



PORT OF OAKLAND

January 17, 2001

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

00 JAN 18 PM 4:27
ENVIRONMENTAL
PROTECTION

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

Dear Mr. Chan:

Enclosed is a copy of the Harding ESE report entitled "*Quarterly Groundwater Monitoring Report, October 1 through December 31, 2000, South Airport Self-Fueling Facility, Taxiway U*", dated January 17, 2001. This is the 3rd quarter of groundwater monitoring for this site, and the 4th quarter groundwater monitoring event will be performed before the end of February 2001.

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

enclosure

c: (w/o encl.): Jeff Jones - EH & SC Files
c:\206006bc.gwmrjan2001



Harding ESE, Inc.
383 Fourth Street
Suite 300
Oakland, CA 94607
Telephone: 510/451-1001
Fax: 510/451-3165
Home Page: www.mactec.com

January 17, 2001
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
October 1 through December 31, 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland International Airport
Oakland, California**

Dear Mr. Klettke:

Harding, ESE, Inc. (Harding), formerly Harding Lawson Associates, presents this groundwater monitoring report summarizing groundwater conditions observed during the fourth 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 third of four quarterly groundwater monitoring events that Harding will perform for the Port of Oakland in accordance with Harding's Work Plan - Groundwater Monitoring, Oakland International Airport, Oakland, California, dated March 16, 2000.

*on track for closure
after next issue*

BACKGROUND

UST Removal

On April 26, 1999, the Port of Oakland's 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) and methyl tertiary butyl-ether (MTBE) were detected in both soil and groundwater samples collected from the excavations.

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At the diesel UST excavation, 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 in the soil. 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 at concentrations 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 contained TPH-gas and TPH-diesel concentrations of up to 42 and 1.7 mg/L, respectively; dissolved BTEX compounds ranged in concentration 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 below the ground surface (bgs). 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, Harding 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 mg/kg to 680 mg/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. Water samples from two of the borings contained MTBE above the MCL of 13 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. Harding 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 could indicate microbial growth because phosphorous is

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utilized by the microbes to break down the petroleum hydrocarbons. These results are discussed in more detail in Harding's *Subsurface Investigation Report* issued to the Port on October 7, 1999.

Monitoring Well Installation

On April 27, 2000, Gregg Drilling and Testing, Inc (Gregg), under the direction of Harding, 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 (PVC). Under the direction of Harding, Gregg installed the screened interval consisting of 0.02-inch slotted casing between 3 and 10 feet bgs. Three feet of flush-threaded, 2-inch diameter PVC solid casing was installed from the screen interval to the ground surface. 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, Harding contracted PLS Surveys, Inc. to locate and provide top of well casing 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

Harding conducted quarterly groundwater monitoring on November 15 for the quarter beginning October 1 and ending December 31, 2000. Prior to purging or sampling the monitoring wells, Harding measured dissolved oxygen (DO) concentrations, reduction oxidation potential (Redox), and water levels. Harding monitored the pH, conductivity, and temperature of the groundwater during purging. Harding 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.

Harding 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 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

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- BTEX and MTBE in accordance with EPA Test Method 8020 with MTBE detections confirmed 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.

Harding 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 reported above the detection limit in all four of the monitoring wells this quarter at concentrations ranging from 57 micrograms per liter ($\mu\text{g/L}$) in MW-2 to 70 $\mu\text{g/L}$ in MW-4. TPH-diesel was not reported above the detection limits in any of the four wells during the previous quarter. MTBE was detected in MW-4 at a concentration of 32 $\mu\text{g/L}$. The MTBE detection was confirmed by EPA Method 8260 with results of 44 $\mu\text{g/L}$ in MW-4. Last quarter's EPA Method 8260 results yielded a MTBE concentration of 42 $\mu\text{g/L}$ 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. Harding also measured certain groundwater parameters in the field to supplement the chemical data. Because of the low concentrations of petroleum hydrocarbons (the majority being non-detect), evidence indicating high rates of microbial activity are not expected at this time. This data is summarized in Table 3.

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QUALITY ASSURANCE AND QUALITY CONTROL

All samples were received by the laboratory cold and intact. Groundwater submitted for TPH-diesel analysis was treated with silica gel prior to analysis. Harding 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 ESE, INC.



Trish Eliasson
Staff Engineer



Stephen J. Osborne
Geotechnical Engineer



TAE/SJO/dmw/p:wpdata/49967/037907R

Attachments:

- Table 1 - Groundwater Elevations
- Table 2 - Petroleum Hydrocarbon Analytical Results for Groundwater Samples
- Table 3 - Natural Attenuation Analytical Results for Groundwater Samples

- Plate 1 - Site Location Map
- Plate 2 - Site Plan
- Plate 3 - Groundwater Elevation (11/15/00)
- Plate 4 - Groundwater Chemical Results (11/15/00)

- Appendix A - Groundwater Sampling Forms
- Appendix B - Laboratory Reports

TABLES

Table 1. Groundwater Elevations
Quarterly Groundwater Monitoring Report
October through December 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
		11/15/00	6.10	2.18
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
		11/15/00	4.18	2.23
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
		11/15/00	3.26	1.98
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
		11/15/00	3.27	1.22

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. Petroleum Hydrocarbon Analytical Results for Groundwater Samples
Quarterly Groundwater Monitoring Well Report
October through December 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland, California

Well	Date	Analyte:	TPH gas	TPH diesel	TPH motor oil	MTBE	Confirmation MTBE	Benzene	Toluene	Ethylbenzene	Total Xylenes
		EPA Method: Units:	8015 M µg/L	8015 M µg/L	8015 M µg/L	8020 µg/L	8260 µg/L	8020 µg/L	8020 µg/L	8020 µg/L	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
	11/15/00		ND<50	58 ¹	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
	11/15/00		ND<50	57 ¹	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
	11/15/00		ND<50	67 ¹	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
	11/15/00		ND<50	70 ¹	NA	32	44	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

