492 cy)[6]:

December 1992 Initial Maximum Concentrations	Feb. 1995 Analytical Results - 295 cy (1/20 cy) (mg/kg)	May 1995 Analytical Results - 197 cy (1/20 cy) (mg/kg)	June 1995 Analytical Results- 295 cy (1/50 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	Diesel = avg. 43/ max. 81 Oil = avg. 371/max. 650 Gasoline = avg. 1.1/max. 6.5 BTEX = avg. 0.04/max. 0.220	BTEX = avg. 0.055/ max. 0.115 Gasoline = avg. 4.8/ max. 12 Diesel = avg. 17/ max. 48 Oil = avg. 45/ max. 96	Diesel = avg. 11/ max. 14 Oil = avg. 59/ max. 73

[6] 295 cy of the 492 cy total volume were sampled in February and June 1995; the remaining 197 cy were sampled in May 1995.

7.6 Soil Pile C

Source: Excavation of soil associated with two to four gasoline and diesel tanks at the former Powerine Oil Company site located at Seventh and Terminal. Soil Pile C contained approximately 814 cy of this soil.

Treatment: Soil was brought to the Bioremediation Site in December 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. This soil was retreated in September and October 1994. Soil was sampled to assess the progress of treatment in May 1995.

Disposition of Soils: The soils in Soil Pile C meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile C:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x			x	x	x	x	x
5/95[2]	x			x								

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil Pile C:

December 1992 Initial Maximum Concentrations	May. 1995 Analytical Results (1/20 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	BTEX = avg. 0.038/ max. 0.066 Gasoline = avg. 0.46/ max. 0.8 Diesel = avg. 4/ max. 10 Oil = avg. 41/ max. 88

7.7 Soil Pile D

Source: Excavation of soil associated with two to four gasoline and diesel tanks at the former Powerine Oil Company site located at Seventh and Terminal. Soil Pile D contained approximately 994 cy of this soil.

Treatment: Soil was brought to the Bioremediation Site in December 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. This soil was retreated in September and October 1994. Soil was sampled to assess progress of treatment in March 1994 and November 1995. The maximum concentrations of all constituents other than TPH-O passed the cleanup levels. One sample, representing approximately 22 cy, contained a TPH-O concentration of 130 mg/kg, which is 30 percent greater than the TPH-O cleanup level of 100 mg/kg. The TPH-O levels in all the samples collected in November 1995 were used to calculated an upper 90 percent confidence interval of the mean TPH-O concentration in the Soil Pile. Because the TPH-O upper confidence interval is 80 mg/kg, the entire soil pile is considered to pass the cleanup levels.

Prior to the November 1995 sampling, approximately 188 cy of soil from Soil Pile D had been placed on mixing pads 5, 6, and 7, but was not mixed with compost. These soils were tested on December 19, 1995 and were found to pass the cleanup levels for re-use.

Disposition of Soils: The approximately 806 cy of soils in Soil Pile D and the approximately 188 cy of soils from Soil Pile D that were placed on mixing pads 5, 6, and 7 meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile D:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x			x	x	x	x	x
3/94[2]	x			x								
11/95[2]	x						x					

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil Pile D:

December 1992 Initial Maximum Concentrations	March 1994 Analytical Results (1/20 cy) (mg/kg)	November 1995 Analytical Results (1/20 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	TPH-D = ND to 250 mg/kg Gasoline = < 0.2 mg/kg BTEX = < 0.005 mg/kg	TPH-D = avg. 8.3/max. 15 Confidence interval = 9.3 TPH-O = avg. 75/max. 130 Confidence interval = 80

Analyses Run for Soil from Soil Pile D on Mixing Pads 5, 6, and 7:

Date	8015M	8010	8020	8240	8270	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/92[1]	x			x	x			x	x	x	x	x
3/94[2]	x			x								
12/95[2]	x											

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil from Soil Pile D on Mixing Pads 5, 6, and 7:

December 1992 Initial Maximum Concentrations	March 1994 Analytical Results (1/20 cy) (mg/kg)	December 1995 Analytical Results (1/20 cy) (mg/kg)
TPH-D = 1,400 mg/kg Gasoline = 5,600 mg/kg Benzene = 4 mg/kg Toluene = 21 mg/kg Ethyl benzene = 60 mg/kg Xylenes = 280 mg/kg Total lead = 110 mg/kg Total non-carcinogenic PNAs = 35 mg/kg	TPH-D = ND to 250 mg/kg Gasoline = < 0.2 mg/kg BTEX = < 0.005 mg/kg	TPH-D = avg. 5.2 /max. 11 TPH-O = avg. 61 /max. 98

7.8 Soil Piles E1 and E2

Source: Removal of two USTs (MF25 and MF26) from 1100 Airport Drive in 1992. Approximately 740 cy soils were delivered to the Bioremediation Site. There are no records of tank contents, but the tanks may have contained gasoline, diesel, solvents, or waste oil. Port staff have reviewed available Port records regarding the use and contents of the tanks and found no indication that the soils are listed wastes because there is no record that the tanks contained either listed spent solvents or other listed wastes.

Treatment: Soils initially had low levels of solvents (maximum detected concentration of 7.4 mg/kg PCE). Before being transported to the Bioremediation Site, soils were aerated to reduce solvent concentrations to non-detect.

The soil was brought to the Bioremediation Site in October of 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. Soils were sampled to assess the progress of treatment in March 1994; soils did not meet the site cleanup standards for O&G. In October 1994, the treatment cells were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* The soils from Cell E were split up and grouped in soil piles identified as E1 and E2. Soil Pile E1 was treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. The treated volume of Soil Pile E1 was 700 cy. Soil Pile E1 was sampled in May and October 1995. Based on the May sampling data, 350 cy of the soil pile passed the cleanup standards, while the remaining 350 cy exceeded the cleanup standard for TPH-O. The October sampling program only sampled the 350 cy that had failed the cleanup standard in the May sampling; based on the October data, these 350 cy still did not meet the TPH-O cleanup standard. In November, the soils were sampled to evaluate their suitability for acceptance at BFI Landfill.

In November 1995, the 240 cy of soils in Soil Pile E2 had been placed on mixing pad 2, but had not yet been mixed with compost. These soils were sampled in November 1995 and found to exceed the cleanup standard for TPH-O. The soils were also sampled to evaluate their suitability for acceptance at BFI Landfill.

Disposition of Soils: On January 6 and 7, 1996, 350 cy of Soil Pile E1 and the 240 cy of Soil Pile E2 that had been placed on mixing pads were transported to BFI Landfill at Vasco Road for

disposal. 350 cy of Soil Pile E1 meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile E1:

Date	8015M	5520E	8010	8020	8240	8270	8310	CAM	Bio-assay	pH	Ign.	Corr.
10/92[1]	x	x			x		x	x	x	x	x	
3/94[2]		x			x							
5/95[2]		x										
10/95[2]		x										
12/95[3]						x		x				

Notes:
1 Pre-acceptance sampling.
2 Post-treatment sampling. In the 10/95 sampling, only the 350 cy in Pile E1 that failed the TPH-O cleanup standard in May, 1995 were sampled.
3 Characterization for off-site disposal. Only the 350 cy in Pile E1 that failed the TPH-O cleanup standard in May and October, 1995 were sampled.

Summary of Sampling Results for Soil Pile E1:

October 1992 Initial Maximum Concentrations of Soils Brought to Site	March 1994 Sampling Program Analytical Results (1/20 cy) (mg/kg)	May 1995 Sampling Program Results (1/20 cy) (mg/kg)	October 1995 Sampling Program Results (1/20 cy) (mg/kg)	December 1995 Sampling Program Results (1 4-point/100 cy) (mg/kg)
O&G = 10,000 mg/kg Gasoline = 2,400 mg/kg Total lead = 4 mg/kg Total PNAs = 3.417 mg/kg Toluene = 4.7 mg/kg Xylenes = 33 mg/kg Ethyl benzene = 5.6 mg/kg After aeration, 6/93: VOCs = ND @ 1/20 cy	O&G = 150 to 1,700 Gasoline = ND (0.2) BTEX = ND (0.005) 740 cy sampled (total volume later split into E1 and E2).	O&G = avg. 119/ max. 220 700 cy sampled 350 cy failed cleanup standard.	O&G = avg. 197/max. 380 CAM 17 metals low Only the 350 cy that did not pass in May 1995 were sampled.	SVOCs = ND TTLC Pb = 12, 12, 14, and 16 Only the 350 cy that did not pass in May 1995 were sampled.

Analyses Run for Soil Pile E2 (240 cy):

Date	8015M	5520E	8010	8020	8240	8270	8310	CAM	Bio-assay	pH	Ign.	Corr.
10/92[1]	x	x			x		x	x	x	x	x	
3/94[2]		x			x							
11/95[3]	x	(9071)		x	(8260)	x		x				

Notes for E2:

1 Pre-acceptance sampling.
2 Post-treatment sampling.
3 Characterization for off-site disposal. In this sampling event, EPA Method 9071 was used to analyze for Oil & Grease, and EPA Method 8260 was used to analyze for SVOCs.

Summary of Sampling Results for Soil Pile E2:

April and June 1992 Initial Maximum Concentrations of Soils Brought to Site	March 1994 Sampling Program Analytical Results (1/20 cy) (mg/kg)	November 1995 Sampling Program Results (1 4-point/100 cy) (mg/kg)
O&G = 10,000 mg/kg Gasoline = 2,400 mg/kg Total lead = 4 mg/kg Total PNAs = 3.417 mg/kg Toluene = 4.7 mg/kg Xylenes = 33 mg/kg Ethyl benzene = 5.6 mg/kg After aeration, 6/92: VOCs = ND @ 1/20 cy	O&G = 150 to 1,700 Gasoline = ND (0.2) BTEX = ND (0.005) 740 cy sampled (total volume later split into E1 and E2).	O&G = avg. 480/max. 660 Gasoline = ND BTEX = ND VOCs = ND SVOCs = ND TTLC Pb = 9, 10, and 12 CAM 17 metals low 240 cy sampled (3 composites)

7.9 Soil Pile F

Source: Removal of four USTs (EF06, EF07, EF08, and EF10) from the APL site at 1395 Middle Harbor Road. Two tanks contained diesel, one tank contained gasoline, and one tank contained waste oil. Port staff have reviewed available Port records regarding the use and contents of the tanks and found no indication that listed spent solvents or other listed wastes were placed in the tanks. Therefore, the soils are not believed to be listed wastes.

Treatment: The soil was brought to the Bioremediation Site in October of 1992 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. Soils were sampled to assess the progress of treatment in March 1994; soils did not meet the site cleanup standards for TPH-D and O&G. In October 1994, the treatment cells were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* The soils from Soil Pile F were split up and grouped in soil piles identified as F1 and F2. The two soil piles were treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. Soil Pile F1 had an approximate treated volume of 492 cy, and Soil Pile F2 had an approximate volume of 187 cy. Soil was sampled to assess the progress of treatment in January and February 1995, May 1995 (Soil Pile F1 only), October 1995, and, December 1995 (Soil Pile F2 only). Based on the sampling results, 235 cy of Soil Pile F1 meet the Port's cleanup levels for re-use and none of Soil Pile F2 meets the Port's cleanup levels.

Disposition of Soils: On January 6 and 7, 1996, 257 cy of Soil Pile F1 and all 187 cy of Soil Pile F2 were transported to BFI Landfill at Vasco Road for disposal. 235 cy of Soil Pile F1 meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Piles F1 and F2:

Date	8015M	5520E	8010	8020	8240	8270	CAM	Bio-assay	pH	Ign.	Corr.
9/92[1]	x	x			x	x	x	x			
3/94[2]	x	x			x						
1-2/95[2]	x	x									
5/95[2]	x	x									
10/95[2,3]	x	x					Pb				
12/95[3]	x	x					Pb				

Notes F1 and F2:

1 Pre-acceptance sampling.

2 Post-treatment sampling. In May 1995, only Soil Pile F1 was sampled. Data from January and February 1995 indicated that Soil Pile F2 was not likely to meet the cleanup standards. In October 1995, the 235 cy of Soil Pile F1 that met the cleanup standards in May 1995 were not sampled.

3 Characterization for off-site disposal. In October, only Pile F1 was sampled for TTLC lead. In December, only Soil Pile F2 was sampled.

Summary of Sampling Results for Soil Piles F1 and F2:

September 1992 Initial Maximum Concentrations (1 4-point/50 cy)	**March 1994 Sampling Program Analytical Results (1 4-point/100 cy) (mg/kg)**	**Jan. and Feb. 1995 Analytical Results (1 4-point/100 cy) (mg/kg)**	**May 1995 Sampling Program Results (1/20 cy) (mg/kg)**	**October & December 1995 Sampling Program Results (1 4-point/100 cy or 1 discrete per 20 cy, as noted (mg/kg)**
O&G = 2,400 mg/kg TPH-D = 1,100 mg/kg Total lead = 19 mg/kg Gasoline = 270 mg/kg BTEX = ND Total PNAs = 14.4 mg/kg CAM metals low	O&G = 1,400 to 3,500 TPH-D = 150 to 570 Gasoline = ND (0.2) BTEX = ND (0.005)	**Pile F1:** O&G = ND (50) to 120 TPH-D = ND (10) **Pile F2:** O&G = 140 to 180 TPH-O = 52 to 73 TPH-D = ND (10)	**Pile F1:** TPH-D = avg. 16/ max. 81 TPH-O = avg. 80/ max. 350 O&G = avg. 142/ max. 320 235 cy of F1 passed cleanup levels. TPH-D = avg. 9/ max. 26 TPH-O = avg. 55/ max. 100 O&G = avg. 64/ max. 100 **Pile F2: not sampled**	**October** **Pile F1 (257 cy):** @ 1 4-point, TPH-D = ND TPH-K = ND TPH-O = 40 - 54 O&G = 59 - 73 @ 1 discrete/20 cy TPH-D = avg. 26/ max. 40 TPH-O = avg. 166/ max. 270 O&G = avg. 477/ max. 910 Three 4-point composites: TTLC Pb = 22-35 **Pile F2 (187 cy) @ 1 4-point** TPH-D = ND TPH-K = ND TPH-O = 77 - 98 O&G = 150 - 190 **December 19, 1995** Two 4-point composites: TTLC Pb = 17, 20

7.10 Soil Piles G1 and G2

Source: Removal of four USTs (FF04, FF05, FF06, and FF09) from 245 and 255 Second Street (Amtrak Station). Two tanks contained gasoline and two tanks contained boiler fuel.

Treatment: Soil was brought to the Bioremediation Site in May of 1993 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. The soils were sampled to assess the progress of treatment in March 1994; soils did not meet the site cleanup standards for TPH-D or TPH-O. In October 1994, the treatment cells were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* The soils from Cell G were split up and grouped in soil piles identified as G1 and G2. The two soil piles were treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. Soil Pile G1 had an approximate treated volume of 600 cy and Soil Pile G2 had an approximate volume of 267 cy. Soil Pile G2 was sampled in May and October 1995 to assess the progress of treatment. Soil Pile G1 was sampled to assess the progress of treatment in October 1995.

Disposition of Soils: All 600 cy of Soil Pile G1 and all 267 cy of Soil Pile G2 meet the Port's cleanup levels for re-use. The Port plans to use the soil as fill on the current location of the Bioremediation Site.

Analyses Run for Soil Pile G1:

Date	8015M	5520E	8010	8020	8240	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
5/93[1]					x	x		x	x	x	x	
3/94[2]	x				x							
10/95[2]	x						x					

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling.

Summary of Sampling Results for Soil Pile G1:

May 1993 Initial Maximum Concentrations	March 1994 Sampling Program Results (1/20 cy) (mg/kg)	October 1995 Sampling Program Results (1/20 cy) (mg/kg)
Gasoline = 1,200 mg/kg Boiler Fuel = 33 mg/kg Benzene = 14 mg/kg Toluene = 28 mg/kg Ethyl benzene = 34 mg/kg Xylenes = 67 mg/kg Total lead = 41 mg/kg Total PNAs = 0.283 mg/kg 2 samples run for CAM 17, hazardous char.	Gasoline = ND (0.2) to 4.4 BTEX = ND (0.005) to 0.0577 TPH-D = ND (5.0) to 3,600 TPH-gasoline = ND (5.0) to 24 TPH-mineral spirits = ND (5.0) to 61 TPH-kerosene = ND (5.0) to 61 TPH-jet fuel = ND (5.0) TPH-waste oil = 59 to 4,000	TPH-D = avg. 19/max. 73 90% one-tailed upper confidence Limit = 23 mg/kg TPH-O = avg. 56/max. 160 90% one-tailed upper confidence Limit = 63 mg/kg

Analyses Run for Soil Pile G2:

Date	8015M	5520E	8010	8020	8240	8310	TTLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
5/93[1]					x	x		x	x	x	x	
3/94[2]	x				x							
5/95[2]	x											
10/95[2]	x											

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil Pile G2:

May 1993 Initial Maximum Concentrations	March 1994 Sampling Program Results (1/20 cy) (mg/kg)	May 1995 Sampling Program Results (1/20 cy) (mg/kg)	October 1995 Sampling Program Results (1/20 cy) (mg/kg)
Gasoline = 1,200 mg/kg Boiler Fuel = 33 mg/kg Benzene = 14 mg/kg Toluene = 28 mg/kg Ethyl benzene = 34 mg/kg Xylenes = 67 mg/kg Total lead = 41 mg/kg Total PNAs = 0.283 mg/kg 2 samples run for CAM 17, hazardous char.	Gasoline = ND (0.2) to 4.4 BTEX = ND (0.005) to 0.0577 TPH-D = ND (5.0) to 3,600 TPH-gasoline = ND (5.0) to 24 TPH-mineral spirits = ND (5.0) to 61 TPH-kerosene = ND (5.0) to 61 TPH-jet fuel = ND (5.0) TPH-waste oil = 59 to 4,000	TPH-G = avg. 1.2/max. 2.1 TPH-D = avg. 9/max. 44 TPH-O = avg. 46/max. 170 80 cy do not pass Port cleanup levels. 267 cy pass cleanup levels TPH-G = avg. 0.2/max. 0.3 TPH-D = avg. 8/max. 29 TPH-O = avg. 24/max. 47	Only the 80 cy that did not pass cleanup levels in May 1995 were sampled. TPH-D = avg. 8/max. 10 TPH-O = avg. 53/max. 63

7.11 Soil Pile H

Source: Diesel spill from AST piping at 370 8th Avenue.

Treatment: Soil was brought to the Bioremediation Site in April of 1993 and mixed with nutrients to promote biodegradation of petroleum hydrocarbons. Soil was sampled to assess the progress of treatment in March 1994 at a frequency of one 4-point composite per 100 cy; soils did not meet the site cleanup standards for TPH-D or Oil & Grease. In October 1994, the treatment cells were dismantled and reconfigured. Detailed discussion of the dismantling of the cells can be found in a report prepared by U&A entitled *Documentation of the Dismantling of Treatment Cells at the Port of Oakland Bioremediation Site.* The soils from Soil Pile H were treated by mixing in compost material to promote degradation of the petroleum hydrocarbons. The treated volume of Soil Pile H was 539 cy. Soils were sampled in May 1995 at a frequency of 1 sample per 20 cy and again in October 1995 at a frequency of one 4-point composite per 100 cy. Based on sampling results for Oil & Grease, the entire soil pile of approximately 539 cy remains above the Port's cleanup levels for re-use.

Disposition of Soils: On December 30, 1995 all 539 cy of Soil Pile H were transported to BFI Landfill at Vasco Road for disposal.

Analyses Run for Soil Pile H:

Date	8015M	5520E	8010	8020	8240	8270	8310	CAM	Bio-assay	pH	Ign.
5/93[1]	x			x	x	x		x	x	x	x
3/94[2]	x	x			x						
10/95[2]	x	x									

Notes:
1 Pre-acceptance sampling
2 Post-treatment sampling

Summary of Sampling Results for Soil Pile H:

April 1993 Initial Maximum Concentrations	March 1994 Sampling Program Results (1 4-point/100 cy) (mg/kg)	May 1995 Sampling Program Results (1/20 cy) (mg/kg)	October 1995 Sampling Program Results (1 4-point/100 cy) (mg/kg)
TPH-D = 36,000 mg/kg Total lead = 33 mg/kg Total PNAs = 14.3 mg/kg	TPH-D = 84 to 1,400 O&G = 270 to 2,700 Gasoline = ND (0.2) BTEX = ND (0.005)	TPH-D = avg. 57/ max. 160 TPH-O = avg. 47/ max. 95	TPH-D = ND TPH-O = 16 - 27 O&G = 100 - 140

7.12 Stockpile 1

Source: Removal of three USTs (BF07, BF08, and BF09) from 1195 Maritime Street. One tank contained gasoline, one tank contained diesel, and one tank contained waste oil.

Treatment: 2,200 cy of soil were soil were brought to the Bioremediation Site in December of 1993 and stockpiled as Stockpile 1 without treatment. The soils were sampled in November 1995 at a frequency of one 4-point composite per 500 cy to assess their suitability for disposal at BFI Landfill. The soils were resampled for lead in January 1996, and a statistical analysis was made according to SW-846 to evaluate whether the soils met BFI's acceptance criteria. Based on the statistical analysis, the soils were acceptable.

400 cy of Stockpile 1 were placed on mixing pads but were never treated. The soils on mixing pads were sampled in December, 1995 at a frequency of one 4-point composite per 400 cy to assess their suitability for disposal at BFI Landfill. The soils were resampled for lead in January 1996, and a statistical analysis was made according to SW-846 to evaluate whether the soils met BFI's acceptance criteria. Based on the statistical analysis, the soils were acceptable.

Disposition of Soils: All 2,200 cy of soils associated with Stockpile 1 were transported to BFI at Vasco Road for disposal on March 2, March 10, and April 13, 1996.

Analyses Run for Stockpile S1:

Date	8015M	8010	8020	8240	8270	7420	TTLC Pb	STLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
12/93[1]	x		x	x	x	x			x	x	x	x	
11/95[2,3]	x			x			x	x					
12/95[2,3]	x						x	x					
1/96[3]								x					

Notes:
1 Pre-acceptance sampling.
2 Sampling to assess status. In November, only the 1,800 cy of Stockpile 1 were sampled. In December, only the 400 cy on mixing pads were sampled.
3 Characterization for off-site disposal.

Summary of Sampling Results for Stockpile S1:

December 1993 Initial Maximum Concentrations	November 1995 Sampling Program Results (1 4-point /500 cy) (mg/kg)	December 1995 Sampling Program Results (1 4-point/400 cy) (mg/kg)	January 1996 Sampling Program Results (total of 24 samples) (mg/L)
TPH-D = 150 mg/kg Gasoline = 140 mg/kg Benzene = 0.360 mg/kg Toluene = 1.5 mg/kg Ethyl benzene = 0.900 mg/kg Xylenes = 7.7 mg/kg Total lead = 56 mg/kg 2 samples: VOCs = ND Metals low	**For 1,800 cy in Stockpile:** TPH-D = 6 - 34 TPH-O = 32 - 110 TPH-G = 0.3 - 2.8 Benzene = ND - 0.016 Ethyl benzene = ND - 0.017 Toluene = 0.005 - 0.039 o-Xylenes = ND - 0.013 m,p-Xylenes = 0.008 - 0.044 TTLC Pb = 55 - 140 **TTLC Pb = 75, STLC = 8.2** (STLC individual samples 2.6 - 9.4 mg/l) TTLC Pb = 130, STLC = 4.2 TTLC Pb = 55, STLC = 3.7 TTLC Pb = 140, STLC = 3.9 CAM metals are low. Note on profile form says that due to high STLC comp 1-4 will be disposed of separately.	**For 400 cy on mixing pads:** TPH-D = 10 TPH-O = 62 TPH-G = ND BTEX = ND SVOCs = ND TTLC Pb = 92, STLC = 5.9 (STLC individual samples 1.8 - 10 mg/L)	**To characterize soils for off-site disposal:** **For 1,800 cy in Stockpile: (9 samples)** STLC Pb = 1.36 - 15.3 **For 400 cy on 3 mixing pads: (5 samples per mixing pad)** STLC Pb = <0.42 - 6.84 90% one-tailed upper confidence limit = 4.64 mg/l: waste is not hazardous following SW-846 procedures. Data documented in Baseline, 1996a.

7.13 Stockpile 2

Source: Removal of four USTs (FF04, FF05, FF06, and FF09) from 245 and 255 Second Street (Amtrak Station). Two tanks contained gasoline and two tanks contained boiler fuel. Approximately 500 cy were stockpiled.

Treatment: Soil was brought to the Bioremediation Site in May of 1993 and stockpiled without treatment. The soils were sampled in November 1995 at a frequency of one sample per 20 cy. 179 cy remain above Port cleanup levels for re-use. A portion of the soils (Subarea 1) was resampled for lead in February 1996, and a statistical analysis was made according to SW-846 to evaluate whether the soils met BFI's acceptance criteria. Based on the statistical analysis, the soils were acceptable.

Disposition of Soils: 321 cy of Stockpile 2 meet the cleanup levels. The Port plans to use the soil as fill on the current location of the Bioremediation Site. On April 13 and 20, 1996, 179 cy of Stockpile 2 were transported to BFI Landfill at Vasco Road for disposal.

Analyses Run for Stockpile 2:

Date	8015M	5520E	8010	8020	8240	8310	TTLC Pb	STLC Pb	CAM	Bio-assay	pH	Ign.	Corr.
5/93[1]					x	x			x	x	x	x	
11/95[2,3]	x				x		x						
2/96[3]								x					

Notes:
1 Pre-acceptance sampling
2 Sampling to assess status
3 Characterization for off-site disposal

Summary of Sampling Results for Stockpile 2:

May 1993 Initial Maximum Concentrations (mg/kg)	November 1995 Sampling Program Results (1/20 cy) (mg/kg)		February 1996 Sampling Program Results
Gasoline = 1,200 Boiler Fuel = 33 Benzene = 14 Toluene = 28 Ethyl benzene = 34 Xylenes = 67 Total lead = 41 Total PNAs = 0.283	65% of soils met Port cleanup standards. For soils that meet Port cleanup standards. TPH -G = avg. 2.8/max. 12 * Confidence interval = 2.2 TPH-D = avg. 6.1/max. 21 Confidence interval = 7.7 TPH-O = avg. 53/max. 100 Confidence interval = 63 Benzene = ND - 0.017 Ethyl benzene = ND - 0.039 Toluene - ND - 0.023 o-Xylene - ND - 0.073 p,m-Xylenes - ND - 0.22 * Lab noted that chromatogram did not match typical gasoline pattern.	35% of soils exceeded cleanup standards: TPH -G = avg. 9.3/max. 57 * Confidence interval = 18 TPH-D = avg. 120/max. 530 Confidence interval = 208 TPH-O = avg. 243/max. 1,000 Benzene = ND - 0.005 Ethyl benzene = ND - 0.012 Toluene - ND - 0.019 o-Xylene - ND - 0.018 p,m-Xylenes - ND - 0.054 Subarea 1: One 4-point composite: TTLC Pb = 73 mg/kg Subarea 2: One 4-point composite: TTLC Pb = 48, STLC Pb = 2.7 mg/L * Lab noted that chromatogram did not match typical gasoline pattern.	To characterize Subarea 1 for off-site disposal: One 4-point composite: TTLC Pb = 120 mg/kg 10 samples from 140 cy: STLC Pb = 1.6 - 8.7 mg/L 90% one-tailed upper confidence limit = 4.77 mg/l: waste is not hazardous following SW-846 procedures. Data documented in Baseline, 1996b.

8 Analytical Methods

The analyses methods used during the soil sampling include the following:

EPA 8015 Modified:	TPH as diesel, kerosene, or motor oil.
EPA 5520E&F:	Hydrocarbons as Oil & Grease.
EPA 8010:	Halogenated volatile organic compounds (VOCs).
EPA 8020:	Benzene, toluene, ethyl benzene, and xylenes (BTEX).
EPA 8240:	Volatile organic compounds (VOCs).
EPA 8260:	Volatile organic compounds (VOCs).
EPA 8270:	Semi-volatile organic compounds (SVOCs).
EPA 8310:	Semi-volatile organic compounds (SVOCs) that are polynuclear aromatic hydrocarbons (PAHs).
CAM metals:	California regulated metals. Includes analysis for antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc. EPA Methods 3050, 6010, 7471, 7740, 7841, and 9045 are used.
TTLC Pb:	Total Threshold Limit Concentration of lead per 22 CCR 66261.24(a)(2)(A). EPA Method 6010.
STLC Pb:	Soluble Threshold Limit Concentration of lead per 22 CCR 66261 Appendix II.
Bioassay:	Aquatic toxicity assessment (Fish Kill) per 22 CCR 66261.24(a)(2)(B)(6).
Ign.:	Testing for the RCRA Ignitability Characteristic. SW 7.1.2
Corr.:	Testing for the RCRA Corrosivity Characteristic.
pH:	EPA Method 9045.

9 References

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