PORT OF OAKLAND

December 20, 2000

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

SUBJECT: Groundwater Monitoring, Former USTs: MF08/09/10
South Field, Oakland International Airport, Oakland, CA 94621

Dear Mr. Chan:

Enclosed are copies of the following HLA reports:

"Groundwater Monitoring Well Installation Report, South Airport Self-Fueling Facility, Taxiway U", dated December 15, 2000.

"Quarterly Groundwater Monitoring Report, July 1 through September 30, 2000, South Airport Self-Fueling Facility, Taxiway U", dated October 25, 2000.

Sorry for the delay in getting you these groundwater installation and monitoring reports. Should you have any questions or need additional information, please contact me at 627-1118. Thank you for your on-going assistance and support on this project.

Sincerely,

Dale H. Klettke, CHMM
Associate Environmental Scientist
Environmental Health & Safety Compliance

enclosures

c: (w/o encl.): Jeff Jones - EH & SC Files
c:\206006bc.mwinstall&3rdgwmr

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HLA

#6409

October 25, 2000
Revised December 15, 2000
49667.1

Mr. Dale H. Klettke, CHMM
Port of Oakland
Environmental Health & Safety Compliance
530 Water Street, 2nd Floor
Oakland, California 94607

Quarterly Groundwater Monitoring Report
July 1 through September 30, 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland International Airport
Oakland, California

Dear Mr. Klettke:

Harding Lawson Associates (HLA) presents this groundwater monitoring report summarizing groundwater conditions observed during the third quarter of 2000 in four monitoring wells at the South Airport Self-Fueling Facility adjacent to Taxiway U, Oakland International Airport, Oakland, California (Plate 1). This report is the second of four quarterly groundwater monitoring events that HLA will perform for the Port of Oakland in accordance with HLA's *Work Plan – Groundwater Monitoring, Oakland International Airport, Oakland, California*, dated March 16, 2000.

BACKGROUND

UST Removal

On April 26, 1999, the Port of Oakland' contractor, Enviroclean, removed three underground storage tanks (USTs), MF-08, MF-09, and MF-10 from an area adjacent to Taxiway U, see Plate 2. MF-08 and MF-09 were 1,000-gallon diesel tanks, and MF-10 was a 5,000-gallon gasoline tank. Removal of the three USTs involved two separate excavations, one for the diesel tanks and one for the gasoline tank. Soil and groundwater samples collected from the excavations indicated that there had been a release of petroleum hydrocarbons at both sites. Total petroleum hydrocarbons as diesel (TPH-diesel), total petroleum hydrocarbons as gasoline (TPH-gas), benzene, toluene, ethylbenzene, and total xylenes (BTEX) were detected in both soil and groundwater samples collected from both excavations. Methyl tertiary butl-ether (MTBE) was detected in the excavation for MF-08.

At the excavation of the two diesel USTs, the analytical results of soil samples indicated TPH-diesel and TPH-gas concentrations as high as 39,000 and 3,000 milligrams per kilogram (mg/kg) respectively. Only low concentrations of the BTEX constituents were detected. Groundwater samples exhibited TPH-diesel and TPH-gas concentrations of up to 51 and 120 milligrams per liter (mg/l), respectively.

At the excavation of the gasoline UST, the analytical results of soil samples indicated TPH-gas and TPH-diesel concentrations as high as 4,300 and 6,200 mg/kg respectively. BTEX constituents were detected in soil samples up to 1.4 mg/kg for benzene, 87 mg/kg for toluene, 65 mg/kg for ethylbenzene, 540 mg/kg for xylenes, and 5.5 mg/kg for MTBE. Groundwater samples exhibited TPH-gas and TPH-diesel concentrations of up to 42 and 1.7 mg/l, respectively; dissolved BTEX ranged from 0.27 to 8.9 mg/l and MTBE was detected at 15 mg/l.

Groundwater was measured at a depth of 3.5 to 4.0 feet. Both excavations were reportedly backfilled with pea gravel to a depth of 3 feet and capped with aggregate base rock.

August 1999 Site Investigation

On August 31, 1999, HLA performed a subsurface investigation at the site. Eight geoprobe borings were advanced in locations surrounding the former USTs. Soil and groundwater samples were collected from the borings. TPH-diesel was detected in soil at concentrations of 8.7 micrograms per kilogram (µg/kg) to 680 µg/kg. The soil sample with the highest diesel concentration was also analyzed for polynuclear aromatic hydrocarbons (PAHs). Naphthalene was detected at 8,800 µg/kg and benzo(a)pyrene was detected at 620 µg/kg, as well as minimal concentrations of several other PAHs.

TPH-diesel was detected in the groundwater at concentrations ranging from 72 micrograms per liter (µg/L) to 380 µg/L. TPH-gas was detected in the groundwater at concentrations ranging from 33 µg/L to 300 µg/L. MTBE was encountered at concentrations ranging from 3.5 µg/L to 4,500 µg/L. Benzene was detected above the MCL for drinking water at a concentration of 63 µg/L. PAHs were analyzed in the groundwater sample with the highest diesel concentration and no PAHs were detected at or above their reporting limits.

During the August 31, 1999 investigation, The groundwater samples were subjected to a variety of chemical analyses to evaluate the potential for natural attenuation. HLA also measured certain groundwater parameters in the field to supplement the chemical data. The recorded groundwater temperature and pH measurements were all within ranges acceptable to support the presence of microorganisms. The presence of ferrous iron in the groundwater was evidence of natural bio-degradation

of the petroleum hydrocarbons. The absence of phosphorous in the groundwater indicated micobial growth because phosphorous is utilized by the microbes to break down the petroleum hydrocarbons.

Monitoring Well Installation

On April 27, 2000, Gregg Drilling and Testing, Inc (Gregg), under the direction of HLA, installed four monitoring wells, MW-1, MW-2, MW-3 and MW-4, as located on Plate 2. Gregg installed a monitoring well in each of the four borings at a total depth 10 feet. The wells were constructed of 2-inch diameter schedule 40 polyvinyl chloride (PCV). Under the direction of HLA, Gregg installed the screened interval consisting of 0.02-inch slotted casing between the depths of 3 and 10 feet. 3 feet of flush-threaded, 2-inch diameter PVC solid casing was installed between the ground surface and 3 feet. The top of the well casing was fitted with an expandable locking well plug.

MW-1, MW-2, MW-3 and MW-4 were developed to remove fine particles from the well near the well screen on May 18, 2000. On July 21, 2000 HLA contracted PLS Surveys, Inc. to locate and provide elevations to the nearest 0.01 foot, relative to the Port's datum for the four monitoring wells. The wells were also surveyed in horizontally using NAD '83. Complete details of the well installation can be found in HLA's *Groundwater Monitoring Well Installation Report,* dated December 15, 2000.

GROUNDWATER SAMPLING AND ANALYSIS

HLA conducted groundwater monitoring for the quarter of July 1 through September 30, 2000 on September 20, 2000. Prior to purging or sampling the monitoring wells, HLA measured dissolved oxygen (DO) concentrations, reduction oxidation potential (Redox), and water levels. HLA monitored the pH, conductivity, and temperature of the groundwater during purging. HLA sampled the monitoring wells after purging at least four well volumes of groundwater and after parameters had stabilized to within 10 percent; the groundwater sampling forms with the field data are included in Appendix A.

HLA collected groundwater samples from the four monitoring wells using pre-cleaned disposable Teflon bailers and then transferred the groundwater into laboratory-provided containers. Sample containers were labeled with the sample number, date and time of collection, and sampler's initials, then placed in an insulated cooler with blue ice. The samples were delivered for chemical testing under chain-of-custody to Sequoia Analytical of Walnut Creek, California. The samples were analyzed for the following analytes:

- TPH- gas in accordance with EPA Test Method 8015 modified

- BTEX and MTBE in accordance with EPA Test Method 8020, MTBE confirmation samples of detections by EPA Test Method 8260.
- TPH-diesel in accordance with EPA Test Method 8015 modified
- Total iron and ferrous iron by EPA Test Method 6000/7000
- Nitrate as NO3, Orthophosphate as PO4, and sulfate as SO4 by EPA Test Method 300
- Total Organic Carbon by EPA Test Method 415.1.

HLA contained the purge water in a 55-gallon drum for subsequent disposal by the Port's contractor.

MONITORING RESULTS

Groundwater elevations are presented in Table 1 and shown on Plate 3 with an apparent gradient towards the southeast. Table 2 and Plate 4 present the petroleum hydrocarbon analytical data. Table 3 presents the natural attenuation parameter analytical results. The laboratory report and chain-of-custody form are presented in Appendix B.

TPH-diesel was not reported above the detection limit in any of the four of the monitoring wells this quarter but was detected in all wells during the previous quarter at concentrations ranging from 210 micrograms per liter (µg/L) in MW-4 to 51 µg/L in MW-2. MTBE was detected in MW-4 at a concentration of 32 µg/L. The MTBE detection was confirmed by EPA 8260 with results of 42 µg/L in MW-4, last quarter's 8260 results yielded results of 2.6 µg/L in MW-3 and 17 µg/L in MW-4. No other petroleum hydrocarbons were detected above the reporting limits.