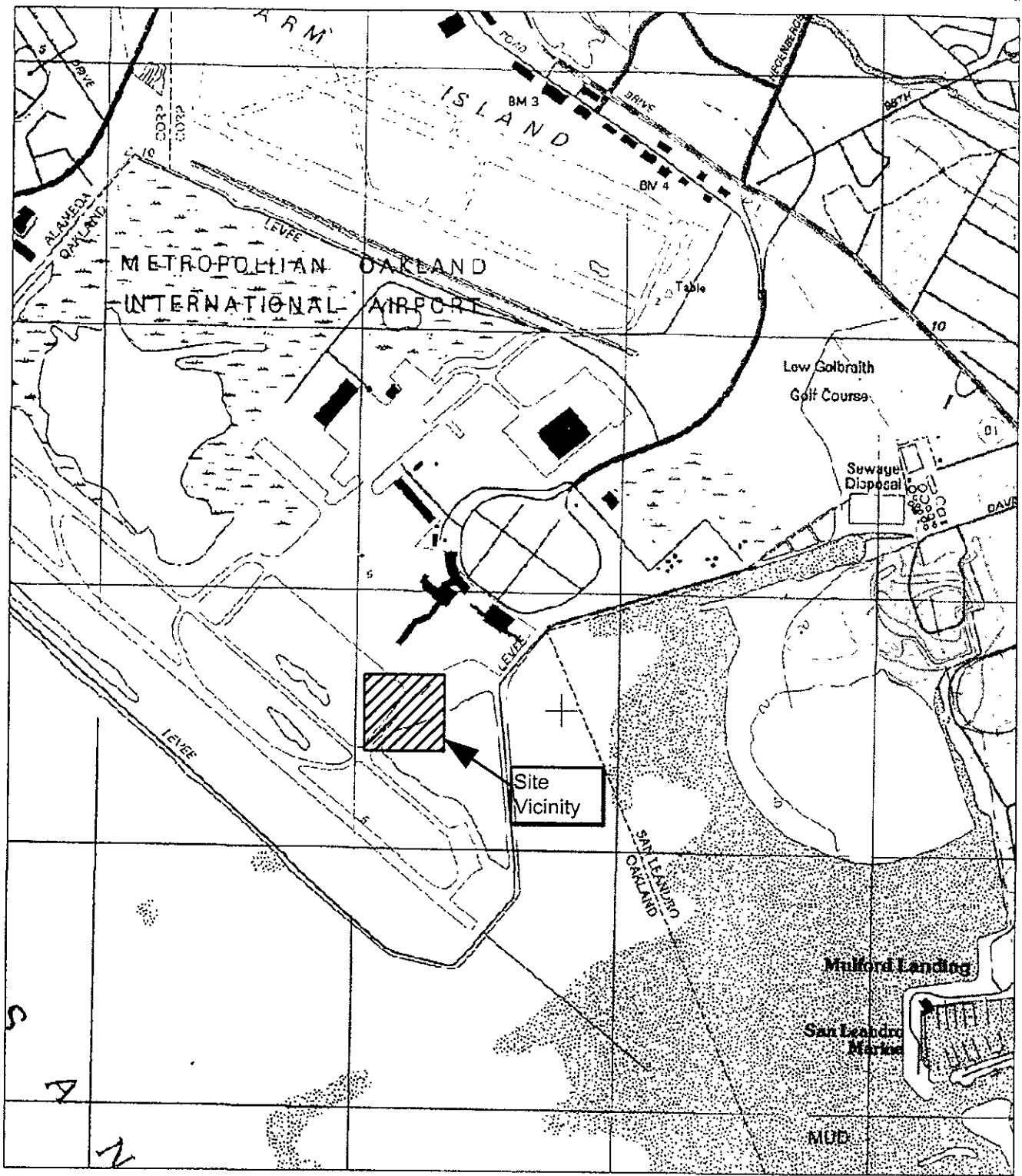
NA Not analyzed

**Table 3. Natural Attenuation Analytical Results for Groundwater Samples
Quarterly Groundwater Monitoring Report
October through December 2000
South Airport Self-Fueling Facility, Taxiway U
Oakland, California**

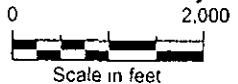
Well	Date	Analyte:	Ferrous Iron	Iron	Nitrate	Orthophosphate	Sulfate	Total Organic Carbon	Dissolved Oxygen	Redox
		EPA Method: Units:	6000/7000 mg/L	6000/7000 mg/L	300 mg/L	300 mg/L	300 mg/L	415.1 mg/L	Field mg/L	Field mV
MW-1	5/30/00		1.0	0.75	5.5	ND<0.5	76	47.2	2.8	208
	9/20/00		0.16	7.1	1.4	1.0	60	26.2	1.4	261
	11/15/00		0.33	2.5	2	ND<0.5	87	1.73	3.6	321
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
	11/15/00		0.68	13.0	0.4	ND<0.5	8.3	ND<1.0	4.4	317
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
	11/15/00		0.46	7.0	ND<0.2	ND<0.5	59	2.20	3.6	296
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
	11/15/00		0.52	5.3	ND<0.2	3	22	2.65	3.0	321

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

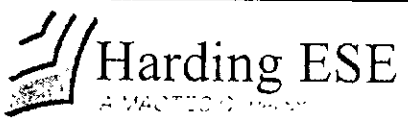
PLATES



Source TOPO! © 1997 Wildflower Productions



48667001.DWG 1.0
20001213.1448



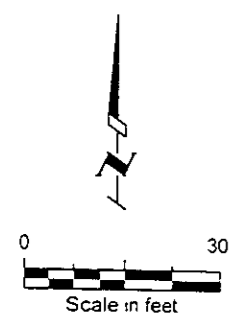
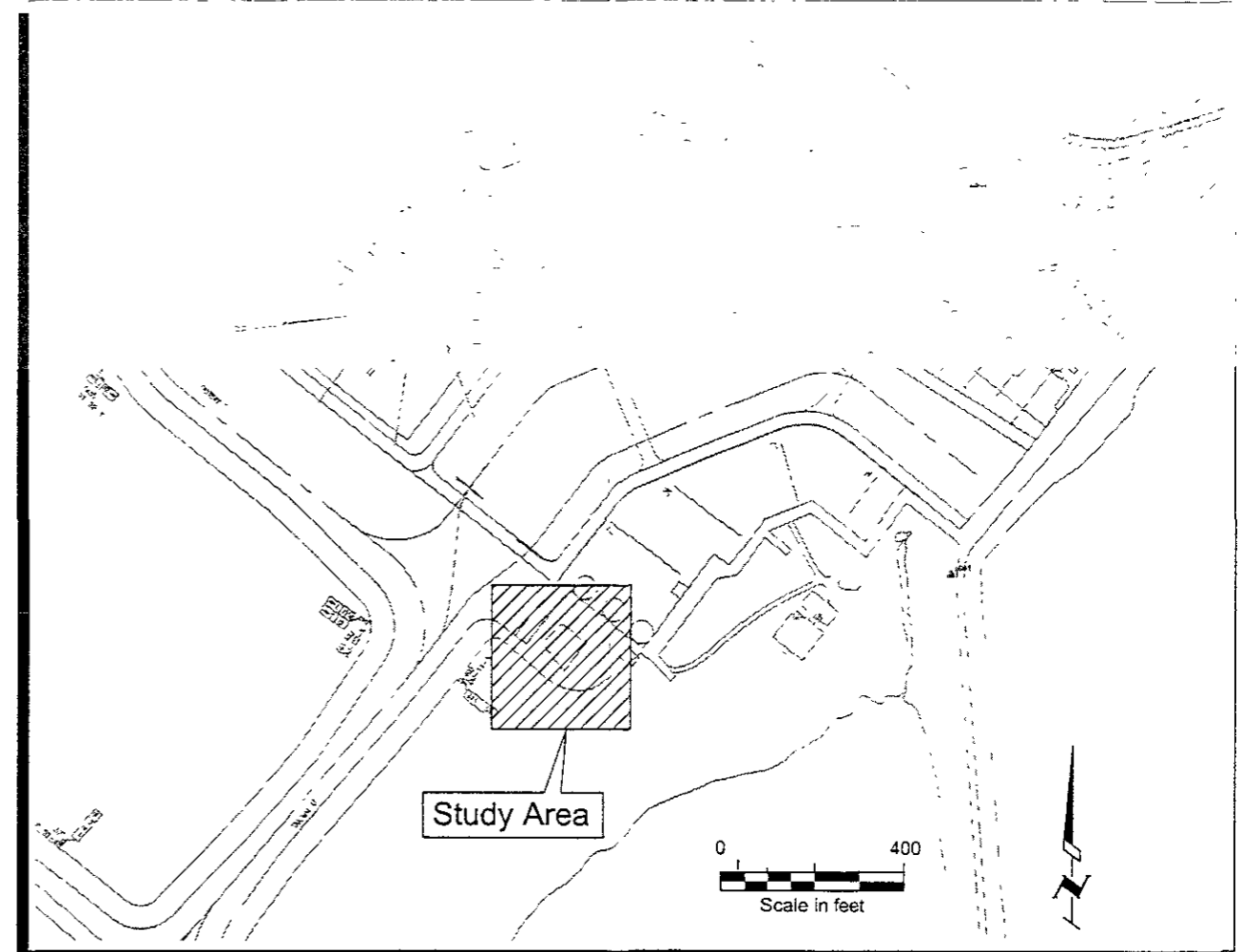
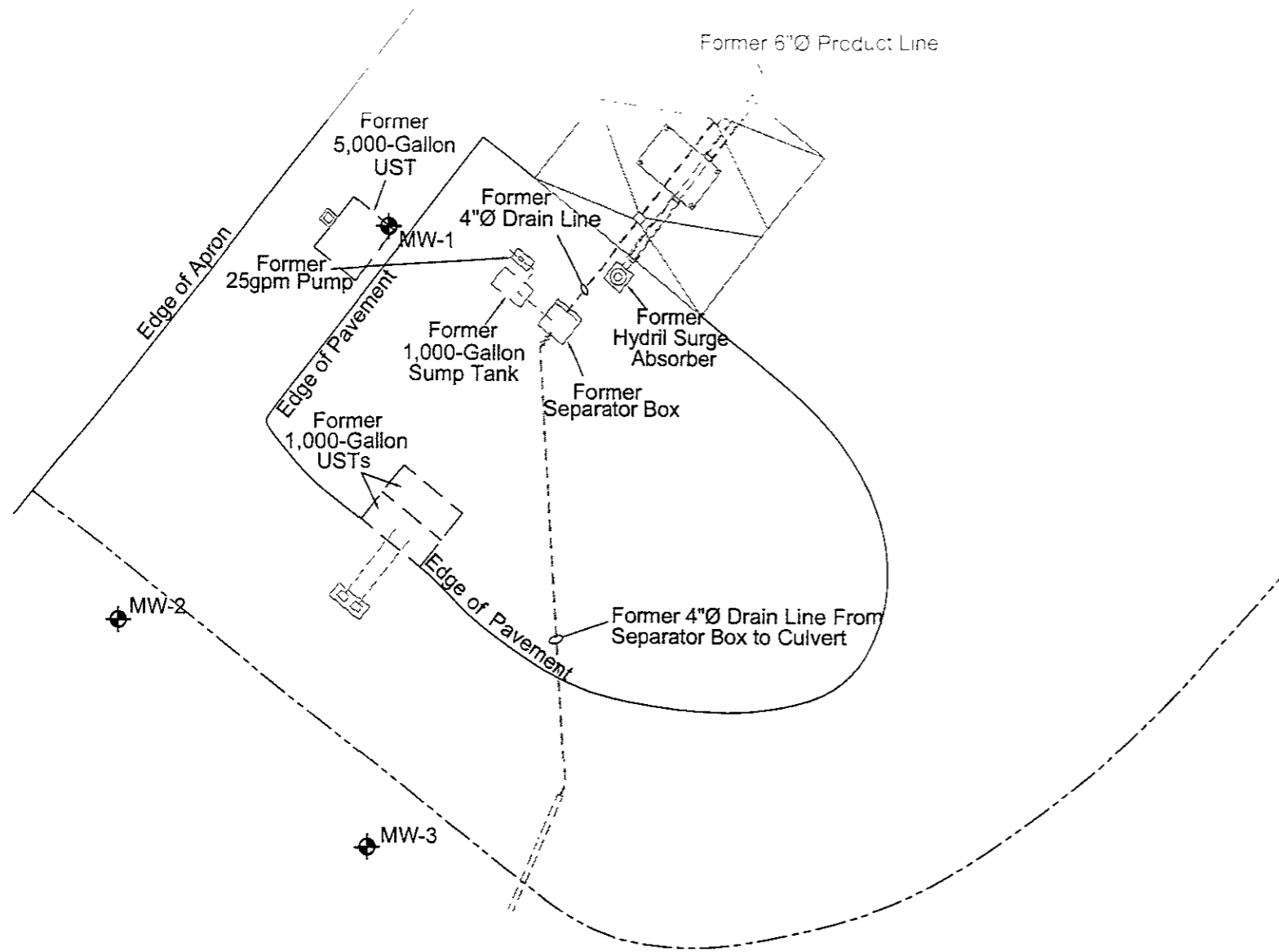
Site Location Map
 Groundwater Monitoring Well Installation Report
 South Airport Self-Fueling Facility, Taxiway U
 Oakland, California

PLATE

1

Legend

MW-1 Monitoring Well





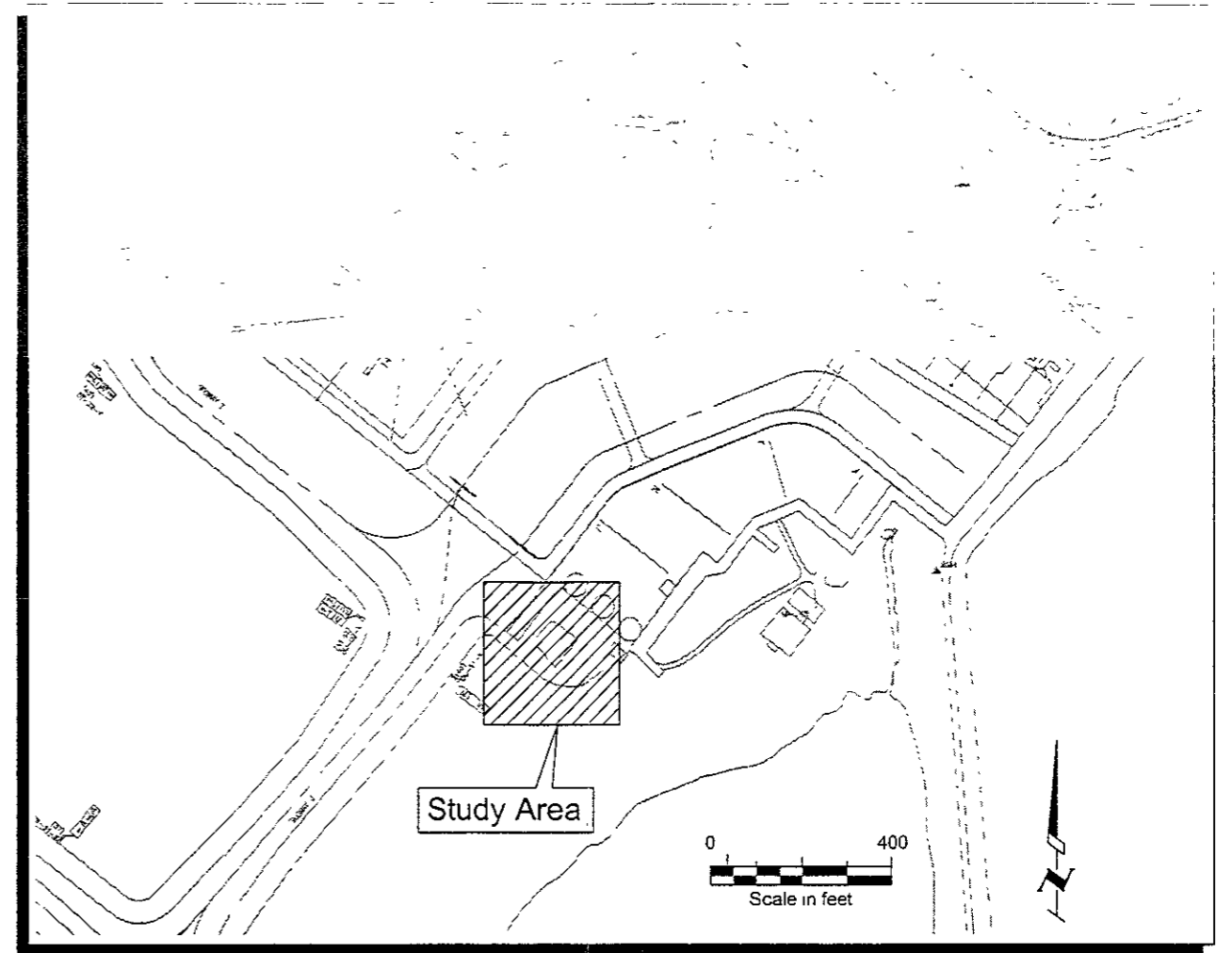
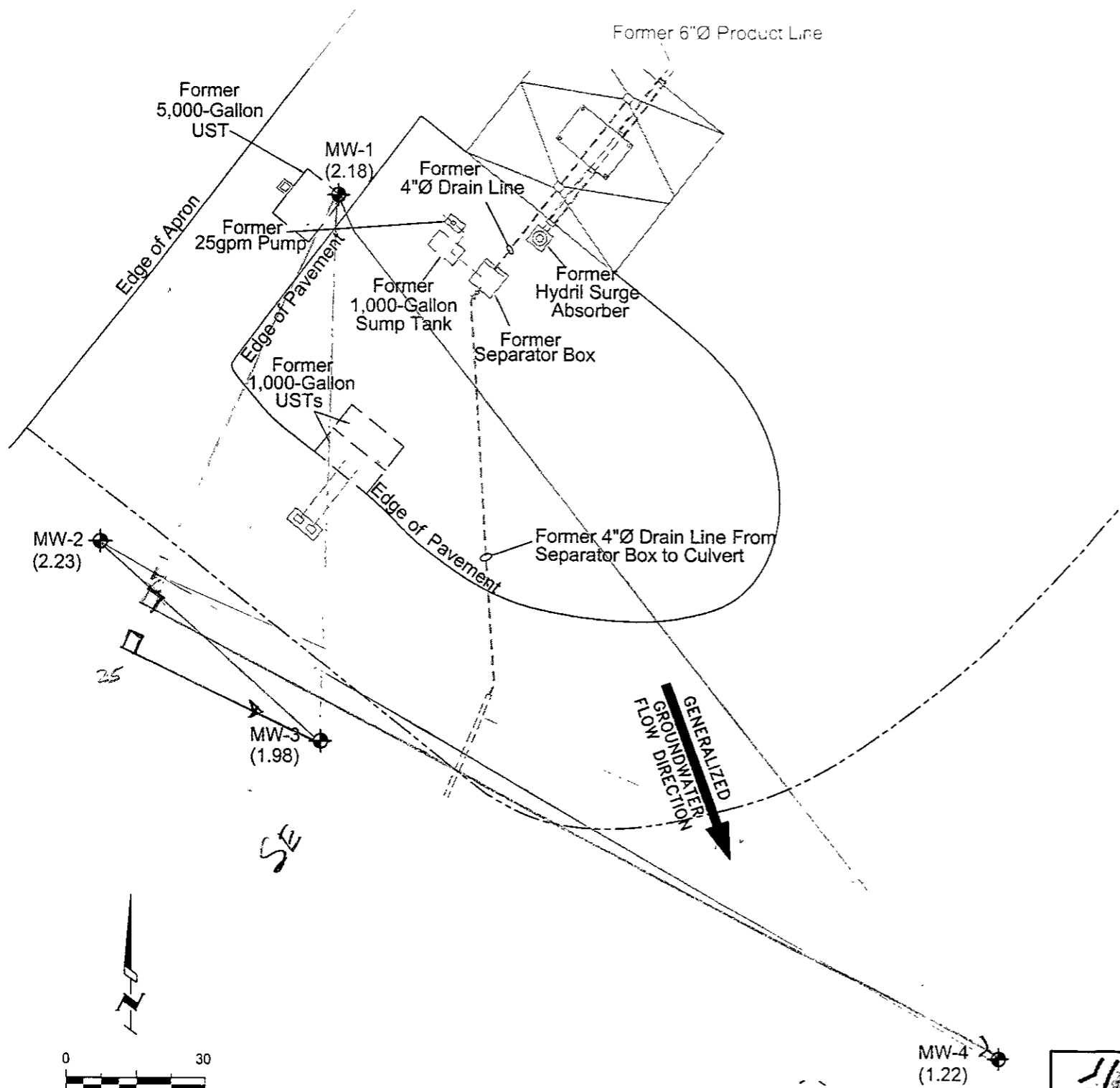
Site Plan
 Groundwater Monitoring Well Installation Report
 South Airport Self-Fueling Facility, Taxiway U
 Oakland, California

DRAWN CN	JOB NUMBER 49667 1	APPROVED	DATE 1,01	REVISION DATE
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49667008.DWG 0.0
20010108 1.521

Legend

-  MW-1 Groundwater Well
-  (2.18) Groundwater Elevation point datum




Groundwater Elevations (11/15/00)
 Groundwater Monitoring Well Installation Report
 South Airport Self-Fueling Facility, Taxiway U
 Oakland, California

PLATE

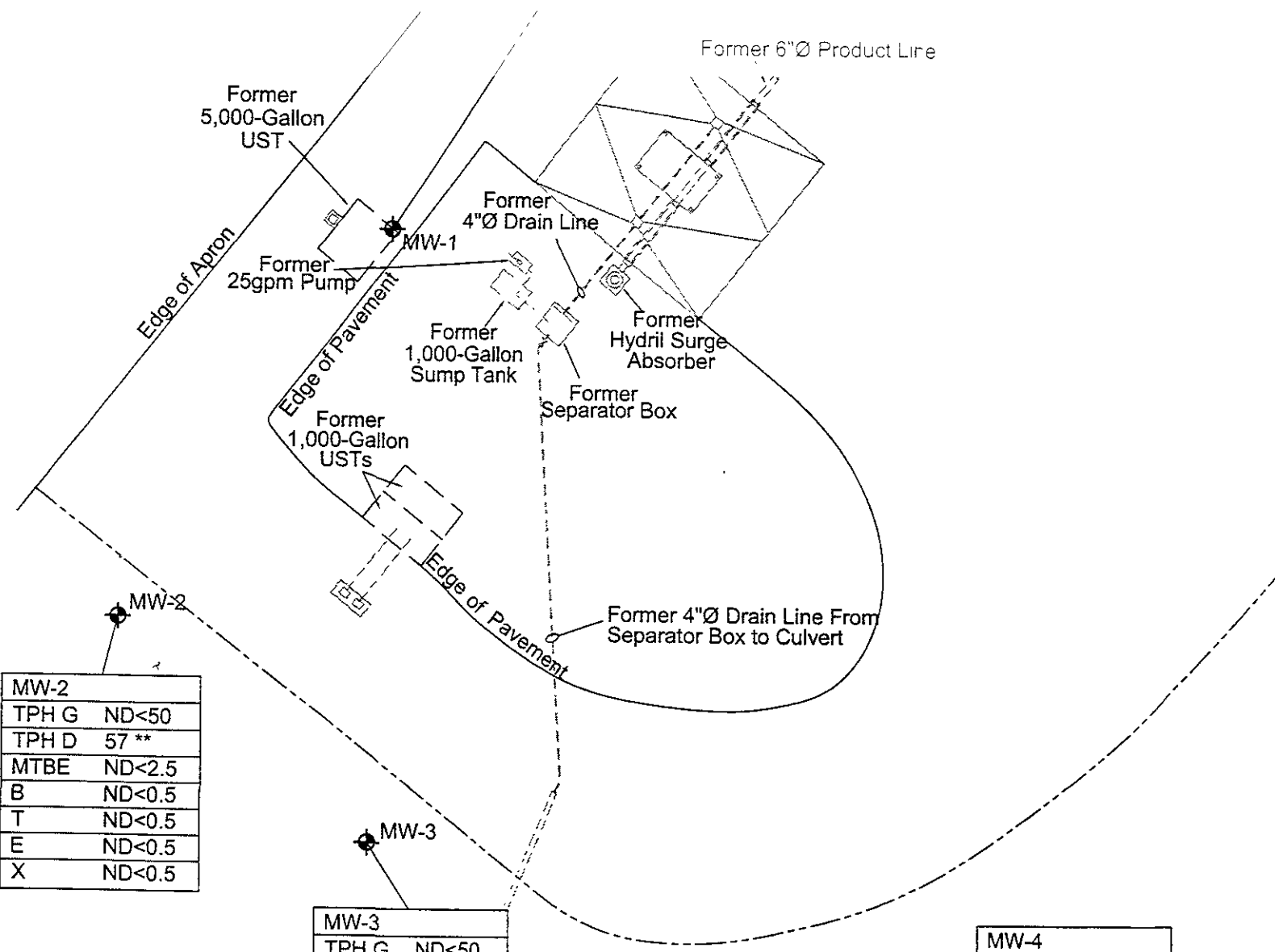
3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CN	49667 1		1-01	

49667004.DWG 0 0
20001214.11.36

Legend
 Monitoring Well

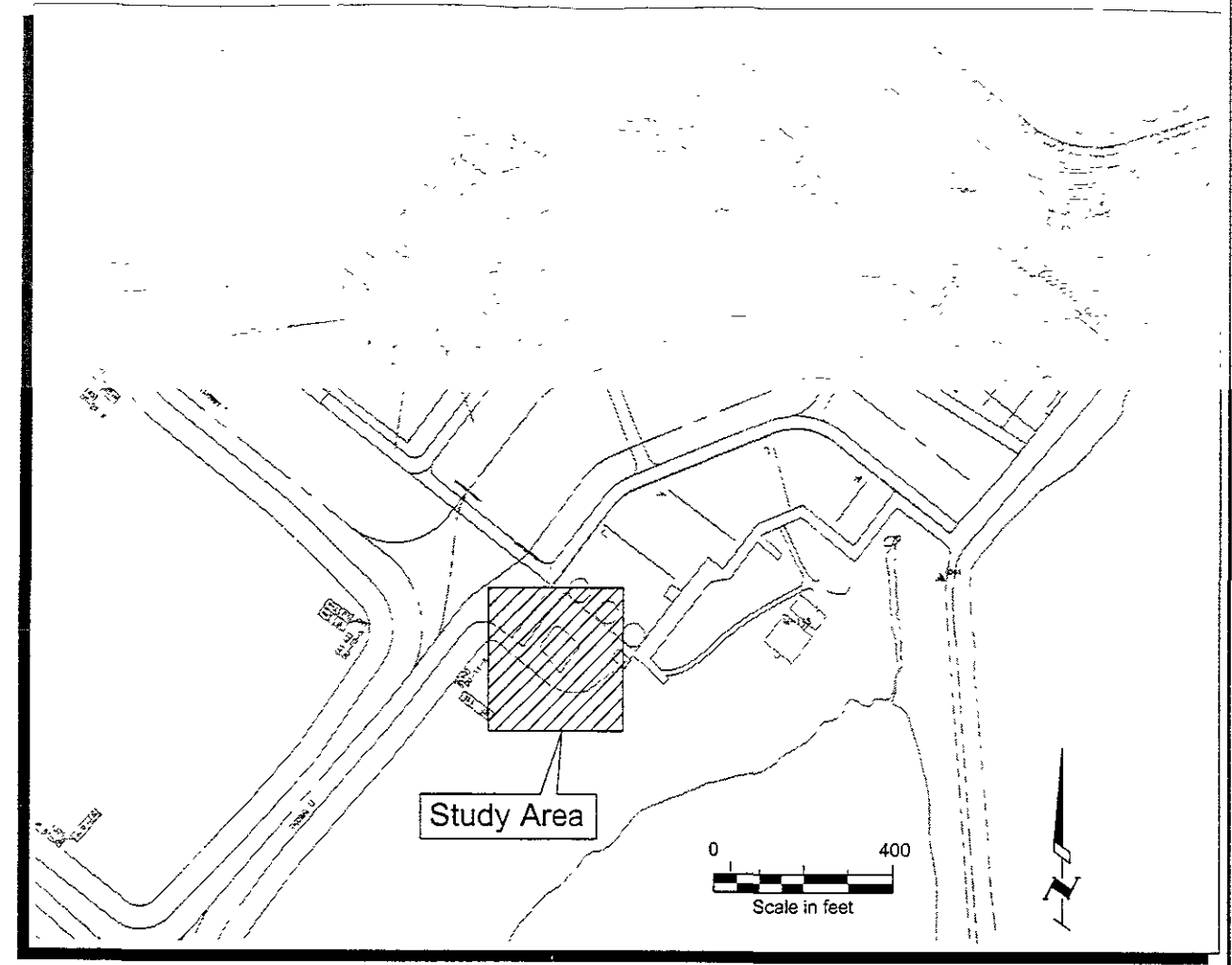
MW-1	
TPH G	ND<50
TPH D	58 **
MTBE	ND<2.5
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5



MW-2	
TPH G	ND<50
TPH D	57 **
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	67 **
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	70 **
MTBE	44 *
B	ND<0.5
T	ND<0.5
E	ND<0.5
X	ND<0.5

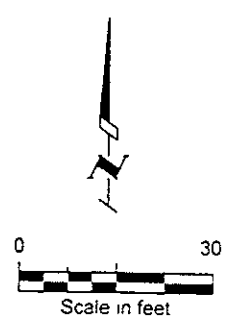


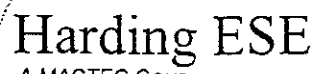
KEY:
 TPH G = TPH Gas
 TPH D = TPH Diesel
 MTBE = Methyl Tertiary Butyl Ether
 B = Benzene
 T = Toluene
 E = Ethylbenzene
 X = Xylene

* MTBE results by 8260.
 **TPH D results by 8015M.

NOTES: All results in ug/L.

Samples collected 11/15/00.



 A MACTEC COMPANY	Groundwater Chemical Results Groundwater Monitoring Well Installation Report South Airport Self-Fueling Facility, Taxiway U Oakland, California		PLATE 4
	DRAWN CN	JOB NUMBER 49667 1	APPROVED DATE 1/01

49667010.DWG 0.0
20010112.0911

APPENDIX A
GROUNDWATER SAMPLING REPORTS



Job Name: Port of Oakland - Taxiway U
 Job Number: 49667.1
 Recorded By: *Trish Elwood*
 (Signature)

Well Number: MW- 1
 Well Type: Monitor Extraction Other
 PVC St. Steel Other
 Date: 11/15/00
 Sampled By: VJH/TE
 (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): 6.1
 No. of Well Volumes to be purged (#) 4

PURGE METHOD
 Bailer - Type: teflon
 Submersible - Type: _____
 Other - Type: _____

PURGE VOLUME CALCULATION
 $(10 - 6.1) \times 2^2 \times 4 \times 0.0408 = 2.48$ 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. <input type="checkbox"/> °C <input checked="" type="checkbox"/> °F	DO/redox (mg/L/mV)
Initial	6.91	1530	59.1	3.6/321
1	6.53	1460	60.1	
2	6.40	1410	62.9	
3	6.34	1310	63.9	
Meter S/N	9510	9510	9510	

PURGE TIME **PURGE RATE**
 Purge Start: 0850 GPM: _____
 Purge Stop: 0855 GPM: _____
 Elapsed: 5

PURGE VOLUME
 Volume: _____ gallons
 Observations During Purging (Well Condition, Color, Odor):
clear turning cloudy
no odor
 Discharge Water Disposal: Sanitary Sewer
 Storm Sewer Other onsite drum

WELL SAMPLING

Bailer - Type: disposable Sample Time: 0905

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.



Job Name: Port of Oakland - Taxiway U
 Job Number: 49667.1
 Recorded By: *Tom Edwards*
 (Signature)

Well Number: MW- 2
 Well Type: Monitor Extraction Other
 PVC St. Steel Other
 Date: 11/15/00
 Sampled By: VJH/TE
 (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): 4.18
 No. of Well Volumes to be purged (#) 4

PURGE METHOD

Bailer - Type: teflon
 Submersible - Type: _____
 Other - Type: _____

PURGE VOLUME CALCULATION

$(10 - 4.18) \times 2^2 \times 4 \times 0.0408 = 3.8$ 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.		DO/redox (mg/L/mV)
			<input type="checkbox"/> °C	<input checked="" type="checkbox"/> °F	
Initial	6.98	280	60.5		4.4/317
1	6.78	190	62.9		
2	6.68	190	63.3		
3	6.65	200	64.6		
Meter S/N	9510	9510	9510		

PURGE TIME

Purge Start: 0920
 Purge Stop: 0930
 Elapsed: 10

PURGE RATE

GPM: _____
 GPM: _____

PURGE VOLUME

Volume: 4 gallons

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

clear → light brown
no odor, small roots initially
 Discharge Water Disposal: Sanitary Sewer
 Storm Sewer Other onsite drum

WELL SAMPLING

Bailer - Type: disposable

Sample Time: 0935

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.



Job Name: Port of Oakland - Taxiway U
 Job Number: 49667 1
 Recorded By: *Tim F. Liang*
 (Signature)

Well Number: MW- 3
 Well Type: Monitor Extraction Other
 PVC St. Steel Other
 Date: 11/15/00
 Sampled By: VJH/TE
 (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): 3.26
 No. of Well Volumes to be purged (#): 4

PURGE METHOD

Bailer - Type: teflon
 Submersible - Type: _____
 Other - Type: _____

PURGE VOLUME CALCULATION

10 - 3.26 x 2² x 4 x 0.0408 = 4.40 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. <input type="checkbox"/> °C <input checked="" type="checkbox"/> °F	DO/redox (mg/L/mV)
Initial	7.01	680	60.2	3.6/296
1	6.80	1280	63.5	
2	6.72	1960	64.8	
3	6.92	1780	63.8	
Meter S/N	9510	9510	9510	

PURGE TIME

Purge Start: 0955
 Purge Stop: 1005
 Elapsed: 10

PURGE RATE

GPM: _____
 GPM: _____

PURGE VOLUME

Volume: 4.5 gallons

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

Discharge Water Disposal: Sanitary Sewer
 Storm Sewer Other onsite drum

WELL SAMPLING

Bailer - Type: disposable Sample Time: 1010

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.



Job Name: Port of Oakland - Taxiway U
 Job Number: 49667 1
 Recorded By: Tom Egan
 (Signature)

Well Number: MW-4
 Well Type: Monitor Extraction Other
 PVC St. Steel Other
 Date: 11/15/00
 Sampled By: VJH/TE
 (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): 3.27
 No. of Well Volumes to be purged (#): 4

PURGE METHOD

Bailer - Type: teflon
 Submersible - Type: _____
 Other - Type: _____

PURGE VOLUME CALCULATION

$(10 - 3.27) \times 2^2 \times 4 \times 0.0408 = 4.4$ 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.		DO/redux (mg/L/mV)
			<input type="checkbox"/> °C	<input checked="" type="checkbox"/> °F	
Initial	7.26	410	61.1		3.0/321
1	7.08	390	62.6		
2	7.15	380	63.1		
3	7.00	835	63.3		
Meter S/N	9510	9510	9510		

PURGE TIME

Purge Start: 1035 GPM: _____
 Purge Stop: 1045 GPM: _____
 Elapsed: 10

PURGE RATE

PURGE VOLUME

Volume: 4.5 gallons

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

clear, no odor

Discharge Water Disposal: Sanitary Sewer
 Storm Sewer Other onsite drum

WELL SAMPLING

Bailer - Type: disposable Sample Time: 09 1050

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.

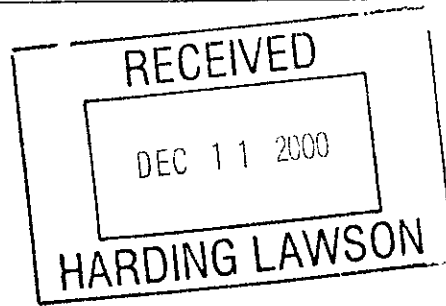
Other Samples	
Type	Sample No.

APPENDIX B
LABORATORY REPORTS



Sequoia Analytical

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




6 December, 2000

Valerie Harris
Harding-Lawson Associates - Oakland
383 Fourth Street
Oakland, CA 94607

RE: Port of Oakland
Sequoia Report: W011356

Enclosed are the results of analyses for samples received by the laboratory on 15-Nov-00 14:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,


Dimple Sharma
Project Manager

CA ELAP Certificate #1271





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

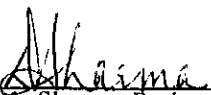
Reported:
06-Dec-00 09:47

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	W011356-01	Water	15-Nov-00 09:05	15-Nov-00 14:55
MW-2	W011356-02	Water	15-Nov-00 09:35	15-Nov-00 14:55
MW-3	W011356-03	Water	15-Nov-00 10:10	15-Nov-00 14:55
MW-4	W011356-04	Water	15-Nov-00 10:50	15-Nov-00 14:55

Sequoia Analytical - Walnut Creek

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.


Dimple Sharma, Project Manager





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**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 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Purgeable Hydrocarbons	ND	50	ug/l	1	0K28001	28-Nov-00	28-Nov-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	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		102 %	70-130	"	"	"	"	"	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Purgeable Hydrocarbons	ND	50	ug/l	1	0K28001	28-Nov-00	28-Nov-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	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		98.7 %	70-130	"	"	"	"	"	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Purgeable Hydrocarbons	ND	50	ug/l	1	0K28001	28-Nov-00	28-Nov-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	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		99.0 %	70-130	"	"	"	"	"	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**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 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Purgeable Hydrocarbons	ND	50	ug/l	1	0K28001	28-Nov-00	28-Nov-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	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		<i>102 %</i>		<i>70-130</i>	"	"	"	"	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

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 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Diesel Range Hydrocarbons	58	50	ug/l	1	0K20007	20-Nov-00	20-Nov-00	EPA 8015M	
Surrogate: n-Pentacosane	65.2 %		50-140		"	"	"	"	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Diesel Range Hydrocarbons	57	50	ug/l	1	0K20007	20-Nov-00	21-Nov-00	EPA 8015M	
Surrogate: n-Pentacosane	53.2 %		50-140		"	"	"	"	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Diesel Range Hydrocarbons	67	50	ug/l	1	0K20007	20-Nov-00	21-Nov-00	EPA 8015M	
Surrogate: n-Pentacosane	127 %		50-140		"	"	"	"	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Diesel Range Hydrocarbons	70	50	ug/l	1	0K20007	20-Nov-00	21-Nov-00	EPA 8015M	
Surrogate: n-Pentacosane	55.0 %		50-140		"	"	"	"	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**MTBE Confirmation by EPA Method 8260B
Sequoia Analytical - Walnut Creek**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Methyl tert-butyl ether	44	2.0	ug/l	1	0K29018	29-Nov-00	29-Nov-00	EPA 8260B	
<i>Surrogate: Dibromofluoromethane</i>		<i>94.0 %</i>	<i>50-150</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>82.0 %</i>	<i>50-150</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	





Harding-Lawson Associates - Oakland
383 Fourth Street
Oakland CA. 94607

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**Total Metals by EPA 200 Series Methods
Sequoia Analytical - Walnut Creek**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Iron	2.5	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 200.7	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Iron	13	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 200.7	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Iron	7.0	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 200.7	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Iron	5.3	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 200.7	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

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 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Ferrous Iron	0.33	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 6010A	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Ferrous Iron	0.68	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 6010A	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Ferrous Iron	0.46	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 6010A	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Ferrous Iron	0.52	0.010	mg/l	1	0K22017	22-Nov-00	01-Dec-00	EPA 6010A	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Orthophosphate as PO4	ND	1.0	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Orthophosphate as PO4	ND	1.0	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Orthophosphate as PO4	ND	1.0	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Orthophosphate as PO4	3.0	1.0	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**Anions by EPA Method 300.0
Sequoia Analytical - Walnut Creek**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Nitrate as NO3	2.0	0.20	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
Sulfate as SO4	87	1.0	"	10	"	"	16-Nov-00	"	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Nitrate as NO3	0.40	0.20	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
Sulfate as SO4	8.3	0.20	"	"	"	"	15-Nov-00	"	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Nitrate as NO3	ND	0.20	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
Sulfate as SO4	59	1.0	"	10	"	"	16-Nov-00	"	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Nitrate as NO3	ND	0.20	mg/l	2	0K15023	15-Nov-00	15-Nov-00	EPA 300.0	
Sulfate as SO4	22	0.20	"	"	"	"	15-Nov-00	"	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

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 0K28001 - EPA 5030B [P/T]

Blank (0K28001-BLK1)

Prepared & Analyzed: 28-Nov-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	30.4		"	30.0		101	70-130			

LCS (0K28001-BS1)

Prepared & Analyzed: 28-Nov-00

Benzene	18.7	0.50	ug/l	20.0		93.5	70-130			
Toluene	19.3	0.50	"	20.0		96.5	70-130			
Ethylbenzene	20.2	0.50	"	20.0		101	70-130			
Xylenes (total)	60.8	0.50	"	60.0		101	70-130			
Surrogate a,a,a-Trifluorotoluene	29.5		"	30.0		98.3	70-130			

Matrix Spike (0K28001-MS1)

Source: W011356-01

Prepared & Analyzed: 28-Nov-00

Benzene	18.5	0.50	ug/l	20.0	ND	92.5	70-130			
Toluene	19.0	0.50	"	20.0	ND	95.0	70-130			
Ethylbenzene	19.6	0.50	"	20.0	ND	98.0	70-130			
Xylenes (total)	59.6	0.50	"	60.0	ND	99.3	70-130			
Surrogate a,a,a-Trifluorotoluene	30.3		"	30.0		101	70-130			

Matrix Spike Dup (0K28001-MSD1)

Source: W011356-01

Prepared & Analyzed: 28-Nov-00

Benzene	18.5	0.50	ug/l	20.0	ND	92.5	70-130	0	20	
Toluene	19.2	0.50	"	20.0	ND	96.0	70-130	1.05	20	
Ethylbenzene	20.1	0.50	"	20.0	ND	101	70-130	2.52	20	
Xylenes (total)	60.7	0.50	"	60.0	ND	101	70-130	1.83	20	
Surrogate a,a,a-Trifluorotoluene	29.7		"	30.0		99.0	70-130			





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**Diesel Hydrocarbons (C9-C24) with Silica Gel Cleanup 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
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Batch 0K20007 - EPA 3510B

Blank (0K20007-BLK1)										
										Prepared & Analyzed: 20-Nov-00
Diesel Range Hydrocarbons	ND	50	ug/l							
Surrogate: n-Pentacosane	45.0		"	33.3		135	50-140			
LCS (0K20007-BS1)										
										Prepared & Analyzed: 20-Nov-00
Diesel Range Hydrocarbons	420	50	ug/l	500		84.0	35-125			
Surrogate: n-Pentacosane	47.7		"	33.3		143	50-150			
LCS Dup (0K20007-BSD1)										
										Prepared & Analyzed: 20-Nov-00
Diesel Range Hydrocarbons	432	50	ug/l	500		86.4	35-125	2.82	50	
Surrogate: n-Pentacosane	49.7		"	33.3		149	50-150			





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

MTBE Confirmation by EPA Method 8260B - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC	Limits	RPD	RPD Limit	Notes
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Batch 0K29018 - EPA 5030B [P/T]

Blank (0K29018-BLK1)

Prepared & Analyzed: 29-Nov-00

Methyl tert-butyl ether	ND	2.0	ug/l							
Surrogate: Dibromofluoromethane	49.0		"	50.0		98.0	50-150			
Surrogate: 1,2-Dichloroethane-d4	42.0		"	50.0		84.0	50-150			

LCS (0K29018-BS1)

Prepared & Analyzed: 29-Nov-00

Methyl tert-butyl ether	46.3	2.0	ug/l	50.0		92.6	70-130			
Surrogate: Dibromofluoromethane	49.0		"	50.0		98.0	50-150			
Surrogate: 1,2-Dichloroethane-d4	41.0		"	50.0		82.0	50-150			

LCS Dup (0K29018-BSD1)

Prepared & Analyzed: 29-Nov-00

Methyl tert-butyl ether	42.9	2.0	ug/l	50.0		85.8	70-130	7.62	25	
Surrogate: Dibromofluoromethane	49.0		"	50.0		98.0	50-150			
Surrogate: 1,2-Dichloroethane-d4	42.0		"	50.0		84.0	50-150			





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

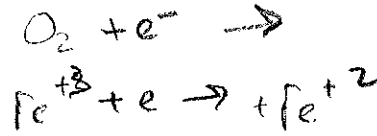
Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**Total Metals by EPA 200 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 0K22017 - 200.7										
Blank (0K22017-BLK1)										
Iron	ND	0.010	mg/l							
Prepared: 22-Nov-00 Analyzed: 01-Dec-00										
LCS (0K22017-BS1)										
Iron	1.03	0.010	mg/l	1.00		103	80-120			
Prepared: 22-Nov-00 Analyzed: 01-Dec-00										
LCS Dup (0K22017-BSD1)										
Iron	1.10	0.010	mg/l	1.00		110	80-120	6.57	20	
Prepared: 22-Nov-00 Analyzed: 01-Dec-00										
Matrix Spike (0K22017-MS1)										
		Source: W011356-01								
Iron	3.21	0.010	mg/l	1.00	2.5	71.0	80-120			Q-01
Prepared: 22-Nov-00 Analyzed: 01-Dec-00										
Matrix Spike Dup (0K22017-MSD1)										
		Source: W011356-01								
Iron	3.47	0.010	mg/l	1.00	2.5	97.0	80-120	7.78	20	
Prepared: 22-Nov-00 Analyzed: 01-Dec-00										





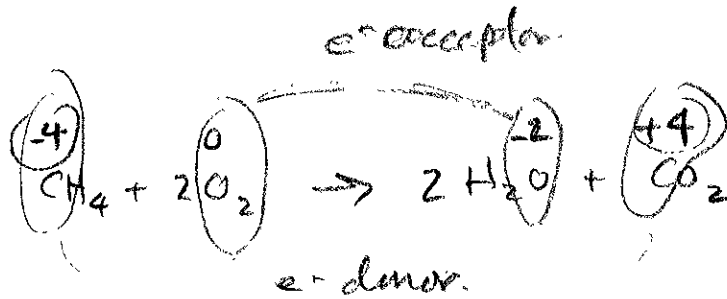
Harding-Lawson Associates - Oakland
 383 Fourth Street
 Oakland CA, 94607

Project: Port of Oakland
 Project Number: Taxiway U
 Project Manager: Valerie Harris

Reported:
 06-Dec-00 09:47

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 0K22017 - 200.7										
Blank (0K22017-BLK1)										
				Prepared: 22-Nov-00 Analyzed: 01-Dec-00						
Ferrous Iron	ND	0.010	mg/l							
LCS (0K22017-BS1)										
				Prepared: 22-Nov-00 Analyzed: 01-Dec-00						
Ferrous Iron	1.03	0.010	mg/l	1.00		103	80-120			
LCS Dup (0K22017-BSD1)										
				Prepared: 22-Nov-00 Analyzed: 01-Dec-00						
Ferrous Iron	1.10	0.010	mg/l	1.00		110	80-120	6.57	20	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**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 0K15023 - General Preparation										
Blank (0K15023-BLK1)										
Prepared & Analyzed: 15-Nov-00										
Orthophosphate as PO4	ND	0.50	mg/l							
LCS (0K15023-BS1)										
Prepared & Analyzed: 15-Nov-00										
Orthophosphate as PO4	19.3	0.50	mg/l	20.0		96.5	80-120			
Matrix Spike (0K15023-MS1)										
Source: W011251-01 Prepared & Analyzed: 15-Nov-00										
Orthophosphate as PO4	19.0	1.0	mg/l	20.0	ND	95.0	75-125			
Matrix Spike Dup (0K15023-MSD1)										
Source: W011251-01 Prepared & Analyzed: 15-Nov-00										
Orthophosphate as PO4	19.1	1.0	mg/l	20.0	ND	95.5	75-125	0.525	20	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

**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
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Batch 0K15023 - General Preparation

Blank (0K15023-BLK2)

Prepared & Analyzed: 15-Nov-00

Nitrate as NO3	ND	0.10	mg/l							
Sulfate as SO4	ND	0.10	"							

LCS (0K15023-BS2)

Prepared & Analyzed: 15-Nov-00

Nitrate as NO3	10.2	0.10	mg/l	10.0		102	80-120			
Sulfate as SO4	10.8	0.10	"	10.0		108	80-120			

Matrix Spike (0K15023-MS2)

Source: W011251-01

Prepared & Analyzed: 15-Nov-00

Nitrate as NO3	128	2.0	mg/l	100	28	100	75-125			
Sulfate as SO4	224	2.0	"	100	120	104	75-125			

Matrix Spike Dup (0K15023-MSD2)

Source: W011251-01

Prepared & Analyzed: 15-Nov-00

Nitrate as NO3	128	2.0	mg/l	100	28	100	75-125	0	20	
Sulfate as SO4	224	2.0	"	100	120	104	75-125	0	20	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
06-Dec-00 09:47

Notes and Definitions

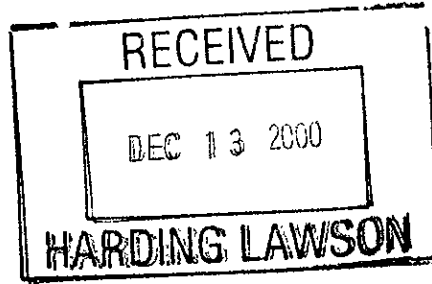
- Q-01 The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference





Sequoia Analytical

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



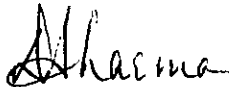
11 December, 2000

Valerie Harris
Harding-Lawson Associates - Oakland
383 Fourth Street
Oakland, CA 94607

RE: Port of Oakland
Sequoia Report: W011356

Enclosed are the results of analyses for samples received by the laboratory on 15-Nov-00 14:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,


Dimple Sharma
Project Manager

CA ELAP Certificate #1271





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
11-Dec-00 16:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	W011356-01	Water	15-Nov-00 09:05	15-Nov-00 14:55
MW-2	W011356-02	Water	15-Nov-00 09:35	15-Nov-00 14:55
MW-3	W011356-03	Water	15-Nov-00 10:10	15-Nov-00 14:55
MW-4	W011356-04	Water	15-Nov-00 10:50	15-Nov-00 14:55





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
11-Dec-00 16:44

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Petaluma

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-1 (W011356-01) Water Sampled: 15-Nov-00 09:05 Received: 15-Nov-00 14:55									
Total Organic Carbon	1.73	1.00	mg/l	1	0120157	07-Dec-00	07-Dec-00	EPA 415.1	
MW-2 (W011356-02) Water Sampled: 15-Nov-00 09:35 Received: 15-Nov-00 14:55									
Total Organic Carbon	ND	1.00	mg/l	1	0120157	07-Dec-00	07-Dec-00	EPA 415.1	
MW-3 (W011356-03) Water Sampled: 15-Nov-00 10:10 Received: 15-Nov-00 14:55									
Total Organic Carbon	2.20	1.00	mg/l	1	0120157	07-Dec-00	07-Dec-00	EPA 415.1	
MW-4 (W011356-04) Water Sampled: 15-Nov-00 10:50 Received: 15-Nov-00 14:55									
Total Organic Carbon	2.65	2.00	mg/l	2	0120157	07-Dec-00	07-Dec-00	EPA 415.1	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
11-Dec-00 16:44

**Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control
Sequoia Analytical - Petaluma**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 0120157 - General Preparation									
Blank (0120157-BLK1)				Prepared & Analyzed: 07-Dec-00					
Total Organic Carbon	ND	1.00	mg/l						
LCS (0120157-BS1)				Prepared & Analyzed: 07-Dec-00					
Total Organic Carbon	40.8	2.00	mg/l	40.0		102 80-120			
Matrix Spike (0120157-MS1)				Source: W011356-02		Prepared & Analyzed: 07-Dec-00			
Total Organic Carbon	39.8	4.00	mg/l	40.0	ND	99.5 75-125			
Matrix Spike Dup (0120157-MSD1)				Source: W011356-02		Prepared & Analyzed: 07-Dec-00			
Total Organic Carbon	40.7	4.00	mg/l	40.0	ND	102 75-125	2.24	20	





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

Project: Port of Oakland
Project Number: Taxiway U
Project Manager: Valerie Harris

Reported:
11-Dec-00 16:44

Notes and Definitions

- 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



CHAIN OF CUSTODY FORM

W011356

Lab: No 1790

Job Number: 49667.1
 Name/Location: Port of Oakland - Taxiway U
 Project Manager: Trish Eliasson

Samplers: WHITE
 Recorder: Trish Eliasson
 (Signature Required)

SOURCE CODE	MATRIX					# CONTAINERS & PRESERV.				SAMPLE NUMBER OR LAB NUMBER			DATE			
	Water	Sediment	Soil	Oil	Unpres.	H ₂ SO ₄	HNO ₃	HCL	Ice	Yr	Wk	Seq	Yr	Mo	Day	Time
	✓				3	1	8						00	11	15	0905
	✓				3	1	8						00	11	15	0935
	✓				3	1	8						00	11	15	1010
	✓				3	1	8						00	11	15	1050

STATION DESCRIPTION/NOTES
01A-H
02A-L
03A-L
09A-L

ANALYSIS REQUESTED															
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	METALS	EPA 8015M/TPHG	EPA 8020/BTEX/MTBE	EPA 8015M/TPHG.0	805 Gasoline Range Organics	24hr HD Ferrous Iron	Totals Iron	Nitrate as NO ₃ EPA 300	Sulfate EPA 300	Orthophosphate EPA 300	IDC 415-1	EPA 8015 TPH/CSA
					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	X	X	X	X	X	X	X	X

LAB NUMBER			DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
Yr	Wk	Seq				
						Standard TAT
						email results to taeliasson@mactec.com
						Confirmation of MTBE detected by 8260

CHAIN OF CUSTODY RECORD			
RELINQUISHED BY: (Signature) <i>Trish Eliasson</i>		RECEIVED BY: (Signature) <i>Mark Collier / Sequoia</i>	
RELINQUISHED BY: (Signature) <i>Mark Collier</i>		RECEIVED BY: (Signature) <i>Mike Cronin</i>	
RELINQUISHED BY: (Signature)		RECEIVED BY: (Signature)	
DISPATCHED BY: (Signature)		DATE/TIME	RECEIVED FOR LAB BY: (Signature)
METHOD OF SHIPMENT			
SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY			