BIOREMEDIATION PROGRAM
FOR SOILS FROM 801 MARITIME STREET
Oakland, California

Prepared for

Regional Quality Control Board, San Francisco Bay Region
Oakland, California

On Behalf of
Port of Oakland
Oakland, California

August 1989

Prepared by

BASELINE ENVIRONMENTAL CONSULTING
5900 Hollis Street, Suite D
Emeryville, California 94608
415/420-8686

S9-134.12

8/8/89

BASELINE

ENVIRONMENTAL CONSULTING
TRANSMITTAL

TO: Dr. Rafat Shahid
Hazardous Materials Division
Alameda County Dept. of Envir. Hlth.
~~80 Swan Way, Room 200~~
Oakland, CA 94621

DATE: 7 August 1989
PROJECT NO.: S9-134.14
Via:
Mail: _____
Fed Ex: _____
UPS: _____
Hand Delivery: X

SUBJECT:

ENCLOSED PLEASE FIND:

Copies	Description
1	Work Plan for Bioremediation Program for Soils From 801 Maritime Street, Oakland, CA 94607

___ As requested
-x- For your use
___ For your signature

___ For your review and comment
___ Returned after loan to us

COMMENTS:

TRANSMITTED BY:

Irene Kan

AD1-6/89

5900 Hollis Street, Suite D • Emeryville, CA 94608 • (415) 420-8686 • FAX (415) 420-1707

BASELINE

ENVIRONMENTAL CONSULTING

7 August 1989
S9-134.12

Mr. Lester Feldman
Regional Water Quality Control Board,
San Francisco Bay Region
1111 Jackson Street
Oakland, California 94607

Subject: Work Plan for Proposed Bioremediation Program for Soils from 801 Maritime Street, Oakland, CA

Dear Mr. Feldman:

Enclosed please find the subject work plan for bioremediation of soils excavated from 801 Maritime Street, Oakland. The soils were removed as part of an underground tank removal project and contain diesel hydrocarbons at concentrations which do not exceed 1,000 milligrams per kilogram. Laboratory analysis indicates that the soils are not hazardous according to the provisions of Title 22 of the California Code of Regulations. Further investigation of the environmental impacts associated with the former underground tanks will be performed by the PORT in a separate investigation. The investigation will be conducted strictly in accordance with County and Board requirements.

The treatment area is located at 801 Maritime Street. The estimated date for commencement of the bioremediation program is 14 August 1989. Concurrent with the proposed program, soils from another site located at 196 Burma Road in Oakland, will also undergo bioremediation treatment at 801 Maritime. Although the two programs will be commencing at approximately the same time, the soils from the two sites will be segregated in the treatment area. A work plan for bioremediation of soils from 196 Burma Road (CAN Transport) will be transmitted under separate cover.

Please call us if you have any questions.

Sincerely,

Marta Williams
Associate

Yane Nordhav
Reg. Geologist # 4009

MW:ik

cc: Ms. Michele Heffes, PORT of Oakland
Mr. Rafat Shahid, Alameda County Dep't. Environmental Health

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D. Sampling Results and Chain-of-Custody Records - Native Soils/801 Maritime

BIOREMEDIATION PROGRAM
FOR SOILS FROM 801 MARITIME STREET
Oakland, California

INTRODUCTION

The Port of Oakland has retained BASELINE Environmental Consulting to implement a bioremediation program for diesel-contaminated soils excavated during underground tank removals conducted on Port property at 801 Maritime Street in Oakland. This work plan provides information on the source and character of contaminated soils excavated at 801 Maritime, and describes the technique which has been selected for remediating these soils.

BACKGROUND

Contaminated Soils

In February 1989, three underground diesel storage tanks, ranging in size from 10,000 to 20,000 gallons, were removed from Port of Oakland property at 801 Maritime. Approximately 400 cubic yards of soils in the tank area were removed and stockpiled on-site. The excavated soils were then sampled and analyzed for benzene, toluene, xylene, and ethyl benzene (BTXE) using EPA Method 8020, and for total extractable hydrocarbons (TEH) and total volatile hydrocarbons (TVH) using a modified EPA Method 8015. Soils were found to contain diesel in varying levels. The highest value recorded was 920 mg/kg. Tank removal activities are described in a separate report (BASELINE 1989). Further investigation of the environmental impact associated with these tanks will be performed by the PORT in accordance with applicable regulatory requirements. The analytical report and chain-of-custody records for 801 Maritime soils are included in Appendix A.

Subsequently, two representative samples were collected from the stockpiled soils and analyzed to determine whether soils were hazardous according to the hazardous waste criteria set forth in the California Code of Regulations, Title 22, Chapter 11. All soil sampling efforts (described in Appendix B) were conducted according to EPA and DHS requirements, and all sample analyses were performed by a state-certified laboratory. The following analyses were conducted on these representative sample: fish toxicity, Title 22 metals, corrosivity, and flammability. The potential reactivity of the soils was not investigated since there was no historical basis for the presence of any reactive substances in or near the tanks.

The waste was determined to be non-hazardous on the basis of the analytical work. The laboratory report and chain-of-custody records are included in Appendix C.

Proposed Treatment Technology

Bioremediation of soils containing less than 1,000 mg/kg total petroleum hydrocarbons in the form of diesel, kerosene and oil and grease has proven effective in reducing the level of petroleum hydrocarbons in soils to less than 100 mg/kg within a period of 8 to 10 weeks following initiation of bioremediation (Rapp 1989; Canutt 1989). Numerous bioremediation projects involving diesel contaminated soils have been conducted in the San Francisco Bay Area. In most cases, levels of diesel in soils have been reduced to less than 10 mg/kg (non-detectable) through bioremediation (Rapp 1989; Canutt 1989).

The bioremediation process involves aerobic composting of contaminated soils. Enriched organic compost obtained from local mushroom growers is added to soils and the mixture is lightly watered and turned weekly. This maintains aerobic conditions and exposes the microbial colonies in the mixture to sunlight. Colony growth within the mixture is thus enhanced and microbial degradation of petroleum hydrocarbon components in soils accelerated. The following sections of this work plan describe the specific characteristics of the bioremediation plan for contaminated soils excavated at 801 Maritime.

APPLICABLE REGULATORY REQUIREMENTS

As previously discussed, the soils at 801 Maritime do not qualify as hazardous waste under Title 22, and are therefore not subject to EPA or DHS regulation. Alameda County Environmental Health Department personnel were contacted regarding this proposal and requested that the County be kept informed of the project's progress, but noted that the soils would also be exempt from County regulation (Howell 1989). The Bay Area Air Quality Management District (BAAQMD) was also consulted (Dvorak 1989). Soils with the characteristics of those excavated at 801 Maritime (less than 1,000 mg/kg diesel) are not subject to BAAQMD regulations concerning aeration of contaminated soils (BAAQMD Rules and Regulations 1988).

Regulations relating to control of hazardous substances discharged to land do pertain to this project. These regulations, contained in the California Code of Regulations, Title 23, Subchapter 15, are enforced by the Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). This work plan is intended to inform the RWQCB of the specifics of this project and the methods that will be used to contain soils, prevent rainwater infiltration into treatment beds, prevent runoff from the treatment area, verify results of treatment, and document the condition of the native soils following completion of the project.

Currently, soils containing greater than 100 mg/kg petroleum hydrocarbons are not accepted for disposal at Class III solid waste landfills. Class II landfills have yet to be constructed, so soils containing greater than 100 mg/kg petroleum hydrocarbons are by default disposed of in a Class I hazardous waste landfill. It is our understanding that a decision by the RWQCB regarding possible alternative uses of remediated soils which contain less than 10 mg/kg petroleum hydrocarbons is pending. One possible alternative is that remediated soils with extractable hydrocarbon concentrations equal to or less than 10 mg/kg may be taken out of the regulatory sphere and disposition of these soils may be left up to the generator (Hugenberger 1989).

PROPOSED REMEDIATION SITE

Location

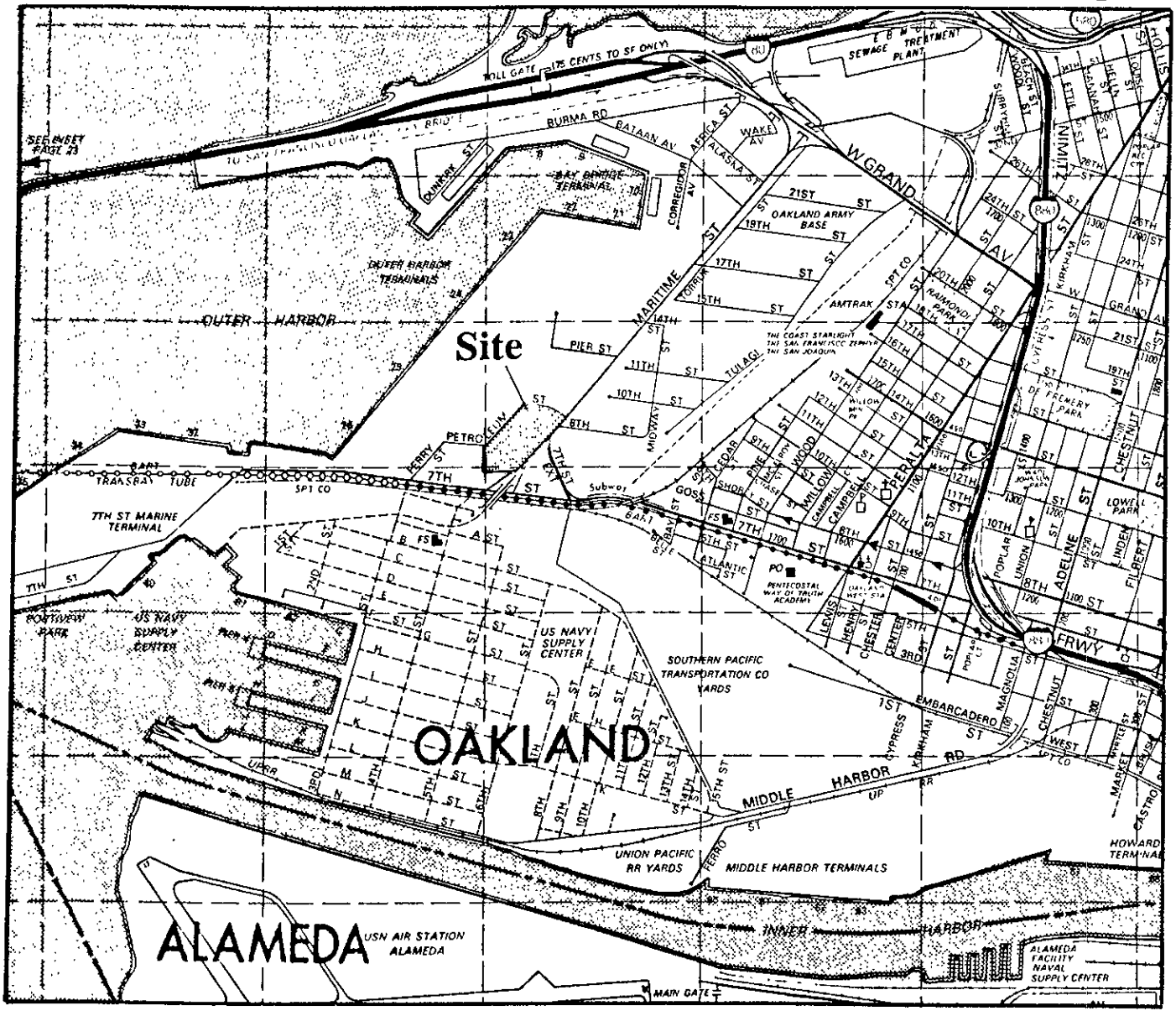
It is proposed that the soils be remediated at the excavation address, 801 Maritime Street in Oakland, California. A regional location map for this site is provided in Figure 1. A topographical map of the area is included in Figure 2. The site is located about one-half mile east of the Oakland Outer Harbor and one mile south of the Bay Bridge. The site is bounded by Petroleum, 7th and Ferry streets. There are currently no buildings on-site, and the majority of the site is covered with asphalt. The former tank excavation area is filled with clean materials. The overall lot covers approximately three acres. The area is level, with a slight crown running along the center of the lot from the southwest to the northeast. Drainage is uniformly away from this crown and toward storm drains located in the area (see Figure 3). A one-half acre parcel on the lot has been selected as the bioremediation site, as illustrated in Figure 3.

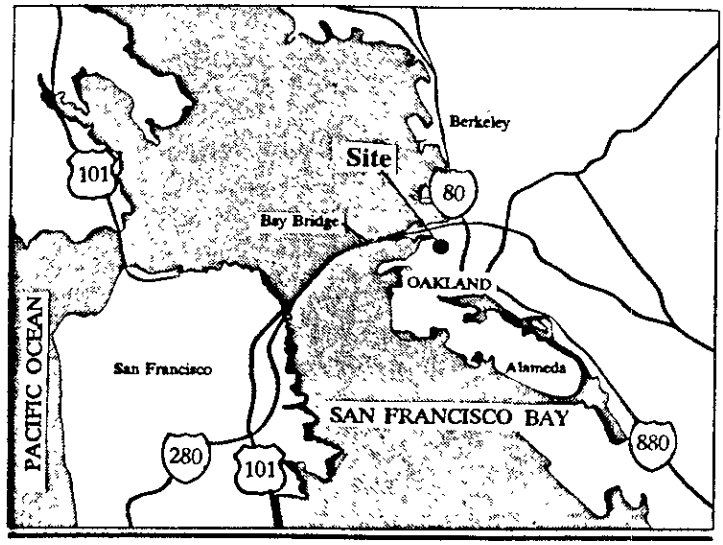
Background Soils Data

Native soils upgradient, underlying, and downgradient from the proposed remediation parcel were sampled to determine background conditions. Four samples were collected (see sampling methods - Appendix B) at the locations shown in Figure 3. Soils were sampled for BTXE and diesel in accordance with RWQCB guidance (RWQCB 1988). Analysis was conducted by a state-certified laboratory. All parameters were non-detectable for three of the collected samples. In the fourth, upgradient, samples, the levels of petroleum constituents are slightly elevated above background. This is likely due to the past operation of underground storage tanks on-site. As previously mentioned, investigations of these tanks is on-going. The laboratory report and chain-of-custody records are included in Appendix D. This soils data will be compared with data obtained from repeat native soil sampling to be conducted after remediation is completed.

REGIONAL LOCATION

Figure 1





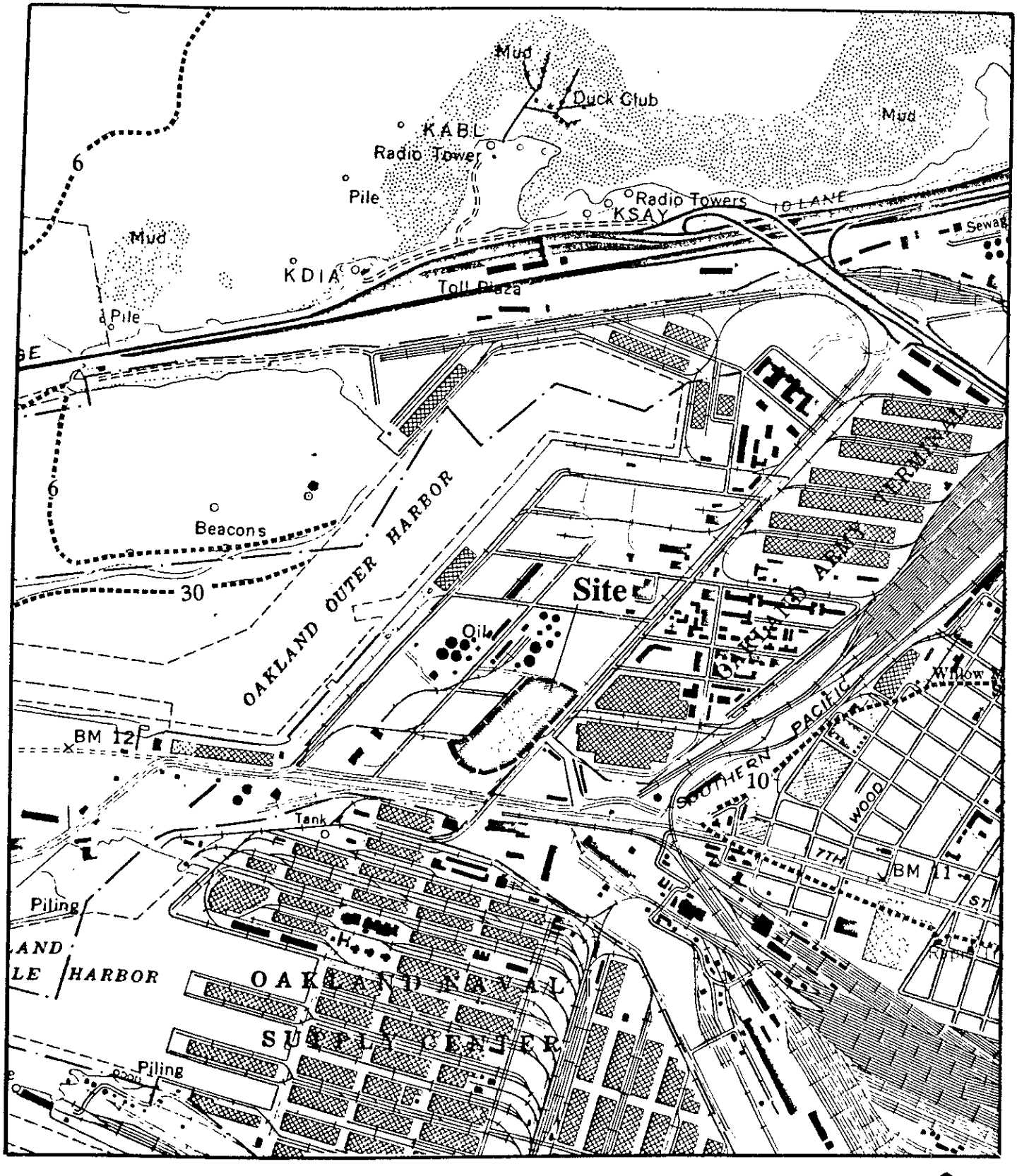
Bioremediation Program

801 Maritime Soils
Oakland, California

BASELINE

AREA TOPOGRAPHICAL MAP

Figure 2



Bioremediation Program

801 Maritime Soils
Oakland, California

Source: United States Geological Survey Map - Oakland West, California, 1980

0 2000 Feet

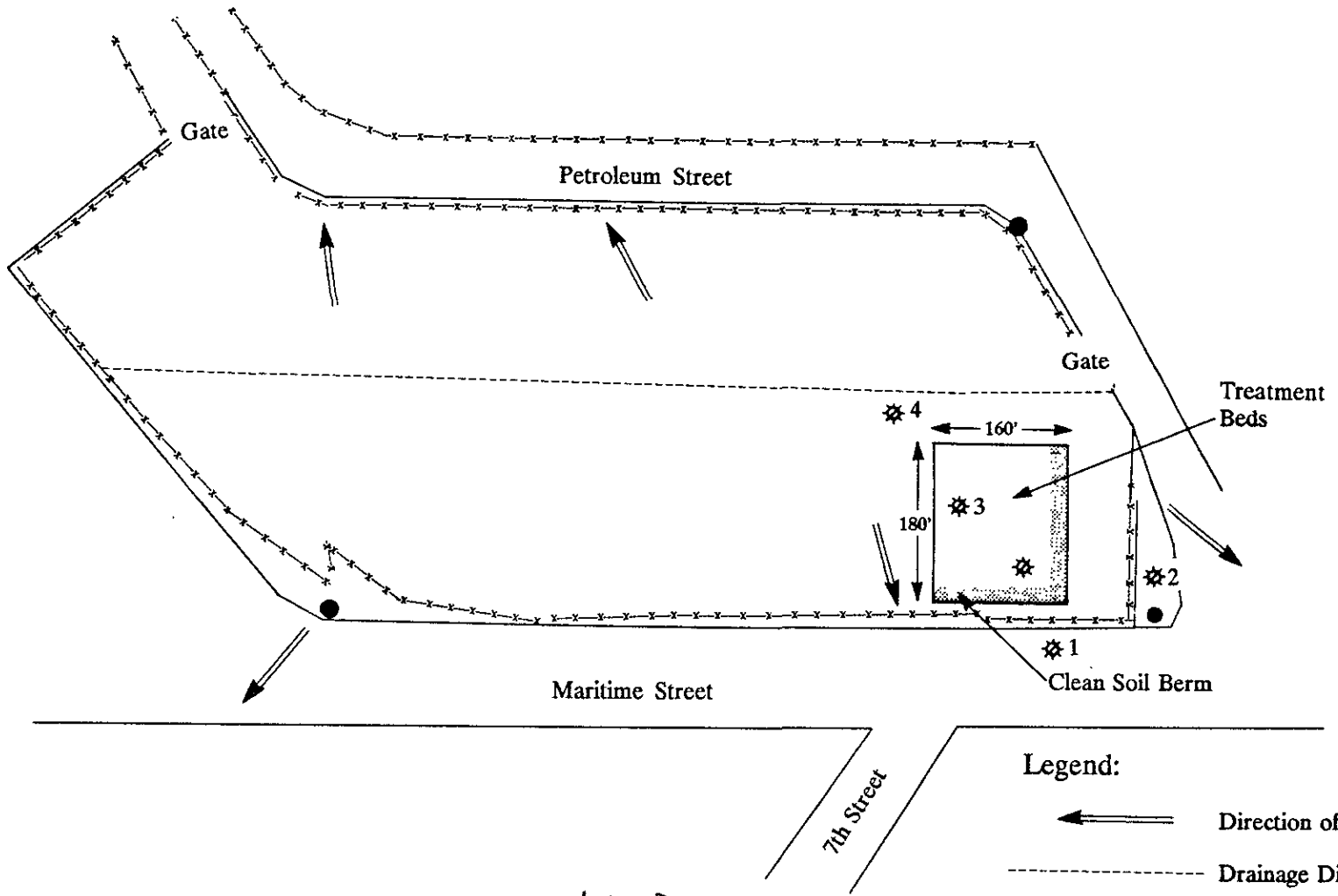
N

BASELINE

SITE PLAN
Bioremediation Program

801 Maritime Soils
Oakland, California

Figure 3



BASELINE

DESCRIPTION OF PROPOSED PROCESS

Site Preparation

BASELINE will work in conjunction with its subcontractor, Bay Area Tank and Marine, to remediate the contaminated soils at the 801 Maritime site. Approximately 400 cubic yards of soil are to be remediated. The site is now fenced and access will be restricted to individuals involved in the remediation process. The site will also be posted to warn of restricted access. Prior to bioremediation, the treatment area will be cleared of debris and approximately one foot of clean earthen fill will be placed along the fence along Maritime and Petroleum streets, as illustrated in Figure 3. This berm would be located downgradient from potential runoff from the site and would provide a barrier between the treatment area and the storm drains located along the streets.

Treatment Beds

Ten millimeter thick visquene sheeting will then be laid on the ground in five strips approximately 20 feet wide by 150 feet long. A layer of compost one foot thick and 12 feet wide will be laid in the center of each row. Two feet of contaminated soil will then be placed on top of the compost. Each row will be separated by approximately eight feet to allow passage for a tractor-mounted rototiller. A 20-foot strip of free space will be left on the outside perimeter of the treatment area to allow service vehicles space to turn around.

Initially, the soil and compost are lightly wetted down with water and rototilled to mix the two components. Water will be applied by water truck to avoid overwatering. Then the mixture is moistened and rototilled once per week until remediation is completed. Rototiller tines will be set to extend no closer than within two inches of the asphalt in order to avoid puncturing the visquene.

Contingencies

To avoid any possibility of excess moisture forming in treatment beds, the beds will be covered with plastic whenever rain is forecast. Excess plastic at the sides and the ends of each bed will be turned up onto the bed and a plastic cover will be added to the top of each bed and weighted with sandbags. If heavy storms occur during the course of the project, the site will be inspected for leaks or damage to visquene. Leaks would be detected by inspecting for sheen on the water around the beds.

All maintenance of the beds is directed toward promoting microbial activity through optimal moisture and aerobic conditions. High moisture would reduce rather than enhance microbial activity. Since, this project is expected to be completed before the beginning of the rainy season, free liquid conditions in the treatment area

are not anticipated. In the event that a free liquid condition occurred in the treatment area, liquid would be recovered manually (using biologically inert adsorbents), or by vacuum truck, depending on the amount. Collected liquid would be sampled and disposed of accordingly. Berms constructed along the fence on Maritime and Petroleum streets would prevent the discharge of any run-off liquids into unpaved areas or storm drains downgradient of the treatment area. Any tears in the visquene liners will be immediately repaired by patching the liner with a plastic patch using an asphalt adhesive.

Project Completion

Soil remediation should be completed within eight to nine weeks based on conditions which have prevailed at other remediation projects (Canutt 1989). In the final stage, one composite sample will be collected for every 50 yards of material. Four separate samples collected from each 50 yard area will be used to construct the composite sample. The four samples will be collected at a depth of three feet. Samples will be analyzed for TEH using Modified EPA Method 8015. Sample collection will be conducted according to state and federal guidelines (see Appendix B). Samples will be analyzed by a state-certified laboratory, under strict chain-of-custody procedures.

Once soils have been remediated to less than 100 mg/kg diesel they may be transported for disposal to a Class III landfill. It is anticipated that levels will reach less than 10 mg/kg. If this occurs and RWQCB policies permit, remediated soils will be used either as clean fill or for landscaping purposes elsewhere on Port property. If this option is not approved, soils will be disposed of at a Class III landfill.

Native soils will be resampled after remediated soils have been removed from the site, to determine whether background conditions persist subsequent to remediation. Background sample stations will be resampled, and sampling will be conducted as previously discussed. A report documenting project activities and results will be forwarded to the RWQCB and the County upon completion of the project.

SCHEDULE

Work is scheduled to begin the week of 14 August 1989. Soil remediation is expected to be completed and soils removed by the week of 16 October 1989, within a ten week period.

REFERENCES

BASELINE Environmental Consulting, Report of Tank Removal and Remediation Activities, 801 Maritime Street, Oakland, prepared for Port of Oakland, Oakland, CA, April 1989.

Bay Area Air Quality Management District, Rules and Regulations: Regulation 8, Rule 40, Section 113, 1988.

Dvorak, Vicki, Bay Air Quality Control Board, personal communication, July 1989.

Canutt, Forrest, Bay Area Tank and Marine, personal communication, June and July 1989.

Howell, Edward, Alameda County Environmental Health Department, personal communication, 23 June 1989.

Hugenberger, Scott, RWQCB, personal communication, 19 July 1989.

Knight, JoAnne, Department of Health Services, personal communication, June 1989.

Rapp, John, San Francisco County Environmental Health Department, personal communication, July 1989.

State of California, Regional Water Quality Control Board, San Francisco Bay Region, letter to John Rapp from Donald Dalke dated 23 September 1988.

State of California, Department of Health Services, Toxic Substances Control Division.

State of California, California Code of Regulations, Title 22 and 23.

Smarkle, Ken and Oshida, Cindy, DHS, personal communication, July 1989.

United States Geological Survey, Oakland West Quadrangle N3745-W12215/7.5, 1959 (photo revised 1980).

APPENDIX A

INITIAL SAMPLING RESULTS AND CHAIN-OF-CUSTODY RECORDS
801 MARITIME/CONTAMINATED SOILS

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 16844
CLIENT: BASELINE
JOB #: S9-111
LOCATION: P OF O/801 MARITIME

DATE RECEIVED: 02-17-89
DATE ANALYZED: 02-17-89
DATE REPORTED: 02-23-89

Total Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	GASOLINE (mg/Kg)	KEROSINE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
16844-1	ST - 1	ND(10)	ND(10)	ND(10)	ND(10)
16844-2	ST - 2	ND(10)	ND(10)	ND(10)	920 *
16844-3/4	COMPOSITE ST - 3a ST - 3b	ND(10)	ND(10)	ND(10)	ND(10)

* Fingerprint pattern does not match Hydrocarbon Standards. Quantitation based on largest peaks withing C12-C24 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	16
Spike: % Recovery	97

LABORATORY DIRECTOR

BASELINE

315 Washington Street
Oakland, CA 94607
(415) 763-7037

CHAIN OF CUSTODY RECORD

Turn-Around Time: normal
Lab: Curtis & Tompkins
Contact Person:

Project No.	Project Name and Location
59-111	POTO / 801 Maritime

Samplers: (Signature) Irene Kan

No.	Station	Date	Time	Media	Depth	Composites	No. of Containers	Station Location	TPH light	TPH heavy	BTX & E EPA 602	BTX & E EPA 602	Modified 8015	Total Hydrocarbons					Remarks	Detection Limits
	M-2	2/16/89	13:55	soil	6'	(4)			X	X	X									
	ST-1 (1)	2/16/89	14:30	soil	N/A				X	X	X		X						24-hr	
	ST-2 (2)	2/16/89	14:40	soil	N/A				X	X	X		X						24-hr	
	ST-3a (3)	2/16/89	14:45	soil	N/A	X			X	X	X		X						composite into 1 24-hr sample	
	ST-3b (4)	2/16/89	14:50	soil	N/A				X	X	X		X							
	W-1	2/16/89	13:30	water	(1)				X	X		X								
	W-2	2/16/89	13:33	water	(2)				X	X		X								
	W-3	2/16/89	13:35	water	(3)				X	X		X								

1684H due 2/21/89 monitoring

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Irene Kan	2/16/89 4:00 PM	Teresa Amaya			
Relinquished by: (Signature) Teresa Amaya	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time 2/17 10:00	Remarks: RWQCB Guidelines to June '88	

CHROMALAB, INC.

Analytical Laboratory
Specializing in G. C.

- Environmental Analysis
- Hazardous Waste
- Drinking Water
- Research and Method Development
- Consultation
- Training

March 8, 1989 ChromaLab File # 0389005

Baseline Environmental Consulting

Attn: Irene Kan

Re: Four soil samples marked ST-5a,b,c, and d for gasoline, BTEX and TEPH analysis.

Duration of Analysis: March 6-8, 1989

Results:

Sample No.	Gasoline (ppm)	Diesel (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl Benzene (ppb)	Total Xylenes (ppb)
ST-5a+b	N.D.	110	N.D.	N.D.	N.D.	N.D.
ST-5c+d	<2.5	149	N.D.	N.D.	6.2	<5.0
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Rec.	109.3%	105.2%	90.4%	93.7%	86.4%	87.0%
MDL	2.5	5.0	5.0	5.0	5.0	5.0
Method #	mod.8015	mod.8015	8020	8020	8020	8020

ChromaLab, Inc.

Eric Tam
Chief Chemist

David Duong
Senior Chemist

2239 Omega Road • San Ramon, California 94583 • 415/831-1788
• Facsimile 415-831-87-98

APPENDIX B

STANDARD SAMPLING METHODS

SOIL SAMPLING PROCEDURES

In-place soil samples are collected with a stainless steel corer, fitted with a 6-inch brass liner. The corer is driven into the ground by a slide hammer. The brass liner is removed from the steel corer, capped with aluminum foil and a plastic cap, taped with masking tape, placed in a zip-lock bag, and iced prior to being brought to the laboratory for analysis. Proper chain-of-custody and sample labeling procedures are followed.

All sampling equipment is decontaminated with tri-sodium phosphate (TSP) and deionized water prior to collection of each sample.

APPENDIX C

TITLE 22, WASTE CHARACTERISTIC SAMPLING RESULTS AND CHAIN-OF-CUSTODY RECORDS 801 MARITIME/CONTAMINATED SOILS

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#955)
- Waste Water
- Consultation

July 28, 1989 ChromaLab File # 0789061

Baseline Environmental Consultants, Inc.

Attn: Ms. Irene Kan

Re: Four rush soil samples for Diesel/BTX analysis

Project No.: S9-134.12
Project Location: Bioremediation of 801 Maritime soils
Analysis duration: July 26-28, 1989

Results:

Sample No.	Diesel (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
POM-1	N.D.	N.D.	N.D.	N.D.	N.D.
POM-2	N.D.	N.D.	N.D.	N.D.	N.D.
POM-3	N.D.	N.D.	N.D.	N.D.	N.D.
POM-4	9.5	12.3	7.4	N.D.	5.6
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE RECOVERY	90.3%	91.2%	95.4%	96.3%	96.4%
DETECTION LIMIT	5.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	MOD.8015	8020	8020	8020	8020

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Lab Director

BASELINE
5900 Hollis Street, Suite D
Emeryville, CA 94608
(415) 420-8686

CHAIN OF CUSTODY RECORD

Turn-Around Time 3 days
Lab Chroma
Contact Person ERIC TAM / PIERRE

Project No.	Project Name and Location
59-134.12	Bioremediation of 801 Maritime Soils

Samplers: (Signature) William E Scott

No.	Station	Date	Time	Media	Depth	Composites	No. of Containers	Station Location	Analysis: TPH as diesel SOIS	Analysis: BTXE 8020	Remarks	Detection Limits
	POM-1	7-26-89	10:27	Soil	.5-1		1		X	X		
	POM-2	7-26-89	10:32	Soil	.5-1		1		X	X		
	POM-3	7-26-89	15:39	Soil	.5-1		1		X	X		
	POM-4	7-26-89	15:51	Soil	.5-1		1		X	X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
William E Scott	7-26-89 17:26				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	
		Peter Whitt	7/26 5:30 PM		

APPENDIX D

SAMPLING RESULTS AND CHAIN-OF-CUSTODY RECORDS
NATIVE SOILS/801 MARITIME

Static Acute Bioassay

Kennedy/Jenks/Chilton,Laboratory Division
303 Second Street, Tenth Floor North
San Francisco,CA 94107
(415)362-6065

For Baseline
Attention Irene Kan
Address 5900 Hollis Street, Suite D
Emeryville, CA 94608

Received 07/24/89
Reported 08/01/89

Lab.Sample No. 895594 Sample Description: MBR-2(West Pile) Sampling Procedure --
Date Sampled:07/24/89 Time Sampled: 1130 Sampled by:Baseline Test Begun:07/27/89 End:7/31/89

TIME	INITIAL					24 Hours				48 Hours				72 Hours				96 Hours			
TEST	pH	D.O.	TEMP.	ALK.	HARD.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.
CONC.	UNIT	mg/L	°C	mg/L	mg/L	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C
Control	7.9	8.9	20	33	45	0	8.0	8.1	20	0	7.7	10	20	0	7.0	8.2	20	0	7.8	8.5	20
750mg/L	8.2	8.8	20	35	45	0	8.1	7.9	20	0	7.4	9.7	20	0	7.5	7.9	20	0	7.5	8.0	20
500mg/L	8.1	8.9	20	33	45	0	8.0	8.0	20	0	7.4	9.7	20	0	7.5	7.8	20	0	7.5	8.1	20
250mg/L	8.0	8.9	20	33	44	0	7.9	8.0	20	0	7.9	9.7	20	0	7.6	7.8	20	0	7.5	8.0	20

Test Species **Fathead Minnows** Avg. Length 3.1cm Max. Length 3.4 cm Min. Length 2.8 cm
Source of Test Species **Thomas Fish Co., Novato, CA** Avg. Wt. 0.37 g Max. Wt. 0.57g Min. Wt. 0.28g
Organisms/Conc. **10** Dilution Water **Reconstituted Freshwater (Soft)**
Test Solution Vol. **10 L** Depth **12.6** cm Aeration **Compressed Air** Dead in Acclimation Tank 0%
Accl.Tank Water Dechlorinated tap water Acclimation Period 3 days Acclimation Temp. 17 °C

96 Hour LC50 >750mg/L
95% Confidence Limits for LC50 -
96-Hr. Survival in Undiluted Wastewater - %

Remarks:

Analyst DB

Manager Leverett R. Smith

Reference: "Guidelines for Performing Static Acute Bioassays in Municipal and Industrial Wastewaters", July 1979, SWRCB and DFG.

Static Acute Bioassay

Kennedy/Jenks/Chilton,Laboratory Division
303 Second Street, Tenth Floor North
San Francisco,CA 94107
(415)362-6065

For Baseline
Attention Irene Kan
Address 5900 Hollis Street, Suite D
Emeryville, CA 94608

Received 07/24/89
Reported 08/01/89

Lab.Sample No. 895593 Sample Description: MBR-1(East Pile) Sampling Procedure --
Date Sampled:07/24/89 Time Sampled: 1100 Sampled by:Baseline Test Begun:07/27/89 End:7/31/89

TIME	INITIAL					24 Hours				48 Hours				72 Hours				96 Hours			
TEST	pH	D.O.	TEMP.	ALK.	HARD.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.	NO.	pH	D.O.	TEMP.
CONC.	UNIT	mg/L	°C	mg/L	mg/L	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C	DEAD	UNIT	mg/L	°C
Control	7.9	8.9	20	33	45	0	8.0	8.1	20	0	7.7	10	20	0	7.8	8.2	20	0	7.8	8.5	20
750mg/L	8.0	8.9	20	33	45	0	7.9	8.2	20	0	7.5	9.7	20	0	7.5	8.3	20	0	7.5	8.4	20
500mg/L	8.0	8.7	20	33	45	0	7.9	8.0	20	0	7.5	9.8	20	0	7.6	8.1	20	0	7.6	8.1	20
250mg/L	7.9	8.9	20	33	45	0	7.7	8.0	20	1	7.5	9.8	20	1	7.6	8.1	20	1	7.5	8.1	20

Test Species **Fathead Minnows** Avg. Length 3.1cm Max. Length 3.4 cm Min. Length 2.8 cm
Source of Test Species **Thomas Fish Co., Novato, CA** Avg. Wt. 0.37 g Max. Wt. 0.57g Min. Wt. 0.28g
Organisms/Conc. **10** Dilution Water **Reconstituted Freshwater (Soft)**
Test Solution Vol. **10 L** Depth **12.6** cm Aeration **Compressed Air** Dead in Acclimation Tank 0%
Accl.Tank Water Dechlorinated tap water Acclimation Period 3 days Acclimation Temp. 17 °C

96 Hour LC50 >750mg/L
95% Confidence Limits for LC50 -
96-Hr. Survival in Undiluted Wastewater - %

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lysis Report

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Baseline
n Irene Kan
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Emeryville, CA 94608

Received 07/24/89
Reported 08/01/89

	Baseline (801 Maritime-Bioremediation)
	895593
.e.:	MBR-1 (East Pile)
	Soil
	1.5 ft.
lected:	07/24/89
l cted:	1100
d by:	Baseline personnel
racted:	--
l zed:	07/26-28/89
d:	--

	Units	Analytical Results	Det.Lim.
atory)(4)	Unit	8.5	±0.1
int	°F	>200	-
Sb)(1)	mg/Kg	0.3	0.3
s)(2)	mg/Kg	0.98	0.03
Ba)(1)	mg/Kg	30	0.05
(Be)(1)	mg/Kg	0.04	0.02
d)(1)	mg/Kg	<0.05	0.05
ium(Cr)(1)	mg/Kg	15	0.1
Co)(1)	mg/Kg	4.0	0.01
)(1)	mg/Kg	10	0.7
)(2)	mg/Kg	19	5
(Hg)(3)	mg/Kg	0.10	0.05
(Mo)(1)	mg/Kg	<0.2	0.2
)(1)	mg/Kg	19	0.1
(Se)(2)	mg/Kg	<0.3	0.3
)(1)	mg/Kg	<0.1	0.1
Tl)(2)	mg/Kg	<0.3	0.3
(V)(1)	mg/Kg	7.4	0.1
)(1)	mg/Kg	34	0.2

: (1)Analysis by inductively coupled argon plasma emission copy. (2)Analysis by atomic absorption spectrophotometry. s by cold-vapor atomic absorption spectrophotometry. Results n milligrams per kilogram, wet (as received) weight basis. pH measured in water.

es Methods for Evaluating Solid Waste - Physical/Chemical Methods,"SW-846, 1984 and 1986, U.S. EPA; and dm istrative Code Title 22, Div. 4, Chapter 30. Minimum Standards for Management of Hazardous and Extremely te , 1985.

AD,MW,TK,DB

Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton, Laboratory Division
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For Baseline
Attention Irene Kan
Address 5900 Hollis Street, Suite D
Emeryville, CA 94608

Received --
Reported 08/01/89

Quality Control Page

Source:	--
Lab No.:	Method Blank
Sample I.D.:	Standard Ottawa Sand
Matrix:	Sand
Depth:	--
Date Collected:	--
Time Collected:	--
Collected by:	K/J/C
Date Extracted:	--
Date Analyzed:	07/26-28/89
EPA Method:	--

Analysis	Units	Analytical Results	Det.Lim.
Flash Point	°F	>200	-
Antimony (Sb)(1)	mg/Kg	<0.3	0.3
Arsenic (As)(2)	mg/Kg	<0.03	0.03
Barium (Ba)(1)	mg/Kg	<0.05	0.05
Beryllium (Be)(1)	mg/Kg	<0.02	0.02
Cadmium (Cd)(1)	mg/Kg	<0.05	0.05
T. Chromium(Cr)(1)	mg/Kg	<0.1	0.1
Cobalt (Co)(1)	mg/Kg	<0.01	0.01
Copper (Cu)(1)	mg/Kg	<0.7	0.7
Lead (Pb)(2)	mg/Kg	<5	5
Mercury (Hg)(3)	mg/Kg	<0.05	0.05
Molybdenum (Mo)(1)	mg/Kg	<0.2	0.2
Nickel (Ni)(1)	mg/Kg	<0.1	0.1
Selenium (Se)(2)	mg/Kg	<0.03	0.03
Silver (Ag)(1)	mg/Kg	<0.1	0.1
Thallium (Tl)(2)	mg/Kg	<0.03	0.03
Vanadium (V)(1)	mg/Kg	<0.1	0.1
Zinc (Zn)(1)	mg/Kg	<0.2	0.2

Comments: (1)Analysis by inductively coupled argon plasma emission spectroscopy. (2)Analysis by atomic absorption spectrophotometry. (3)Analysis by cold-vapor atomic absorption spectrophotometry. Results reported in milligrams per kilogram, wet (as received) weight basis.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods,"SW-846, 1984 and 1986, U.S. EPA; and "California Administrative Code Title 22, Div. 4, Chapter 30. Minimum Standards for Management of Hazardous and Extremely Hazardous wastes", 1985.

Analyst AD,MW,TK,DB Manager Everett R. Smith