The groundwater samples were subjected to a variety of chemical analyses to evaluate the potential for natural attenuation. HLA also measured certain groundwater parameters in the field to supplement the chemical data. This data is summarized in Table 3.

QUALITY ASSURANCE AND QUALITY CONTROL

All samples were received by the laboratory cold and intact. TPH as diesel was treated with silica gel prior to analyses. HLA reviewed the data and noted that no samples were extracted or analyzed outside their holding time.

CLOSURE

If you have any questions or need additional information, please contact either of the undersigned at (510) 451-1001.

Very truly yours,

HARDING LAWSON ASSOCIATES

Stephen J. Osborne
Geotechnical Engineer

HDL/tcp/49667/037855R

Attachments: Table 1 - Groundwater Elevations
Table 2 - Groundwater Monitoring Well Petroleum Hydrocarbon Analytical Results
Table 3 - Groundwater Monitoring Well Natural Attenuation Analytical Results
Plate 1 – Site Location Map
Plate 2 - Site Plan
Plate 3 – Groundwater Elevation (9/20/00)
Plate 4 – Groundwater Chemical Results (9/20/00)
Appendix A - Groundwater Sampling Forms
Appendix B - Laboratory Reports

TABLES

Table 1. Groundwater Elevations
Quarterly Groundwater Monitoring Report
July through September 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

Well ID	Elevation Top of Casing (feet)	Date Of Monitoring	Depth to Water (feet)	Groundwater Elevation (feet)
MW-1	8.28	04/27/00	4.91 [1]	3.37
		05/18/00	4.96 [1]	3.32
		05/30/00	5.11	3.17
		09/20/00	6.30	1.98
MW-2	6.41	04/27/00	4.34 [1]	2.07
		05/18/00	3.21 [1]	3.20
		05/30/00	3.49	2.92
		09/20/00	4.63	1.78
MW-3	5.24	04/24/00	2.38 [1]	2.11
		05/18/00	2.33 [1]	2.16
		05/30/00	2.70	2.54
		09/20/00	3.76	1.48
MW-4	4.49	04/24/00	2.48 [1]	2.01
		05/18/00	2.47 [1]	2.02
		05/30/00	2.93	1.56
		09/20/00	4.11	0.38

Elevation data relative to Port of Oakland datum; well surveys performed on July 21, 2000

[1] Water level taken prior to well development

Table 2. Groundwater Monitoring Well Petroleum Hydrocarbon Analytical Results
Quarterly Groundwater Monitoring Well Report
July through September 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

Well	Date	Analyte / EPA Method / Units	TPH gas 8015 M µg/L	TPH diesel 8015 M µg/L	TPH motor oil 8015 M µg/L	MTBE 8020 µg/L	Confirmation MTBE 8260 µg/L	Benzene 8020 µg/L	Toluene 8020 µg/L	Ethylbeneze 8020 µg/L	Total Xylenes 8020 µg/L
MW-1	5/30/00		ND<50	60 [2]	ND<250	ND<2.5	ND<2.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	9/20/00		ND<50	ND<50	NA	ND<2.5	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-2	5/30/00		ND<50	51 [2]	ND<250	ND<2.5	ND<2.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	9/20/00		ND<50	ND<50	NA	ND<2.5	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-3	5/30/00		ND<50	60 [2]	ND<250	7.5	2.6	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	9/20/00		ND<50	ND<50	NA	ND<2.5	NA	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-4	5/30/00		ND<50	210 [1]	ND<250	19	17	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	9/20/00		ND<50	ND<50	NA	32	42	ND<0.5	ND<0.5	ND<0.5	ND<0.5

µg/L = micrograms per liter
mg/L = milligrams per liter
mV = millivolts

Notes

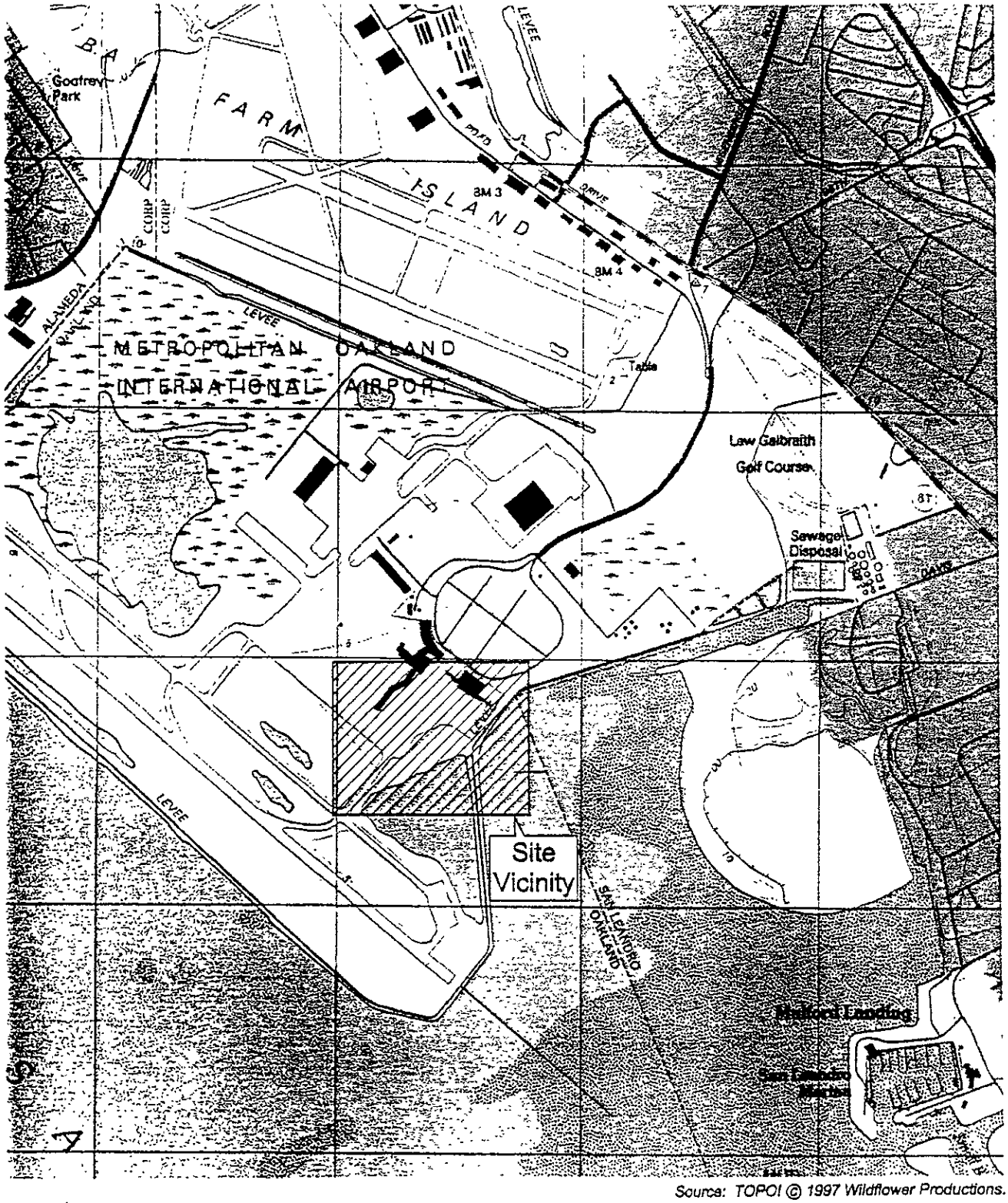
1 Chromatogram pattern: Diesel C9-C24
2 Chromatogram pattern: Unidentified hydrocarbons >C16
NA Not analyzed

Table 3. Groundwater Monitoring Well Natural Attenuation Analytical Results
Quarterly Groundwater Monitoring Report
July through September 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

Well	Date	Analyte / EPA Method / Units	Ferrous Iron 6000/7000 mg/L	Iron 6000/7000 mg/L	Nitrate 300 mg/L	Orthophosphate 300 mg/L	Sulfate 300 mg/L	Total Organic Carbon 415.1 mg/L	Dissolved Oxygen Field mg/L	Redox Field mV
MW-1	5/30/00		1.0	0.75	5.5	ND<0.5	76	47.2	2.8	208
	9/20/00		0.16	7.1	1.4	1.0	60	26.2	1.4	261
MW-2	5/30/00		0.1	2.9	1.3	ND<0.5	14	9.39	2.2	228
	9/20/00		0.093	12	0.23	ND<0.5	8.9	1.56	2.2	252
MW-3	5/30/00		0.7	3.9	ND<0.1	ND<0.5	51	22.5	1.2	164
	9/20/00		0.16	6.5	ND<0.1	ND<0.5	51	6.54	0.8	161
MW-4	5/30/00		0.4	4.6	ND<0.1	0.94	38	21.4	1.0	184
	9/20/00		0.33	9.8	ND<0.1	2.8	25	4.12	2.1	241

µg/L = micrograms per liter
mg/L = milligrams per liter
mV = millivolts

PLATES



Source: TOPO! © 1997 Wildflower Productions.

PLATE1.DWG 1.0
20000731.1721

Harding Lawson Associates
Engineering and
Environmental Services

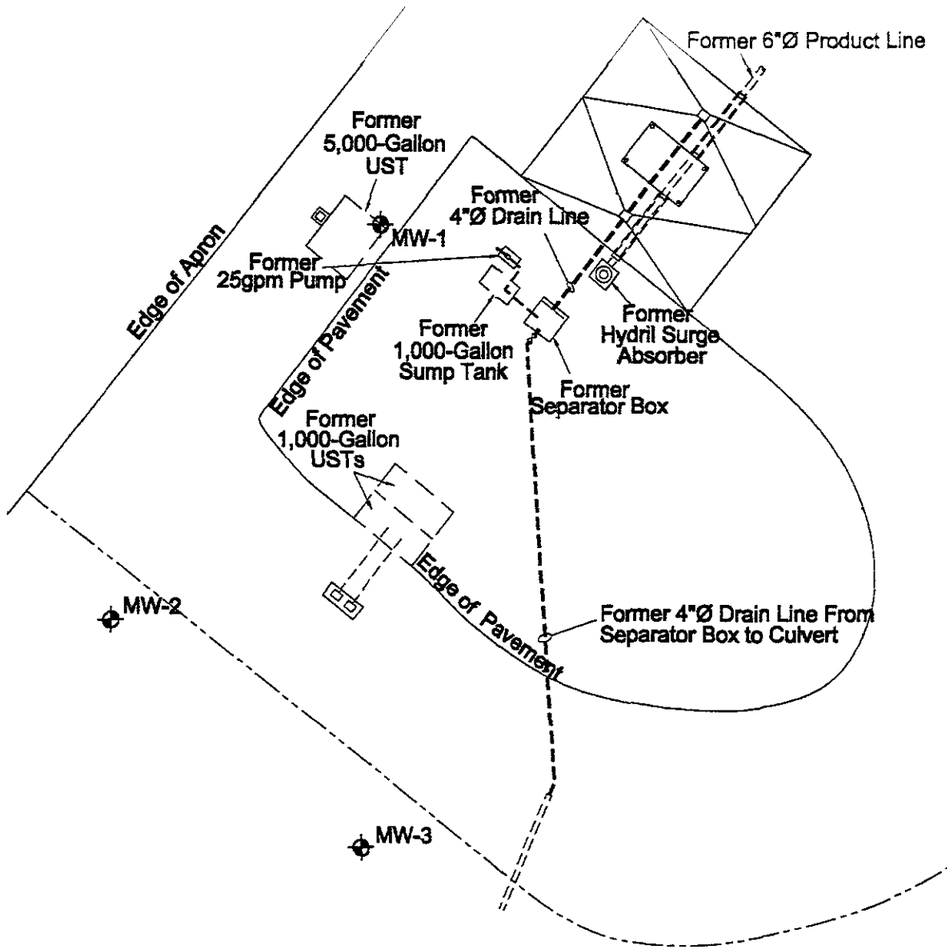
Site Location Map
Quarterly Groundwater Monitoring Report
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	49667.1		10/00	...

Legend

MW-1 Monitoring Well



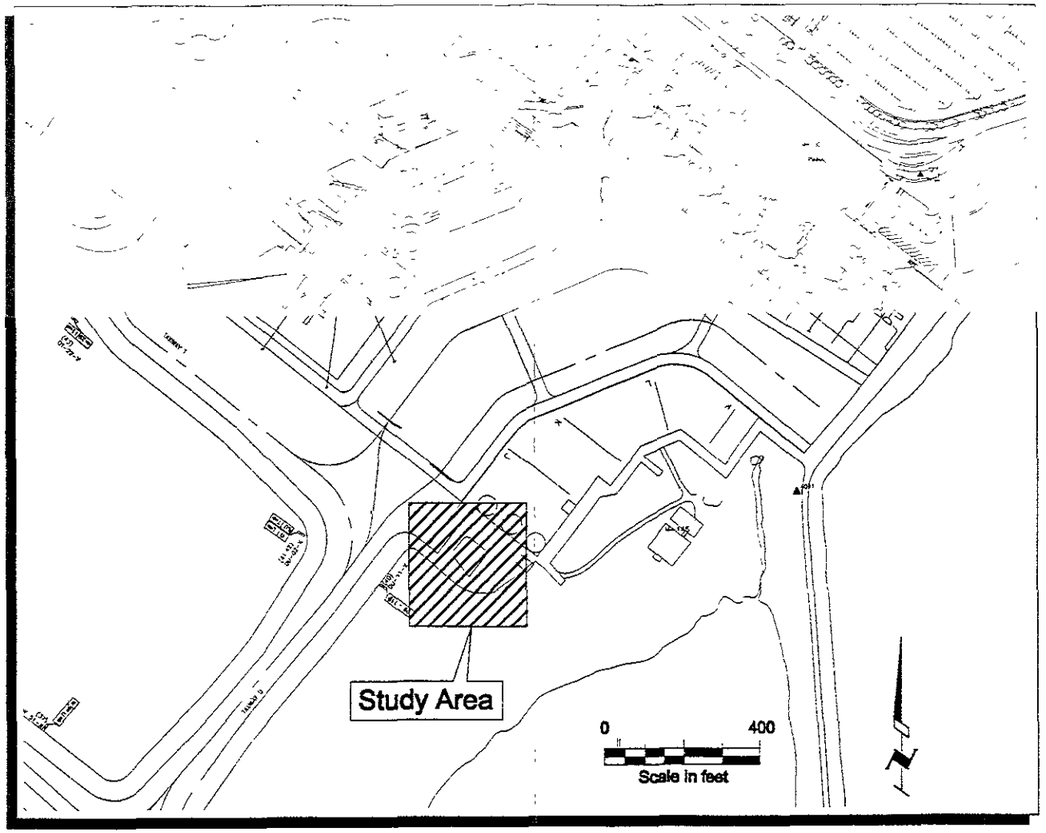


plate2.dwg

Harding Lawson Associates
Engineering and Environmental Services

Site Plan
Quarterly Groundwater Monitoring Report
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

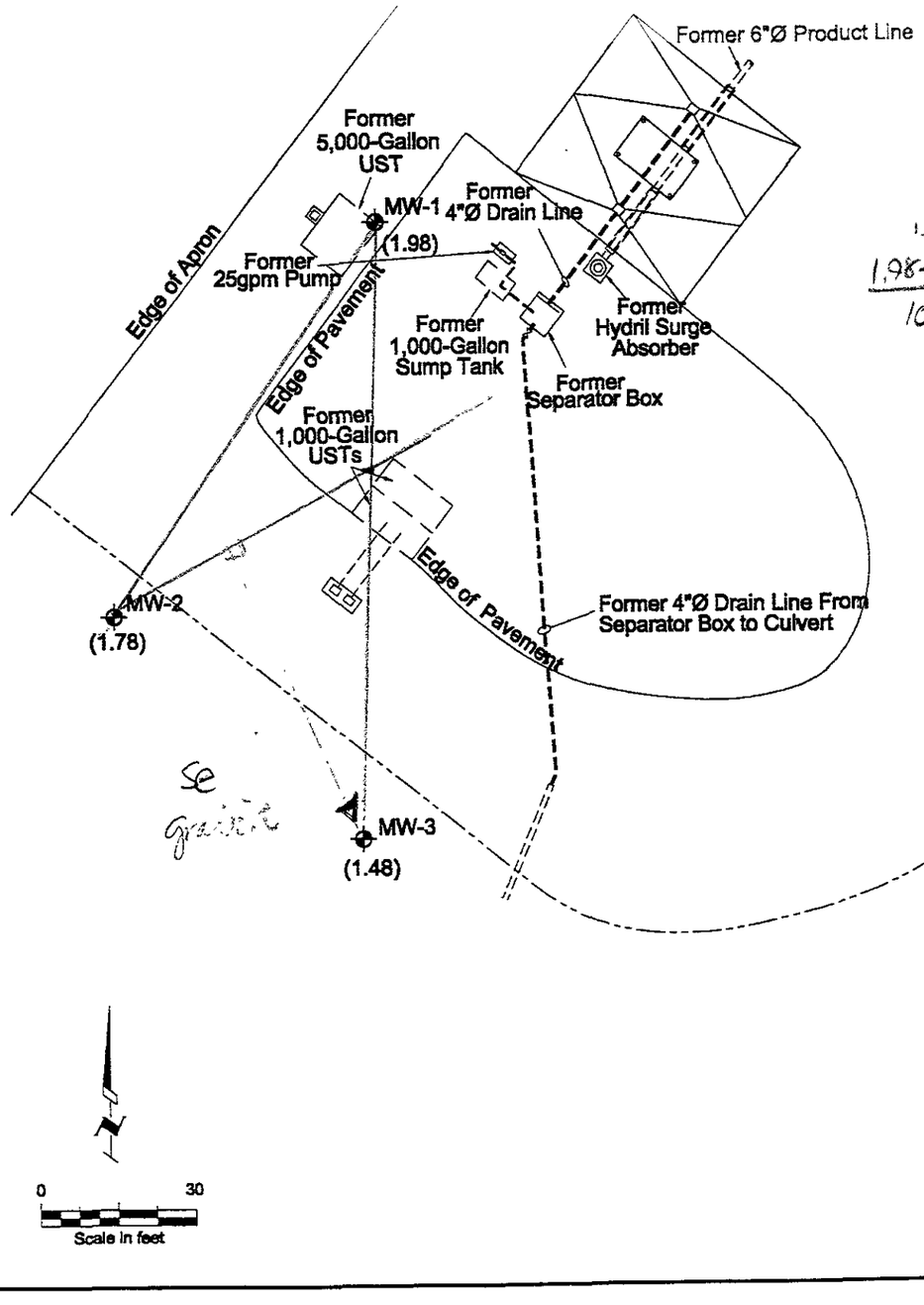
PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	49667.1		10/00	---

Legend

MW-1 Groundwater Well

(3.17) Groundwater Elevation (port datum)



$$\frac{1.5}{1.98-1.48} = \frac{.2}{1.98-1.78-X}$$

$$10.2 \qquad 4.0\,X$$

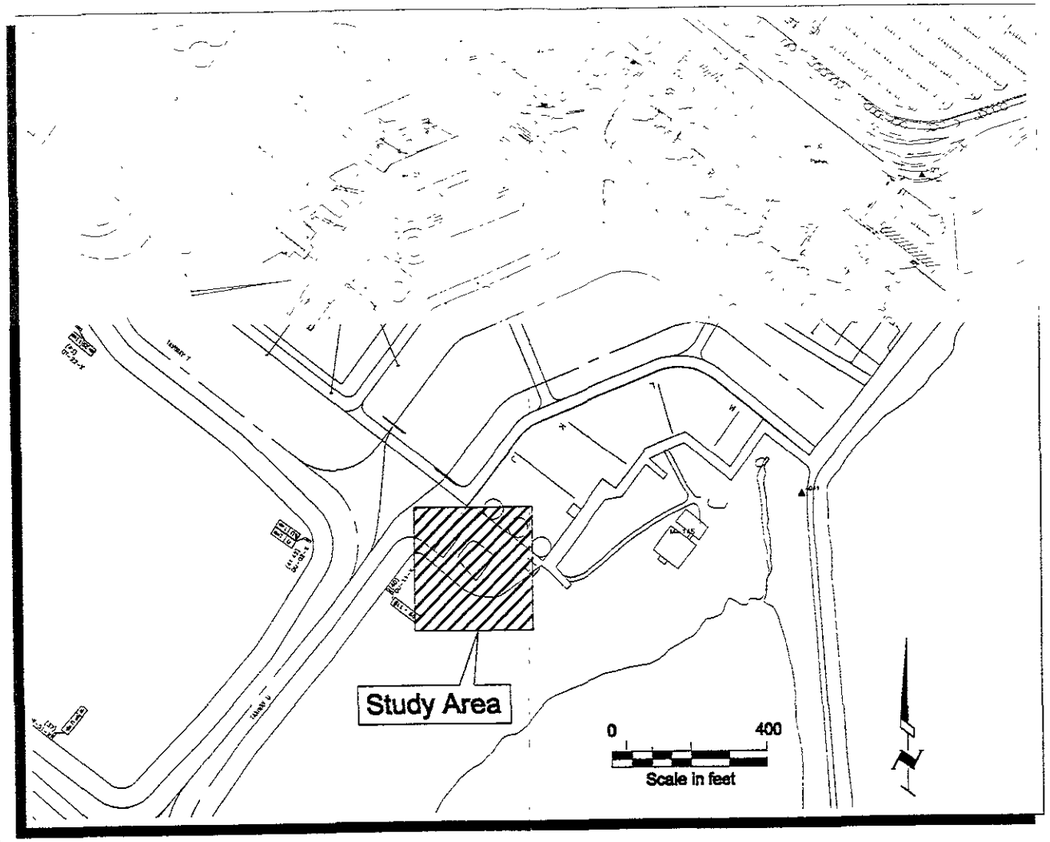


Plate4.dwg

Harding Lawson Associates
Engineering and Environmental Services

Groundwater Elevations (9/20/00)
Quarterly Groundwater Monitoring Report
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

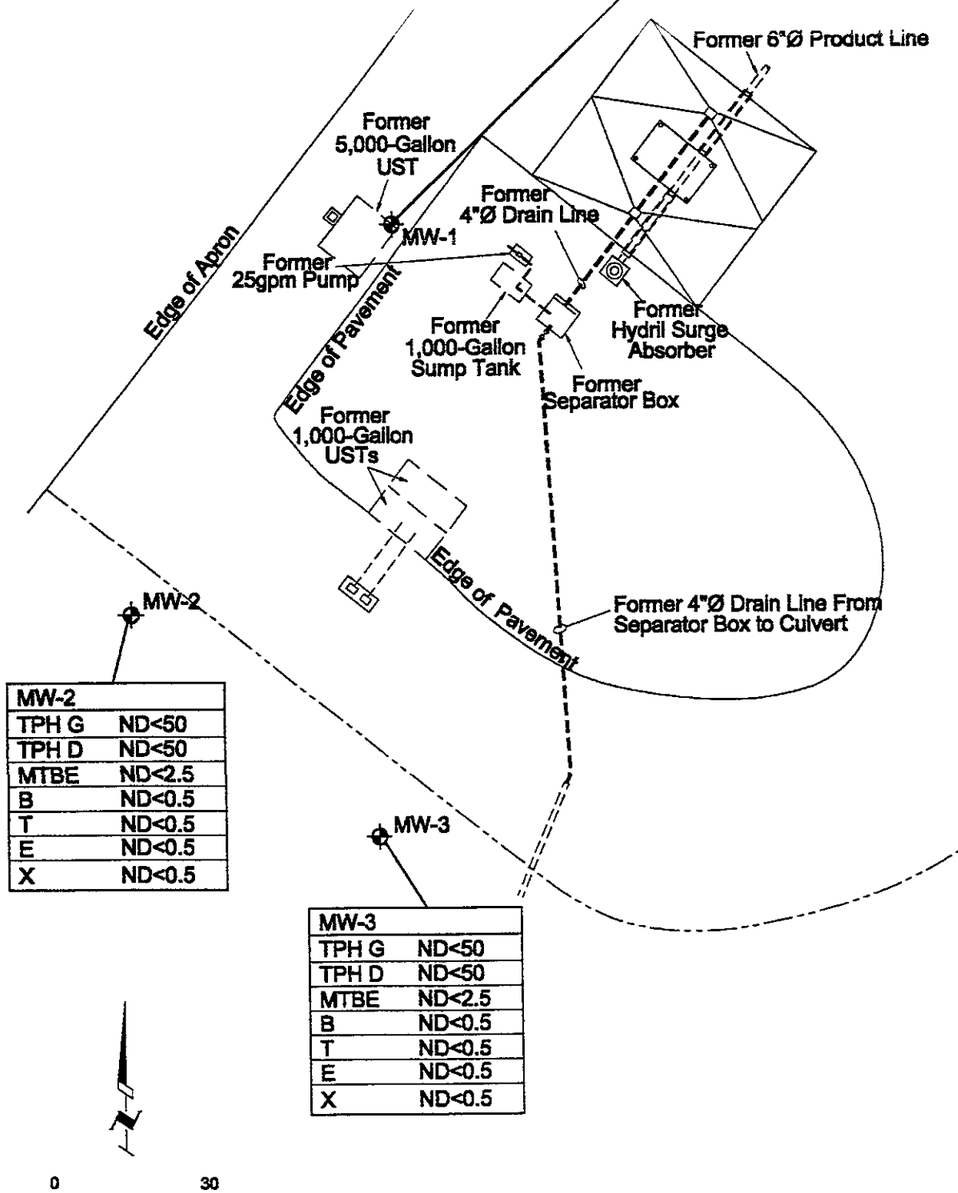
PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	49667.1		10/00	---

Legend

MW-1 Monitoring Well

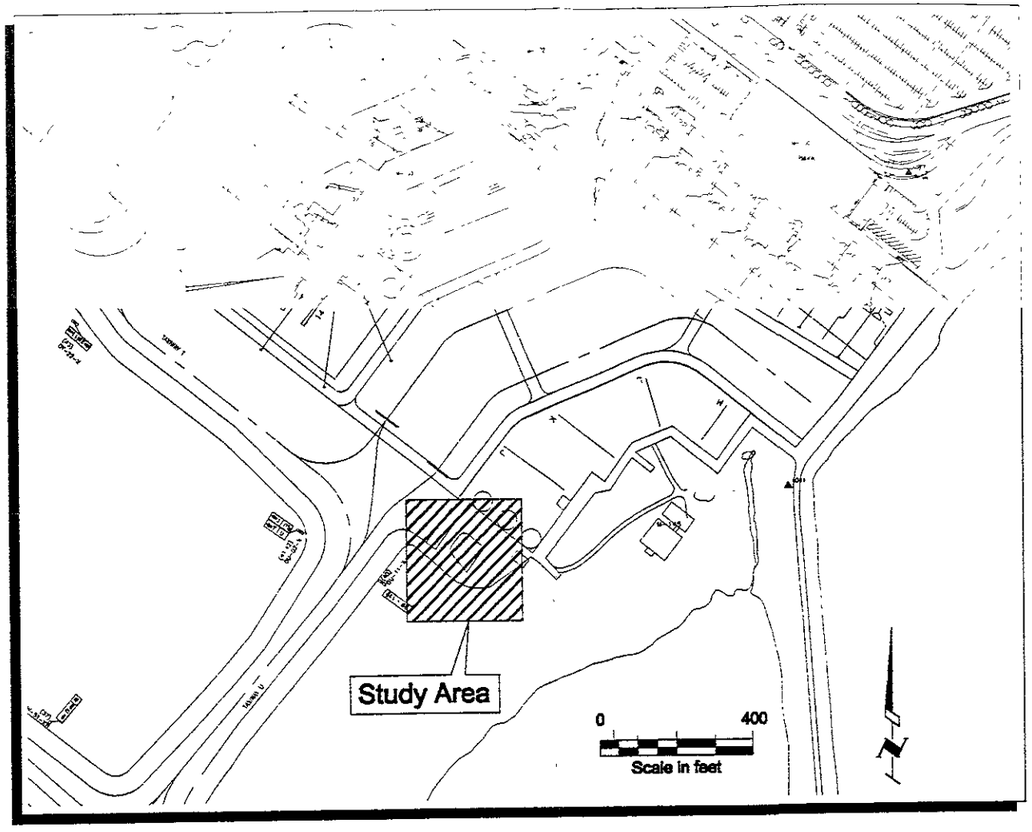
MW-1	
TPH G	ND<50
TPH D	ND<50
MTBE	ND<2.5
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5



MW-2	
TPH G	ND<50
TPH D	ND<50
MTBE	ND<2.5
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5

MW-3	
TPH G	ND<50
TPH D	ND<50
MTBE	ND<2.5
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5

MW-4	
TPH G	ND<50
TPH D	ND<50
MTBE	42*
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5



KEY:

TPH G = TPH Gas
TPH D = TPH Diesel
TPH MO = TPH Motor Oil
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylene
* MTBE results by 8260

All results in ug/L.

Samples collected 5/30/00.

Plate5.dwg

Harding Lawson Associates
Engineering and Environmental Services

Groudwater Chemical Results (9/20/00)
Quarterly Groundwater Monitoring Report
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	49667.1		10/00	---

APPENDIX A

GROUNDWATER SAMPLING REPORTS

Harding Lawson Associates
Engineering and Environmental Services

GROUNDWATER SAMPLING FORM

Well Number: MW- 1

Well Type: [x] Monitor [ ] Extraction [ ] Other ___
[x] PVC [ ] St. Steel [ ] Other ___

Job Name: Port of Oakland - Taxiway U

Job Number: 49667.1

Date: 9/20/00

Recorded By: Heath D Lee (Signature)

Sampled By: HDL (initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches): 2
Total Depth of Casing (TD in ft BTOC): 10
Water Level Depth (WL in ft BTOC): 6.30
No.of Well Volumes to be purged (# 4

PURGE METHOD

[x] Bailer - Type: teflon
[ ] Submersible - Type:
[ ] Other - Type:

PUMP INTAKE SETTING

[ ] Near Bottom [ ] Near Top
[ ] Other
Depth in feet (BTOC):
Screen Interval in feet (BTOC): from ___ to ___

PURGE VOLUME CALCULATION

(10 - 6.30) X 2 ² X 4 X 0.0408 = 2.41 gals
TD (feet) WL (Feet) D (inches) #V Calculated Purge Volume

Field Parameter Measurement

Minutes	pH	Conductivity (µS)	Temp. [ ]°C [x]°F	mg/L DO / mV redox
Initial	7.44	1747	73.6	1.4 / 261
1	7.34	1710	73.5	
2	7.36	2150	73.1	
3	7.40	2010	73.0	
Meter S/N	9510	9510	9510	

PURGE TIME

Purge Start: 0818
Purge Stop: 0827
Elapsed: 9

PURGE RATE

GPM: ___
GPM: ___

PURGE VOLUME

Volume: 3 gallons

Observations During Purging (Well Condition, Color, Odor):
Clear initially becomes cloudy
no odor

Discharge Water Disposal: [ ] Sanitary Sewer
[ ] Storm Sewer [x] Other onsite drum

WELL SAMPLING

[x] Bailer - Type: disposable

Sample Time: 0835

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW- 1	3 VOA	TPH gas by 8015	HCL	Sequoia	
	3 VOA	8020/MTBE/BTEX	HCL	Sequoia	
	2 amber VOA	TOC by 415.1	HCL	Sequoia	
	1 LA	TPH diesel	none	Sequoia	
	1 500mL Poly	Total Iron	HNO3	Sequoia	
	1 500mL Poly	Ferrous Iron	none	Sequoia	24 hour HT on ferrous iron
	1 L Poly	NO3, SO4, PO4	none	Sequoia	

QUALITY CONTROL SAMPLES

Duplicate Samples	
Original Sample No.	Dupl. Sample No

Blank Samples	
Type	Sample No

Other Samples	
Type	Sample No.

Harding Lawson Associates
Engineering and Environmental Services

GROUNDWATER SAMPLING FORM

Well Number: MW- 2

Well Type: [x] Monitor [ ] Extraction [ ] Other ___
[x] PVC [ ] St. Steel [ ] Other ___

Job Name: Port of Oakland - Taxiway U

Job Number: 49667.1

Recorded By: Heath Lee (Signature)

Date: 9/20/00

Sampled By: HDL (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches): 2
Total Depth of Casing (TD in ft BTOC): 10
Water Level Depth (WL in ft BTOC): 4.63
No.of Well Volumes to be purged (# ~~3~~ 4

PURGE METHOD

[x] Bailer - Type: teflon
[ ] Submersible - Type:
[ ] Other - Type:

PUMP INTAKE SETTING

[ ] Near Bottom [ ] Near Top
[ ] Other
Depth in feet (BTOC):
Screen Interval in feet (BTOC): from ___ to ___

PURGE VOLUME CALCULATION

(10 - 4.63) x 2 ² x 4 x 0.0408 = 3.51 gals
TD (feet) WL (Feet) D (inches) # V Calculated Purge Volume

Field Parameter Measurement

Minutes	pH	Conductivity (µS)	Temp. [x] °F [ ] °C	mV / DO mg/L / redox
Initial	8.00	191	73.8	22/252
1.5	7.86	478	71.7	
2.5	7.81	521	70.9	
4	7.88	587	70.8	
Meter S/N	9510	9510	9510	

PURGE TIME

Purge Start: 0855
Purge Stop: 0903
Elapsed: 8

PURGE RATE

GPM: ~~—~~
GPM: ___

PURGE VOLUME

Volume: 4 gallons

Observations During Purging (Well Condition, Color, Odor):
initially clear becomes light brown, no odor

Discharge Water Disposal: [ ] Sanitary Sewer [ ] Storm Sewer [x] Other onsite drum

WELL SAMPLING

[x] Bailer - Type: disposable

Sample Time: 0910

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW- 2	3 VOA	TPH gas by 8015	HCL	Sequoia	
	3 VOA	8020/MTBE/BTEX	HCL	Sequoia	
	2 amber VOA	TOC by 415.1	HCL	Sequoia	
	1 LA	TPH diesel	none	Sequoia	
	1 500mL Poly	Total Iron	HNO3	Sequoia	
	1 500mL Poly	Ferrous Iron	none	Sequoia	24 hour HT on ferrous iron
	1 L Poly	NO3, SO4, PO4	none	Sequoia	

QUALITY CONTROL SAMPLES

Duplicate Samples	
Original Sample No.	Dupl. Sample No.

Blank Samples	
Type	Sample No.

Other Samples	
Type	Sample No.

Harding Lawson Associates
Engineering and Environmental Services

GROUNDWATER SAMPLING FORM

Well Number: MW- 3

Well Type: [x] Monitor [ ] Extraction [ ] Other ___
[x] PVC [ ] St. Steel [ ] Other ___

Job Name: Port of Oakland - Taxiway U

Job Number: 49667.1

Date: 9/20/00

Recorded By: (Signature)

Sampled By: HDL (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches): 2
Total Depth of Casing (TD in ft BTOC): 10
Water Level Depth (WL in ft BTOC): 3.76
No.of Well Volumes to be purged (# 4

PURGE METHOD

[x] Bailer - Type: teflon
[ ] Submersible - Type:
[ ] Other - Type:

PURGE VOLUME CALCULATION

(10 - 3.76) x 2 ²x 4 x 0.0408 = 4.07 gals

TD (feet) WL (Feet) D (inches) #V Calculated Purge Volume

PUMP INTAKE SETTING

[ ] Near Bottom [ ] Near Top
[ ] Other
Depth in feet (BTOC):
Screen Interval in feet (BTOC): from ___ to ___

Field Parameter Measurement

Minutes	pH	Conductivity (µS)	Temp. [ ]°C [x]°F	DO / redox
Initial	8.16	900	74.5	0.8 / 161
1.5	7.98	3110	73.4	
3	7.97	4870	72.9	
4.5	8.07	5150	72.3	
Meter S/N	9510	9510	9510	

PURGE TIME

Purge Start: 0929
Purge Stop: 0937
Elapsed: 9

PURGE RATE

GPM:
GPM:

PURGE VOLUME

Volume: 4.5 gallons

Observations During Purging (Well Condition, Color, Odor):
initially clear brown, light ~~brown~~ no odor initially sulfur odor after bailing

Discharge Water Disposal: [ ] Sanitary Sewer [ ] Storm Sewer [x] Other onsite drum

WELL SAMPLING

[x] Bailer - Type: disposable

Sample Time: 0945

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-3	3 VOA	TPH gas by 8015	HCL	Sequoia	
	3 VOA	8020/MTBE/BTEX	HCL	Sequoia	
	2 amber VOA	TOC by 415.1	HCL	Sequoia	
	1 LA	TPH diesel	none	Sequoia	
	1 500mL Poly	Total Iron	HNO3	Sequoia	
	1 500mL Poly	Ferrous Iron	none	Sequoia	24 hour HT on ferrous iron
	1 L Poly	NO3, SO4, PO4	none	Sequoia	

QUALITY CONTROL SAMPLES

Duplicate Samples	
Original Sample No.	Dupl Sample No.

Blank Samples	
Type	Sample No

Other Samples	
Type	Sample No

Engineering and Environmental Services

Well Number: MW-4

Well Type: [x] Monitor [ ] Extraction [ ] Other ___ [x] PVC [ ] St. Steel [ ] Other ___

Job Name: Port of Oakland - Taxiway U

Job Number: 49667.1

Recorded By: Heather D Lee (Signature)

Date: 9/20/00

Sampled By: HDL (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches): 2

Total Depth of Casing (TD in ft BTOC): 10

Water Level Depth (WL in ft BTOC): 4.11

No.of Well Volumes to be purged (#): 3

PURGE METHOD

[x] Bailer - Type: teflon

[ ] Submersible - Type: ___

[ ] Other - Type: ___

PURGE VOLUME CALCULATION

(10 TD (feet) - 4.11 WL (Feet)) X 2 D (inches) ² X 3 #V X 0.0408 = 3.84 gals Calculated Purge Volume

PUMP INTAKE SETTING

[ ] Near Bottom [ ] Near Top

[ ] Other ___

Depth in feet (BTOC): ___

Screen Interval in feet (BTOC): from ___ to ___

Field Parameter Measurement

Minutes	pH	Conductivity (µS)	Temp. [ ] °C [x] °F	DO / redox
Initial	8.95	561	74.0	2.1 / 211
1.5	8.36	3010	73.1	
2.5	8.36	6274	72.4	
4	8.42	5870	72.3	
Meter S/N	9510	9510	9510	

PURGE TIME

Purge Start: 1004

Purge Stop: 1013

Elapsed: 9

PURGE RATE

GPM: ___

GPM: ___

PURGE VOLUME

Volume. 4.5 gallons

Observations During Purging (Well Condition, Color, Odor):

initially clear becomes light brown, no odor develops sulfur odor

Discharge Water Disposal: [ ] Sanitary Sewer [ ] Storm Sewer [x] Other onsite drum

WELL SAMPLING

[x] Bailer - Type: disposable

Sample Time: 1020

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-4	3 VOA	TPH gas by 8015	HCL	Sequoia	
	3 VOA	8020/MTBE/BTEX	HCL	Sequoia	
	2 amber VOA	TOC by 415.1	HCL	Sequoia	
	1 LA	TPH diesel	none	Sequoia	
	1 500mL Poly	Total Iron	HNO3	Sequoia	
	1 500mL Poly	Ferrous Iron	none	Sequoia	24 hour HT on ferrous iron
	1 L Poly	NO3, SO4, PO4	none	Sequoia	

QUALITY CONTROL SAMPLES

Duplicate Samples	
Original Sample No.	Dupl Sample No

Blank Samples	
Type	Sample No.

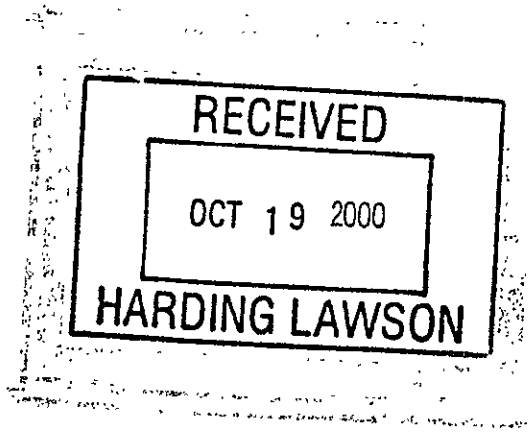
Other Samples	
Type	Sample No.

APPENDIX B

LABORATORY REPORTS

Sequoia
Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673
www.sequoialabs.com



13 October, 2000

Steve Osborne
Harding-Lawson Associates - Oakland
383 Fourth Street
Oakland, CA 94607

RE: Port of Oakland
Sequoia Report: W009486

Enclosed are the results of analyses for samples received by the laboratory on 20-Sep-00 14:08. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

for

Dimple Sharma
Project Manager

CA ELAP Certificate #1271

Sequoia Analytical

404 N. Wiget Lane
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FAX (925) 988-9673
www.sequoialabs.com

Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	W009486-01	Water	20-Sep-00 08:35	20-Sep-00 14:08
MW-2	W009486-02	Water	20-Sep-00 09:10	20-Sep-00 14:08
MW-3	W009486-03	Water	20-Sep-00 09:45	20-Sep-00 14:08
MW-4	W009486-04	Water	20-Sep-00 10:20	20-Sep-00 14:08

Sequoia Analytical - Walnut Creek

Dimple Sharma, Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
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FAX (925) 988-9673
www.sequoialabs.com

Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water Sampled: 20-Sep-00 08:35 Received: 20-Sep-00 14:08									
Purgeable Hydrocarbons	ND	50	ug/l	1	0I28008	28-Sep-00	28-Sep-00	EPA 8015M/8020	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.5	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*95.0 %*		*70-130*		"	"	"	
MW-2 (W009486-02) Water Sampled: 20-Sep-00 09:10 Received: 20-Sep-00 14:08									
Purgeable Hydrocarbons	ND	50	ug/l	1	0I28008	28-Sep-00	28-Sep-00	EPA 8015M/8020	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.5	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*96.0 %*		*70-130*		"	"	"	
MW-3 (W009486-03) Water Sampled: 20-Sep-00 09:45 Received: 20-Sep-00 14:08									
Purgeable Hydrocarbons	ND	50	ug/l	1	0I28008	28-Sep-00	28-Sep-00	EPA 8015M/8020	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	2.5	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*98.7 %*		*70-130*		"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-4 (W009486-04) Water Sampled: 20-Sep-00 10:20 Received: 20-Sep-00 14:08									
Purgeable Hydrocarbons	ND	50	ug/l	1	0I28008	28-Sep-00	28-Sep-00	EPA 8015M/8020	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	**32**	2.5	"	"	"	"	"	"	CC-3
Surrogate: a,a,a-Trifluorotoluene		*93.7 %*		*70-130*		"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Diesel Hydrocarbons (C9-C24) with Silica Gel Cleanup by DHS LUFT

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water	**Sampled: 20-Sep-00 08:35**	**Received: 20-Sep-00 14:08**							
Diesel Range Hydrocarbons	ND	50	ug/l	1	0J04011	04-Oct-00	10-Oct-00	EPA 8015M	
Surrogate: n-Pentacosane		*98.2 %*	*50-140*		"	"	"	"	
MW-2 (W009486-02) Water	**Sampled: 20-Sep-00 09:10**	**Received: 20-Sep-00 14:08**							
Diesel Range Hydrocarbons	ND	50	ug/l	1	0J04011	04-Oct-00	10-Oct-00	EPA 8015M	
Surrogate: n-Pentacosane		*66.1 %*	*50-140*		"	"	"	"	
MW-3 (W009486-03) Water	**Sampled: 20-Sep-00 09:45**	**Received: 20-Sep-00 14:08**							
Diesel Range Hydrocarbons	ND	50	ug/l	1	0J04011	04-Oct-00	10-Oct-00	EPA 8015M	
Surrogate: n-Pentacosane		*75.1 %*	*50-140*		"	"	"	"	
MW-4 (W009486-04) Water	**Sampled: 20-Sep-00 10:20**	**Received: 20-Sep-00 14:08**							
Diesel Range Hydrocarbons	ND	50	ug/l	1	0J04011	04-Oct-00	10-Oct-00	EPA 8015M	
Surrogate: n-Pentacosane		*84.1 %*	*50-140*		"	"	"	"	

Sequoia Analytical

404 N. Wiget Lane
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Harding-Lawson Associates - Oakland 383 Fourth Street Oakland CA, 94607	Project: Port of Oakland Project Number: 49667.1 Project Manager: Steve Osborne	**Reported:** 13-Oct-00 15:51

MTBE Confirmation by EPA Method 8260A

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-4 (W009486-04) Water Sampled: 20-Sep-00 10:20 Received: 20-Sep-00 14:08									
Methyl tert-butyl ether	**42**	2.0	ug/l	1	0J04019	04-Oct-00	04-Oct-00	EPA 8260B	
Surrogate: Dibromofluoromethane		*92.0 %*		*50-150*		"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*82.0 %*		*50-150*		"	"	"	

Sequoia Analytical

404 N. Wiget Lane
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(925) 988-9600
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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
283 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Total Metals by EPA 6000/7000 Series Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water	**Sampled: 20-Sep-00 08:35**		**Received: 20-Sep-00 14:08**						
Ferrous Iron	**0.16**	0.010	mg/l	1	0J04018	04-Oct-00	06-Oct-00	EPA 6010A	
Iron	7.1	0.010	"	"	"	"	"	"	
MW-2 (W009486-02) Water	**Sampled: 20-Sep-00 09:10**		**Received: 20-Sep-00 14:08**						
Ferrous Iron	**0.093**	0.010	mg/l	1	0J04018	04-Oct-00	06-Oct-00	EPA 6010A	
Iron	12	0.010	"	"	"	"	"	"	
MW-3 (W009486-03) Water	**Sampled: 20-Sep-00 09:45**		**Received: 20-Sep-00 14:08**						
Ferrous Iron	**0.16**	0.010	mg/l	1	0J04018	04-Oct-00	06-Oct-00	EPA 6010A	
Iron	6.5	0.010	"	"	"	"	06-Oct-00	"	
MW-4 (W009486-04) Water	**Sampled: 20-Sep-00 10:20**		**Received: 20-Sep-00 14:08**						
Ferrous Iron	**0.33**	0.010	mg/l	1	0J04018	04-Oct-00	06-Oct-00	EPA 6010A	
Iron	9.8	0.010	"	"	"	"	"	"	

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water	**Sampled: 20-Sep-00 08:35**	**Received: 20-Sep-00 14:08**							
Orthophosphate as PO4	**1.0**	0.50	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	
MW-2 (W009486-02) Water	**Sampled: 20-Sep-00 09:10**	**Received: 20-Sep-00 14:08**							
Orthophosphate as PO4	ND	0.50	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	
MW-3 (W009486-03) Water	**Sampled: 20-Sep-00 09:45**	**Received: 20-Sep-00 14:08**							
Orthophosphate as PO4	ND	0.50	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	
MW-4 (W009486-04) Water	**Sampled: 20-Sep-00 10:20**	**Received: 20-Sep-00 14:08**							
Orthophosphate as PO4	**2.8**	0.50	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Anions by EPA Method 300.0

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water	**Sampled: 20-Sep-00 08:35**		**Received: 20-Sep-00 14:08**						
Nitrate as NO3	1.4	0.10	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	
Sulfate as SO4	60	1.0	"	10	0I27010	27-Sep-00	27-Sep-00	"	
MW-2 (W009486-02) Water	**Sampled: 20-Sep-00 09:10**		**Received: 20-Sep-00 14:08**						
Nitrate as NO3	0.23	0.10	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300.0	
Sulfate as SO4	8.9	0.10	"	"	"	"	21-Sep-00	"	
MW-3 (W009486-03) Water	**Sampled: 20-Sep-00 09:45**		**Received: 20-Sep-00 14:08**						
Nitrate as NO3	ND	0.10	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300 0	
Sulfate as SO4	51	1.0	"	10	0I27010	27-Sep-00	27-Sep-00	"	
MW-4 (W009486-04) Water	**Sampled: 20-Sep-00 10:20**		**Received: 20-Sep-00 14:08**						
Nitrate as NO3	ND	0.10	mg/l	1	0I25004	21-Sep-00	21-Sep-00	EPA 300 0	
Sulfate as SO4	25	1.0	"	10	0I27010	27-Sep-00	27-Sep-00	"	

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Petaluma

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W009486-01) Water	**Sampled: 20-Sep-00 08:35**	**Received: 20-Sep-00 14:08**							
Total Organic Carbon	**26.2**	1.00	mg/l	1	0100226	09-Oct-00	10-Oct-00	EPA 415.1	
MW-2 (W009486-02) Water	**Sampled: 20-Sep-00 09:10**	**Received: 20-Sep-00 14:08**							
Total Organic Carbon	**1.56**	1.00	mg/l	1	0100226	09-Oct-00	10-Oct-00	EPA 415.1	
MW-3 (W009486-03) Water	**Sampled: 20-Sep-00 09:45**	**Received: 20-Sep-00 14:08**							
Total Organic Carbon	**6.54**	1.00	mg/l	1	0100226	09-Oct-00	10-Oct-00	EPA 415.1	
MW-4 (W009486-04) Water	**Sampled: 20-Sep-00 10:20**	**Received: 20-Sep-00 14:08**							
Total Organic Carbon	**4.12**	1.00	mg/l	1	0100226	09-Oct-00	10-Oct-00	EPA 415.1	

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Total Purgeable Hydrocarbons (C6-C12), BTEX and MTBE by DHS LUFT - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0I28008 - EPA 5030B [P/T]										
Blank (0I28008-BLK1)				Prepared & Analyzed: 28-Sep-00						
Purgeable Hydrocarbons	ND	50	ug/l							
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	2.5	"							
Surrogate: a,a,a-Trifluorotoluene	*27.9*		"	*30.0*		*93.0*	*70-130*			
LCS (0I28008-BS1)				Prepared & Analyzed: 28-Sep-00						
Benzene	18.9	0.50	ug/l	20.0		94.5	70-130			
Toluene	19.1	0.50	"	20.0		95.5	70-130			
Ethylbenzene	19.3	0.50	"	20.0		96.5	70-130			
Xylenes (total)	55.4	0.50	"	60.0		92.3	70-130			
Surrogate: a,a,a-Trifluorotoluene	*28.8*		"	*30.0*		*96.0*	*70-130*			
LCS Dup (0I28008-BSD1)				Prepared & Analyzed: 28-Sep-00						
Benzene	17.9	0.50	ug/l	20.0		89.5	70-130	5.43	20	
Toluene	18.1	0.50	"	20.0		90.5	70-130	5.38	20	
Ethylbenzene	18.4	0.50	"	20.0		92.0	70-130	4.77	20	
Xylenes (total)	52.9	0.50	"	60.0		88.2	70-130	4.62	20	
Surrogate: a,a,a-Trifluorotoluene	*27.6*		"	*30.0*		*92.0*	*70-130*			

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

MTBE Confirmation by EPA Method 8260A - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J04019 - EPA 5030B [P/T]										
Blank (0J04019-BLK1)				Prepared & Analyzed: 04-Oct-00						
Methyl tert-butyl ether	ND	2.0	ug/l							
Surrogate: Dibromofluoromethane	*48.0*		"	*50.0*		*96.0*	*50-150*			
Surrogate: 1,2-Dichloroethane-d4	*44.0*		"	*50.0*		*88.0*	*50-150*			
LCS (0J04019-BS1)				Prepared & Analyzed: 04-Oct-00						
Methyl tert-butyl ether	47.9	2.0	ug/l	50.0		95.8	70-130			
Surrogate: Dibromofluoromethane	*47.0*		"	*50.0*		*94.0*	*50-150*			
Surrogate: 1,2-Dichloroethane-d4	*41.0*		"	*50.0*		*82.0*	*50-150*			
LCS Dup (0J04019-BSD1)				Prepared & Analyzed: 04-Oct-00						
Methyl tert-butyl ether	49.9	2.0	ug/l	50.0		99.8	70-130	4.09	25	
Surrogate: Dibromofluoromethane	*47.0*		"	*50.0*		*94.0*	*50-150*			
Surrogate: 1,2-Dichloroethane-d4	*45.0*		"	*50.0*		*90.0*	*50-150*			

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Total Metals by EPA 6000/7000 Series Methods - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0J04018 - 200.7										
Blank (0J04018-BLK1)				Prepared: 04-Oct-00 Analyzed: 06-Oct-00						
Ferrous Iron	ND	0.010	mg/l							
Iron	ND	0.010	"							
LCS (0J04018-BS1)				Prepared: 04-Oct-00 Analyzed: 06-Oct-00						
Ferrous Iron	1.19	0.010	mg/l	1.00		119	80-120			
Iron	1.19	0.010	"	1.00		119	80-120			
LCS Dup (0J04018-BSD1)				Prepared: 04-Oct-00 Analyzed: 06-Oct-00						
Ferrous Iron	1.16	0.010	mg/l	1.00		116	80-120	2.55	20	
Iron	1.16	0.010	"	1.00		116	80-120	2.55	20	
Matrix Spike (0J04018-MS1)		Source: W009515-04		Prepared: 04-Oct-00 Analyzed: 06-Oct-00						
Ferrous Iron	2.06	0.010	mg/l	1.00	1.1	96.0	80-120			
Iron	2.06	0.010	"	1.00	1.1	96.0	80-120			
Matrix Spike Dup (0J04018-MSD1)		Source: W009515-04		Prepared: 04-Oct-00 Analyzed: 06-Oct-00						
Ferrous Iron	2.26	0.010	mg/l	1.00	1.1	116	80-120	9.26	20	
Iron	2.26	0.010	"	1.00	1.1	116	80-120	9.26	20	

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0I25004 - General Preparation										
Blank (0I25004-BLK2)				Prepared & Analyzed: 21-Sep-00						
Orthophosphate as PO4	ND	0.50	mg/l							
LCS (0I25004-BS2)				Prepared & Analyzed: 21-Sep-00						
Orthophosphate as PO4	17.7	0.50	mg/l	20.0		88.5	80-120			
Matrix Spike (0I25004-MS2)		Source: W009445-01		Prepared & Analyzed: 21-Sep-00						
Orthophosphate as PO4	111	2.0	mg/l	40.0	76	87.5	75-125			
Matrix Spike Dup (0I25004-MSD2)		Source: W009445-01		Prepared & Analyzed: 21-Sep-00						
Orthophosphate as PO4	112	2.0	mg/l	40.0	76	90.0	75-125	0.897	20	
Batch 0I27010 - General Preparation										
Blank (0I27010-BLK1)				Prepared & Analyzed: 27-Sep-00						
Orthophosphate as PO4	ND	0.50	mg/l							
LCS (0I27010-BS1)				Prepared & Analyzed: 27-Sep-00						
Orthophosphate as PO4	17.4	0.50	mg/l	20.0		87.0	80-120			
Matrix Spike (0I27010-MS1)		Source: W009612-01		Prepared & Analyzed: 27-Sep-00						
Orthophosphate as PO4	16.6	1.0	mg/l	20.0	ND	83.0	75-125			
Matrix Spike Dup (0I27010-MSD1)		Source: W009612-01		Prepared & Analyzed: 27-Sep-00						
Orthophosphate as PO4	16.8	1.0	mg/l	20.0	ND	84.0	75-125	1.20	20	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Anions by EPA Method 300.0 - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0I25004 - General Preparation										
Blank (0I25004-BLK1)				Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	ND	0.10	mg/l							
Blank (0I25004-BLK2)				Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	ND	0.10	mg/l							
Sulfate as SO4	ND	0.10	"							
LCS (0I25004-BS1)				Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	10.1	0.10	mg/l	10.0		101	80-120			
LCS (0I25004-BS2)				Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	10.2	0.10	mg/l	10.0		102	80-120			
Sulfate as SO4	10.2	0.10	"	10.0		102	80-120			
Matrix Spike (0I25004-MS1)		Source: W009455-01		Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	9 63	0.20	mg/l	10.0	ND	96.3	75-125			
Matrix Spike (0I25004-MS2)		Source: W009445-01		Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	19.6	0.40	mg/l	20.0	ND	98.0	75-125			
Sulfate as SO4	21.7	0.40	"	20.0	3.8	89 5	75-125			
Matrix Spike Dup (0I25004-MSD1)		Source: W009455-01		Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	9.60	0.20	mg/l	10.0	ND	96.0	75-125	0.312	20	
Matrix Spike Dup (0I25004-MSD2)		Source: W009445-01		Prepared & Analyzed: 21-Sep-00						
Nitrate as NO3	20.1	0.40	mg/l	20 0	ND	101	75-125	2.52	20	
Sulfate as SO4	21.8	0.40	"	20.0	3.8	90 0	75-125	0.460	20	

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Harding-Lawson Associates - Oakland 383 Fourth Street Oakland CA, 94607	Project: Port of Oakland Project Number: 49667.1 Project Manager: Steve Osborne	**Reported:** 13-Oct-00 15:51

Anions by EPA Method 300.0 - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0I27010 - General Preparation										
Blank (0I27010-BLK1)				Prepared & Analyzed: 27-Sep-00						
Nitrate as NO3	ND	0.10	mg/l							
Blank (0I27010-BLK2)				Prepared & Analyzed: 27-Sep-00						
Sulfate as SO4	ND	0.10	mg/l							
LCS (0I27010-BS1)				Prepared & Analyzed: 27-Sep-00						
Nitrate as NO3	10.5	0.10	mg/l	10.0		105	80-120			
LCS (0I27010-BS2)				Prepared & Analyzed: 27-Sep-00						
Sulfate as SO4	9.93	0.10	mg/l	10.0		99.3	80-120			
Matrix Spike (0I27010-MS1)		Source: W009612-01		Prepared & Analyzed: 27-Sep-00						
Nitrate as NO3	10.1	0.20	mg/l	10.0	ND	101	75-125			
Matrix Spike (0I27010-MS2)		Source: W009213-04		Prepared & Analyzed: 27-Sep-00						
Sulfate as SO4	1190	20	mg/l	1000	220	97.0	75-125			
Matrix Spike Dup (0I27010-MSD1)		Source: W009612-01		Prepared & Analyzed: 27-Sep-00						
Nitrate as NO3	10.1	0.20	mg/l	10.0	ND	101	75-125	0	20	
Matrix Spike Dup (0I27010-MSD2)		Source: W009213-04		Prepared & Analyzed: 27-Sep-00						
Sulfate as SO4	1210	20	mg/l	1000	220	99.0	75-125	1.67	20	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Petaluma

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 0100226 - General Preparation										
Blank (0100226-BLK1)				Prepared: 09-Oct-00 Analyzed: 10-Oct-00						
Total Organic Carbon	ND	1.00	mg/l							
LCS (0100226-BS1)				Prepared: 09-Oct-00 Analyzed: 10-Oct-00						
Total Organic Carbon	39.9	1.00	mg/l	40.0		99 8	80-120			
Matrix Spike (0100226-MS1)		Source: P009479-01		Prepared: 09-Oct-00 Analyzed: 10-Oct-00						
Total Organic Carbon	86 8	1.00	mg/l	80.0	7.47	99 2	75-125			
Matrix Spike Dup (0100226-MSD1)		Source: P009479-01		Prepared: 09-Oct-00 Analyzed: 10-Oct-00						
Total Organic Carbon	87.6	1.00	mg/l	80.0	7.47	100	75-125	0 917	20	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 49667.1	**Reported:**
Oakland CA, 94607	Project Manager: Steve Osborne	13-Oct-00 15:51

Notes and Definitions

CC-3	Continuing Calibration indicates that the quantitative result for this analyte includes a greater than 15% degree of uncertainty. The value as reported is within method acceptance.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

W0009486

Harding Lawson Associates
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HLA/Corps of Engineers CHAIN OF CUSTODY FORM

Seq. No.: Nº 5084

Lab: Sequoia

Samplers: Heather Lee

Job Number: 49667.1

Name/Location: Port Of Oakland: South Airport Self-Fueling Taxiway U

Project Manager: Steve Osborne

Recorder: Heather Lee (Signature Required)

MATRIX			#CONTAINERS & PRESERV.						SAMPLE NUMBER OR LAB NUMBER			DATE				STATION			
Water	Soil		Unpres	H_2SO_4	HNO_3	HCL			YR	WK	SEQ	YR	MO	DAY	TIME	SAMP TYPE	SITE	SEQ	DEPTH
X			3		1	8			MW-	1	01A-4	00	09	20	0835				
X			3		1	8			MW-	2	02	00	09	20	0910				
X			3		1	8			MW-	3	03	00	09	20	0945				
X			3		1	8			MW-	4	04	00	09	20	1020				

ANALYSIS REQUESTED																
Gasoline Range Organics 8015B	Diesel/MotorOil Range Organics 8015B	CCR Title 22 Metals (17)	Priority Pollutant Metals (13)	BTEX plus MTBE	EPA 8021B	EPA 8260B	EPA 8270C	EPA 8310	EPA 8020 /MTBE/BTEX	Ferrous Iron (24 hr HT)	Total Iron	Nitrate as NO_3, EPA 300	Sulfate EPA 300	Orthophosphate EPA 300	Total Organic Carbon EPA 415.1	EPA 8015 TPH diesel with silica gel cleanup
X									X	X	X	X	X	X	X	X
X									X	X	X	X	X	X	X	X
X									X	X	X	X	X	X	X	X
X									X	X	X	X	X	X	X	X

ADDITIONAL INFORMATION

SAMPLE NUMBER YR	WK	SEQ	REMARKS
			Std TAT
			email results to hlee@harding.com
			Confirmation of MTBE detects by 8260

CHAIN OF CUSTODY RECORD

			Date/Time
Relinquished By (signature)	Heather Lee (Print Name)	HLA (Company)	9/20/00 1400
Received By (signature)	(Print Name)	Seq Analytical (Company)	9/20 1140
Relinquished By (signature)	(Print Name)	(Company)	Date/Time
Received By (signature)	(Print Name)	(Company)	Date/Time
Relinquished By (signature)	(Print Name)	(Company)	Date/Time
Received By (signature)	(Print Name)	(Company)	Date/Time

Method of Shipment: