
QUARTERLY GROUND WATER MONITORING REPORT

**Avis Rent A Car System, Inc.
Oakland International Airport Facility
Oakland, California**

Prepared for

**Avis Rent A Car System, Inc.
900 Old Country Road
Garden City, New York 11530**

November 22, 1991

**McCULLEY, FRICK & GILMAN, INC.
Consulting Hydrologists and Geologists**

8712

LFb

LAW OFFICES OF
PILLSBURY MADISON & SUTRO

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STATUS = 3B.
Gwdp = 5'
Date 3B = 5/23/90

November 27, 1991

11/27 QR.
pnm@s@GWS

Mr. Barney Chan
Department of Environmental Health
Hazardous Materials Program
80 Swan Way, Room 200
Oakland, California 94621

Avis Service Center
Re: Avis Rent A Car System, Inc. -
Oakland Airport Remediation

Site Address = 1 Neil
Armstrong Way,
Oakland.

Dear Mr. Chan:

Enclosed please find Avis' Quarterly Ground-Water Monitoring Report dated November 22, 1991, prepared by McCulley, Frick & Gilman on the remediation being conducted at the Oakland Airport rental car facility.

Please let us know if you have any questions or comments.

Very truly yours,

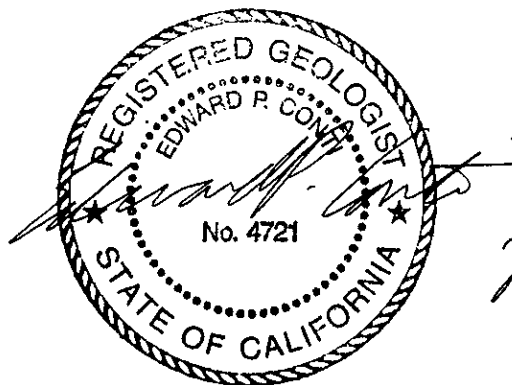
Beth Hamilton
Beth L. Hamilton

Enc.

- cc: Mr. Karl Westermann, Avis w/enc.
- Mr. Lester Feldman, RWQCB w/enc.
- Ms. Michele Heffes, Port of Oakland w/enc.
- Mr. Ed Conti, MF&G w/o enc.

PROFESSIONAL CERTIFICATION

This report has been prepared by McCulley, Frick & Gilman, Inc. under the professional supervision of Edward P. Conti. The findings, recommendations, specifications and/or professional opinions presented in this report have been prepared in accordance with generally accepted professional hydrogeologic practice, and within the scope of the project. There is no other warranty, either express or implied.



November 22, 1991

Edward P. Conti
RG No. 4721
Project Geologist
McCULLEY, FRICK & GILMAN, INC.

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QUARTERLY GROUND WATER MONITORING REPORT

AVIS RENT A CAR SYSTEM, INC.
OAKLAND INTERNATIONAL AIRPORT FACILITY
OAKLAND, CALIFORNIA

1.0 INTRODUCTION

This report presents the methods and results of the October 1991 ground water monitoring event conducted at the Avis Rent A Car System, Inc. (Avis) facility at Oakland International Airport, Neil Armstrong Way, Oakland, California (hereinafter the "Site"). The Site location is illustrated in Figure 1. The monitoring program was conducted by McCulley, Frick & Gilman, Inc. (MFG) on behalf of Avis.

The ground water monitoring was performed in accordance with the monitoring program outlined in Section 5.0 of the report prepared by MFG entitled "Additional Soil Excavation and Quarterly Ground Water Monitoring Report", dated May 20, 1991.

The monitoring program conducted at the Avis facility consisted of the following tasks:

- (1) Measurement of water levels in monitoring wells MW-1A, MW-2 and MW-3, and preparation of a potentiometric surface map of the shallow ground water; and
- (2) Collection and chemical analysis of ground water samples from monitoring wells MW-1A, MW-2 and MW-3.

The monitoring well locations are illustrated in Figure 2. The methods and results of the ground water monitoring program are described below.

2.0 GROUND WATER SAMPLING AND ANALYSIS

2.1 FIELD METHODS

The methods used to measure the water levels and collect ground water samples from monitoring wells MW-1A, MW-2 and MW-3 are described below.

2.1.1 Water Level Measurement

MFG measured the water levels in monitoring wells MW-1A, MW-2 and MW-3 on October 18, 1991 using a weighted, graduated steel tape. Evaluation of the water level data is discussed in Section 3.0 of this report. Following water level measurement, MFG checked for the presence of a light immiscible layer (free product) or sheen using a clear, acrylic bailer. No free product or sheen was observed in the three wells.

2.1.2 Ground Water Sampling

MFG collected ground water samples from monitoring wells MW-1A, MW-2 and MW-3 on October 18, 1991. Prior to collecting samples, each well was purged using a positive displacement hand pump. Wells MW-1A, MW-2 and MW-3 were pumped dry after removal of approximately 3 casing volumes (4 gallons), 4.5 casing volumes (6.5 gallons), and 2 casing volumes (3 gallons), respectively. The temperature, pH and specific conductance of the water were monitored during purging.

After purging, the ground water samples were collected using a Teflon® bailer. One bailer volume collected from each well was used to measure the temperature, pH and specific conductance of the sample. The field measured values of these parameters were as follows:

Sample	Temperature (°C)	pH	Specific Conductance (micromhos/cm at 25°C)
MW-1A	22	7.1	11,000
MW-2	20	7.2	4,000
MW-3	21	7.4	28,000

The following samples were subsequently collected from each well and placed in containers supplied by the laboratory:

- A. Total Volatile Petroleum Hydrocarbons (TPH) as Gasoline and Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX): three, 40-milliliter (ml) glass vials closed with a screw cap with a Teflon®-lined septum, containing hydrochloric acid placed in the vials by the laboratory for sample preservation; and
- B. Polynuclear Aromatic Hydrocarbons (PNA's): two, one-liter amber glass bottles with Teflon®-lined lids.

After filling, the ground water sample containers were placed in an ice-cooled, insulated chest for transport to the laboratory for analysis. A chain-of-custody record was completed for the samples and accompanied the samples until receipt by the laboratory.

All equipment used in purging the wells was washed in an Alconox detergent-water solution and rinsed with tap water both before and after use in each well. All equipment used in sampling the wells was washed in an Alconox detergent-water solution, rinsed with tap water, and then rinsed with deionized water both before and after use in each well.

2.2 ANALYTICAL METHODS AND RESULTS

The ground water samples were analyzed by BC Analytical (BCA) laboratory of Emeryville, California. The following analyses were performed by BCA:

- A. TPH as Gasoline (EPA Method 5030/modified EPA Method 8015)
- B. BTEX (modified EPA Method 8020)
- C. PNA's (EPA Method 625/8270)

The laboratory results are summarized in Table 1. Copies of the laboratory report and chain-of-custody record are included in Appendix A.

TPH as gasoline, benzene, ethylbenzene and total xylenes were not detected above their respective laboratory method reporting limits in the ground water samples collected from wells MW-1A, MW-2 and MW-3. Toluene was detected in the sample from well MW-1A at a concentration of 0.0023 milligrams per liter. Toluene was not detected above the laboratory reporting limit in the samples from wells MW-2 and MW-3. In addition, PNA's were not detected above their respective laboratory method reporting limits in the ground water samples collected from the three wells.

3.0 EVALUATION OF LATERAL HYDRAULIC GRADIENT

MFG measured the depth to ground water in wells MW-1A, MW-2 and MW-3 on October 18, 1991 (Table 2). The depth to water in the wells ranged from approximately six to seven feet below the ground surface. The elevations of the water surface in the wells were calculated using the depth to water measurements and the measuring point (north side, top of casing) elevations of the wells. A potentiometric surface map of the shallow ground water on October 18, 1991 was constructed using these data and is shown in Figure 8. The potentiometric surface contours illustrate that the direction of the lateral hydraulic gradient on October 18, 1991 was southeast, with an approximate magnitude of 0.003.

Water level measurements performed periodically at the Site since May 1990 indicate that the direction of the lateral hydraulic gradient has varied from south-southeast to east-southeast. Historical potentiometric surface maps of the shallow ground water at the Site are included in Figures 3 through 7.

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TABLE 1
(Page 1 of 2)

SUMMARY OF CHEMICAL ANALYSES OF GROUND WATER SAMPLES¹

Avis Rent A Car System, Inc.
Oakland International Airport Facility
Oakland, California

WELL NO.	SAMPLE NO.	DATE SAMPLED	TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYLBENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	OTHER POLYNUCLEAR AROMATIC HYDROCARBONS (mg/L)
			Reporting Limit: 0.05	0.0005	0.0005	0.0005	0.0005	0.01	0.01
MW-1	MW-1	23-May-90	12	0.65	0.05	ND ² [0.05] ³	2.2	0.25	0.033 ⁴
	MW-1	26-Sep-90	0.66	ND [0.0025]	0.004	0.028	0.046	0.016	ND
	MW-1	17-Dec-90 ⁵	1.6	0.19	ND [0.005]	0.063	0.027	0.039	0.023 ⁶
MW-1A ⁷	MW-1A	30-Apr-91	ND	ND	ND	ND	ND	ND	ND
	MW-1A	17-Jul-91	ND	ND	ND	ND	ND	ND	ND
	MW-1A	18-Oct-91	ND	ND	0.0023	ND	ND	ND	ND
MW-2	MW-2	23-May-90	ND	ND	ND	ND	ND	ND	ND
	MW-2	26-Sep-90	ND	ND	ND	ND	ND	ND	ND
	MW-2	17-Dec-90	ND	ND	ND	ND	ND	ND	ND
	MW-2	13-Mar-91	ND	ND	ND	ND	ND	ND	ND
	MW-2	17-Jul-91	ND	ND	ND	ND	ND	ND	ND
	MW-2	18-Oct-91	ND	ND	ND	ND	ND	ND	ND

TABLE 1
(Page 2 of 2)

SUMMARY OF CHEMICAL ANALYSES OF GROUND WATER SAMPLES¹

Avis Rent A Car System, Inc.
Oakland International Airport Facility
Oakland, California

WELL NO.	SAMPLE NO.	DATE SAMPLED	TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (mg/L)	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYLBENZENE (mg/L)	TOTAL XYLENES (mg/L)	NAPHTHALENE (mg/L)	OTHER POLYNUCLEAR AROMATIC HYDROCARBONS (mg/L)
			Reporting Limit: 0.05	0.0005	0.0005	0.0005	0.0005	0.01	0.01
MW-3	MW-3	23-May-90	ND	ND	ND	ND	ND	ND	ND
	MW-3	26-Sep-90	ND	ND	ND	ND	ND	ND	ND
	MW-3	17-Dec-90	ND	ND	ND	ND	ND	ND	ND
	MW-3	13-Mar-91	ND	ND	ND	ND	ND	ND	ND
	MW-3	17-Jul-91	ND	ND	ND	ND	ND	ND	ND
	MW-3	18-Oct-91	ND	ND	ND	ND	ND	ND	ND

NOTES:

- ¹ Constituents in the EPA Method 8270 or 8310 analyses (PNA's) which are not listed were not detected in ground water samples.
- ² ND = Not Detected at or above the reporting limit indicated at top of column.
- ³ [] Indicates reporting limit other than that indicated at top of column.
- ⁴ The PNA compound 2-methyl-naphthalene was detected at a concentration of 0.033 mg/L.
- ⁵ Monitoring Well MW-1 was sealed and abandoned on February 26, 1991.
- ⁶ The PNA compound acenaphthene was detected at a concentration of 0.023 mg/L.
- ⁷ Monitoring Well MW-1A was installed on April 1, 1991.

TABLE 2

**SUMMARY OF WATER LEVEL DATA FOR
GROUND WATER MONITORING WELLS**

Avis Rent A Car System, Inc.
Oakland International Airport Facility
Oakland, California

WELL	MEASUREMENT DATE	DEPTH TO WATER (ft BMP ¹)	MEASURING POINT ELEVATION ² (ft NGVD ³)	WATER LEVEL ELEVATION (ft NGVD)
MW-1	23-May-90	5.62	3.34	-2.28
	26-Sep-90	6.29	3.34	-2.95
	17-Dec-90	5.92	3.34	-2.58
	26-Feb-91 ⁴	5.69	3.34	-2.35
MW-1A	30-Apr-91 ⁵	5.10	3.20	-1.90
	17-Jul-91	5.73	3.20	-2.53
	18-Oct-91	6.09	3.20	-2.89
MW-2	23-May-90	6.13	4.25	-1.88
	26-Sep-90	6.62	4.25	-2.37
	17-Dec-90	6.40	4.25	-2.15
	26-Feb-91	5.96	4.25	-1.71
	17-Jul-91	6.09	4.07 ⁶	-2.02
	18-Oct-91	6.47	4.07	-2.40
MW-3	23-May-90	6.77	3.98	-2.79
	26-Sep-90	7.28	3.98	-3.30
	17-Dec-90	7.05	3.98	-3.07
	26-Feb-91	6.63	3.98	-2.65
	17-Jul-91	6.75	3.98	-2.77
	18-Oct-91	7.18	3.98	-3.20

NOTES:

¹ BMP = Below Measuring Point.

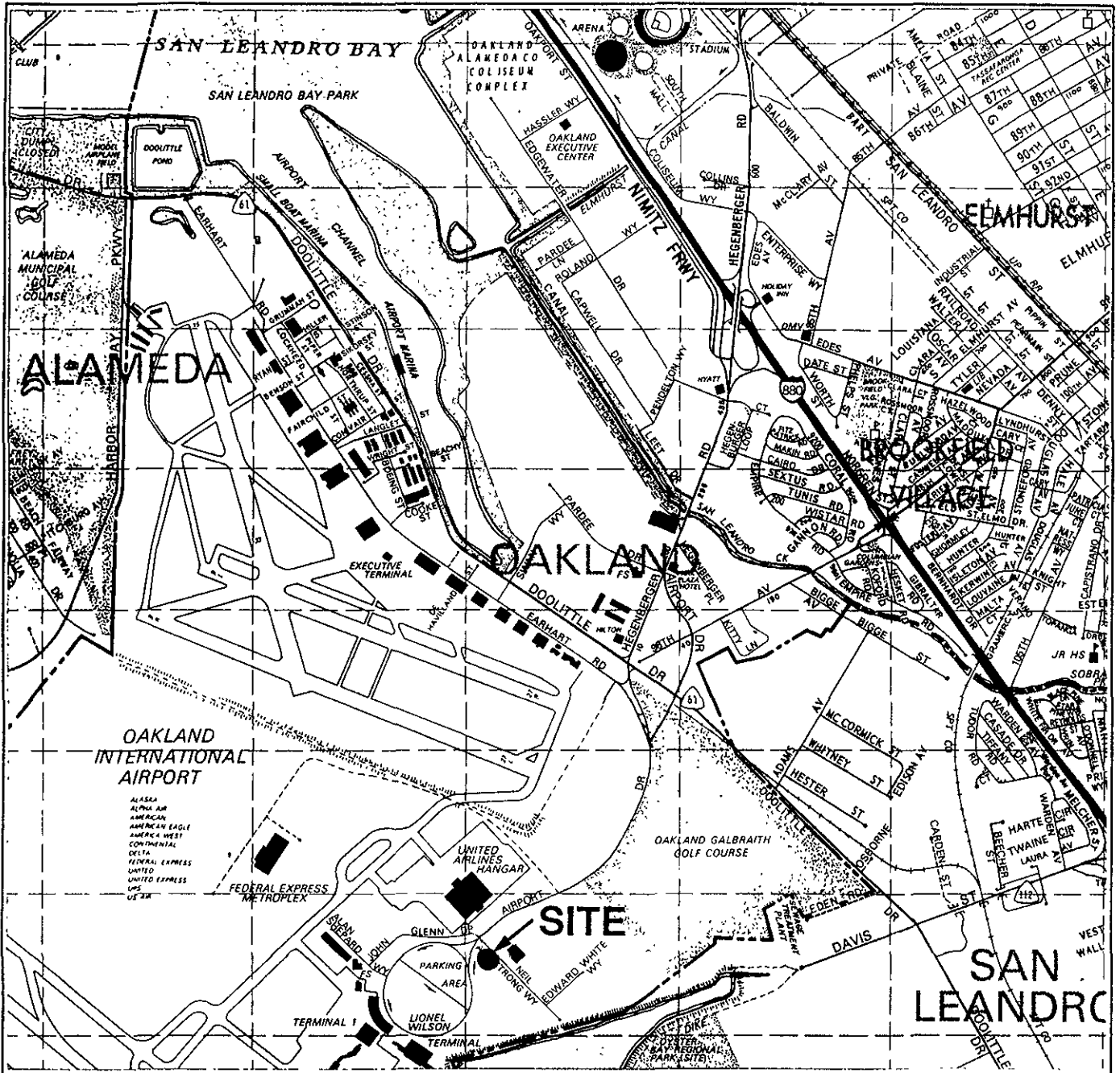
² Measuring Point is north side of top of PVC well casing.

³ National Geodetic Vertical Datum of 1929.

⁴ Monitoring Well MW-1 was sealed and abandoned on February 26, 1991.

⁵ Monitoring well MW-1A was installed on April 1, 1991.

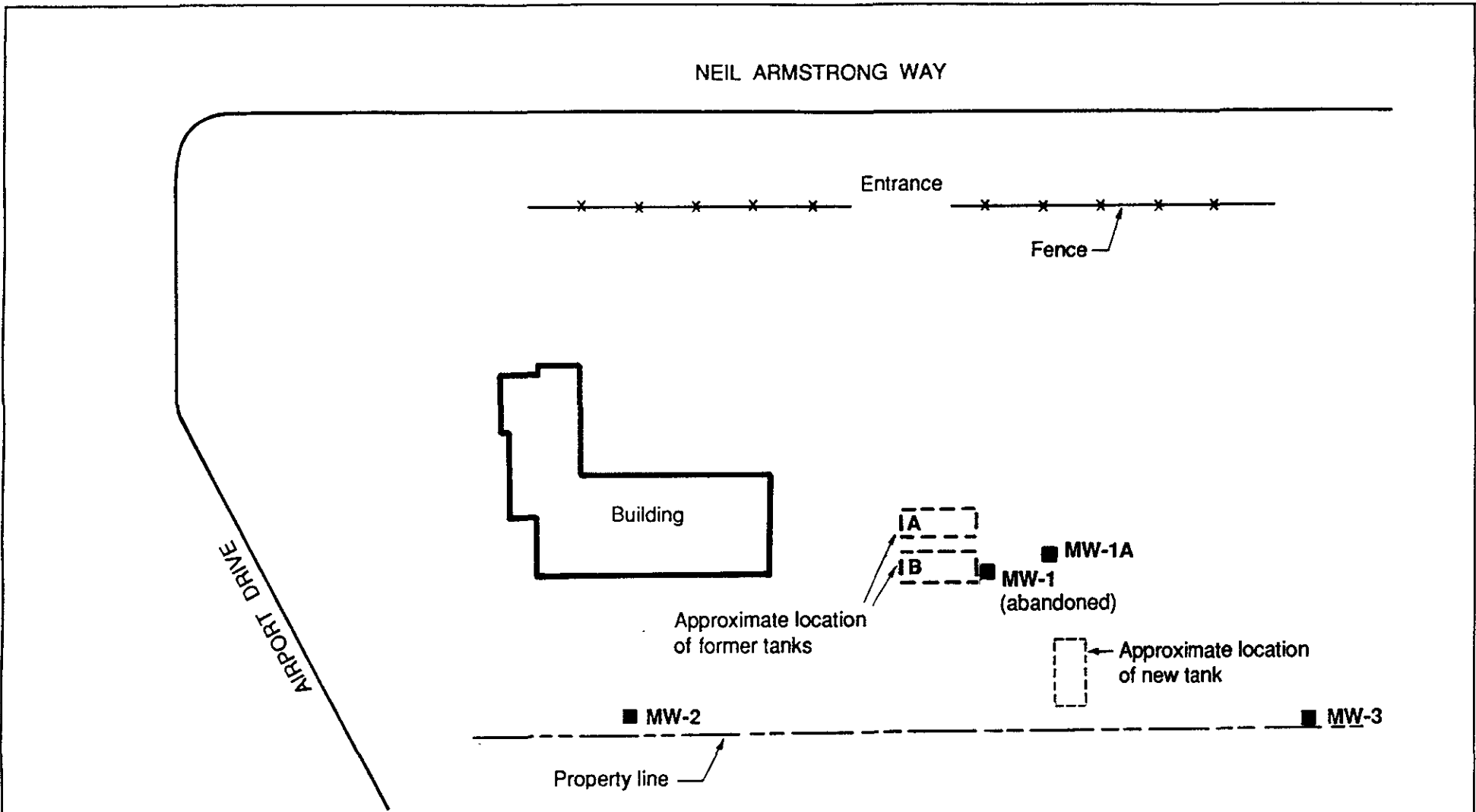
⁶ The top of the PVC casing for well MW-2 was repaired on March 13, 1991. The measuring point elevation of well MW-2 was resurveyed on April 9, 1991. The new measuring point elevation is 4.07 ft. NGVD.



Source: The Thomas Guide,
 Alameda and Santa Clara Counties Street Guide and Directory,
 1989 Edition



LOCATION MAP Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCutley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 1



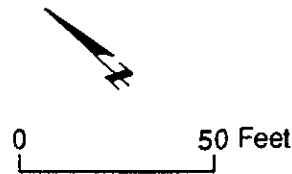
EXPLANATION

MW-2 ■ Location of monitoring well

Notes:

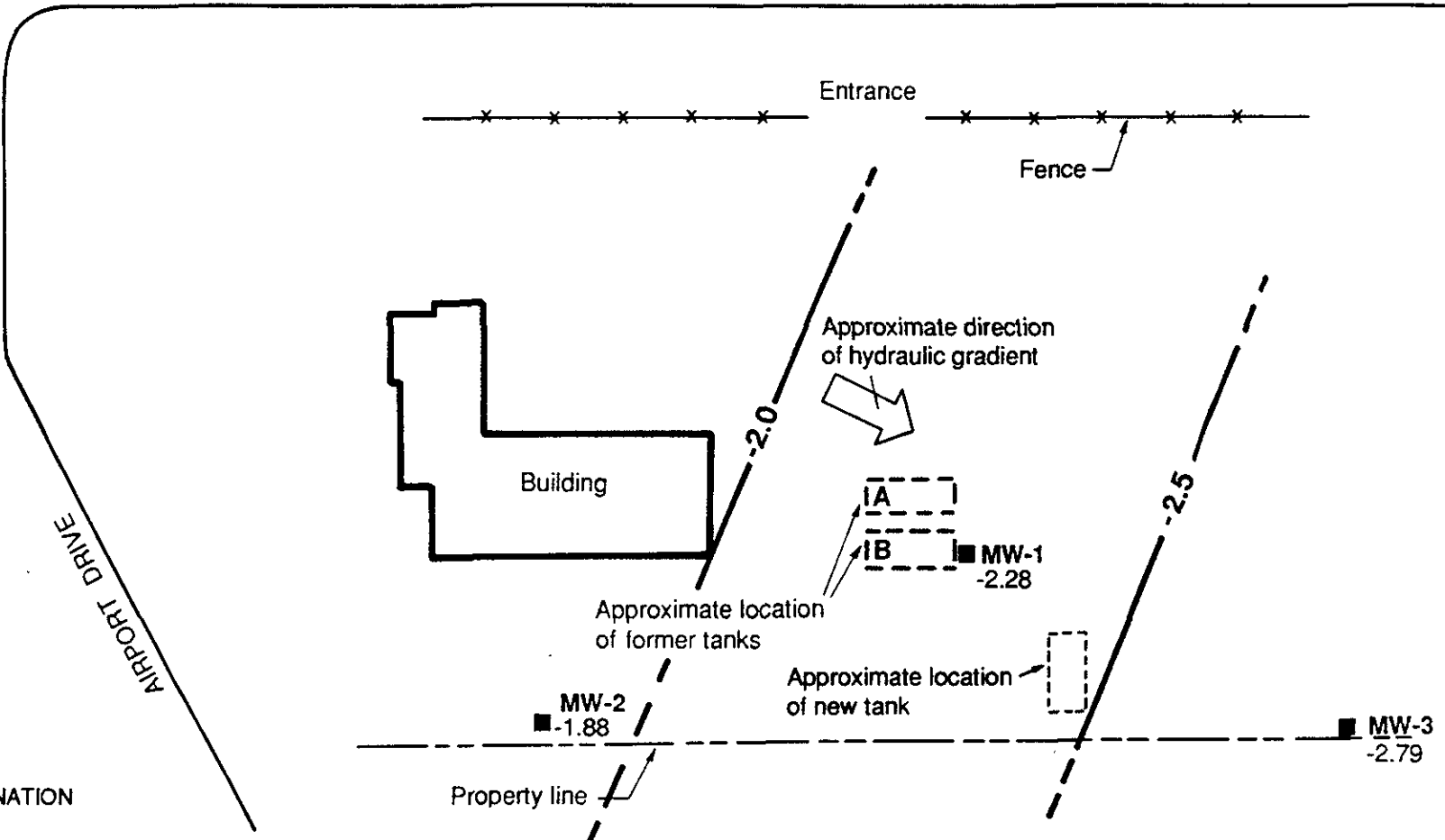
1. Well MW-1 abandoned on February 26, 1991.
2. Well MW-1A installed on April 1, 1991.

Source: Adapted from Blaine Tech Services, Inc.
 Sampling Report 890825M1, dated August 25, 1989



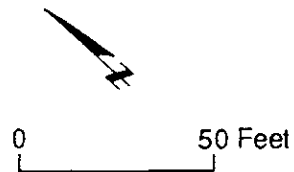
SITE PLAN Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 2

NEIL ARMSTRONG WAY



EXPLANATION

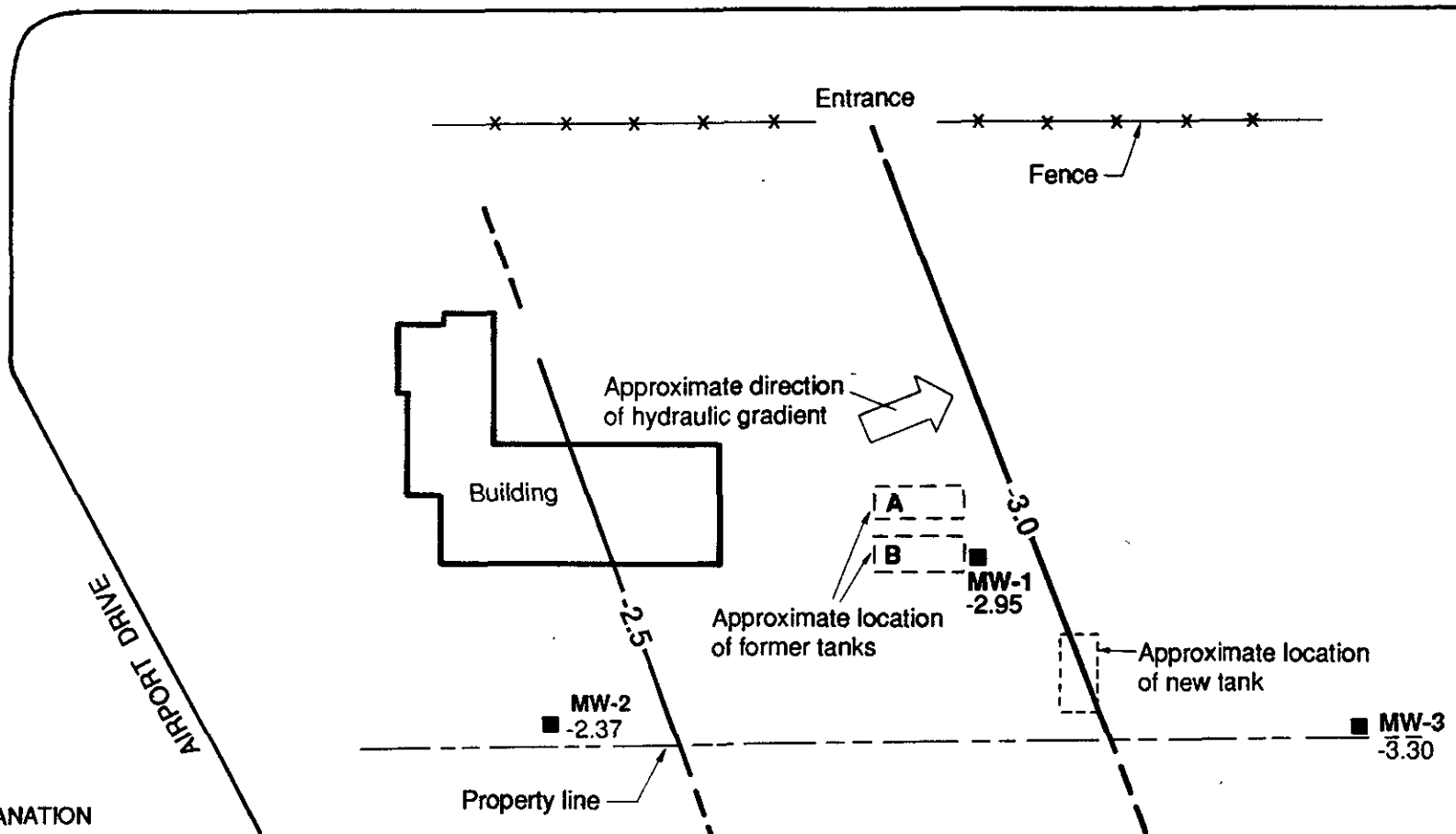
- MW-1 ■ Location of monitoring well with elevation of potentiometric surface on May 23, 1990 (ft. NGVD)
- 2.28
- Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet



POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER MAY 23, 1990 Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 3

Source: Adapted from Blaine Tech Services, Inc. Sampling Report 890825M1, dated August 25, 1989

NEIL ARMSTRONG WAY



EXPLANATION

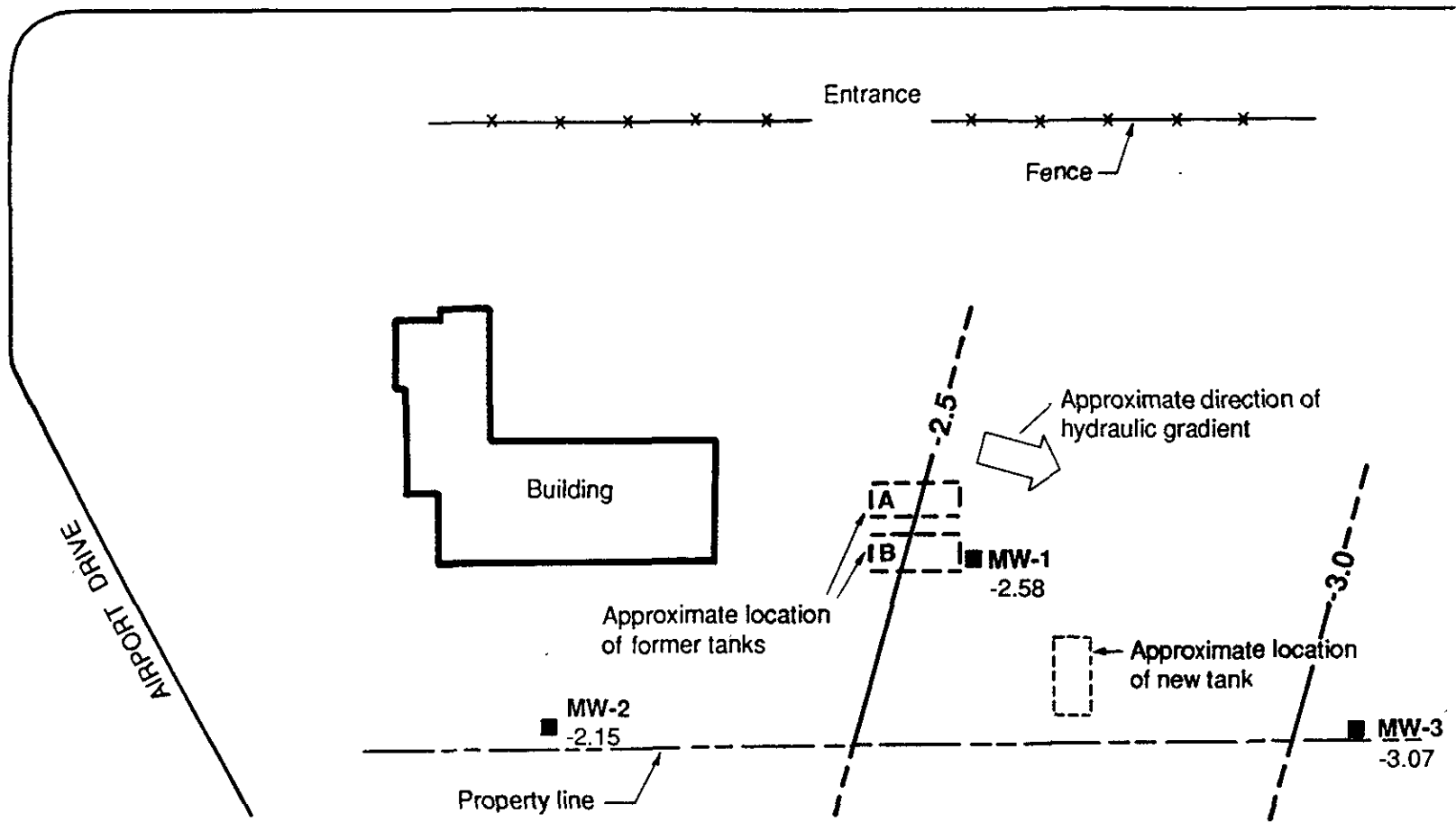
- MW-1** ■ Location of monitoring well with elevation of potentiometric surface on September 26, 1990
- Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet

Source: Adapted from Blaine Tech Services, Inc.
Sampling Report 890825M1, dated August 25, 1989

0 50 Feet

POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER September 26, 1990 Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick, & Gilman, Inc.	Project No. 90-2143	Figure 4

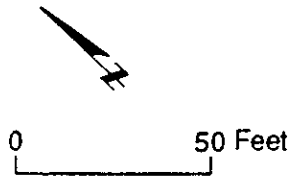
NEIL ARMSTRONG WAY



EXPLANATION

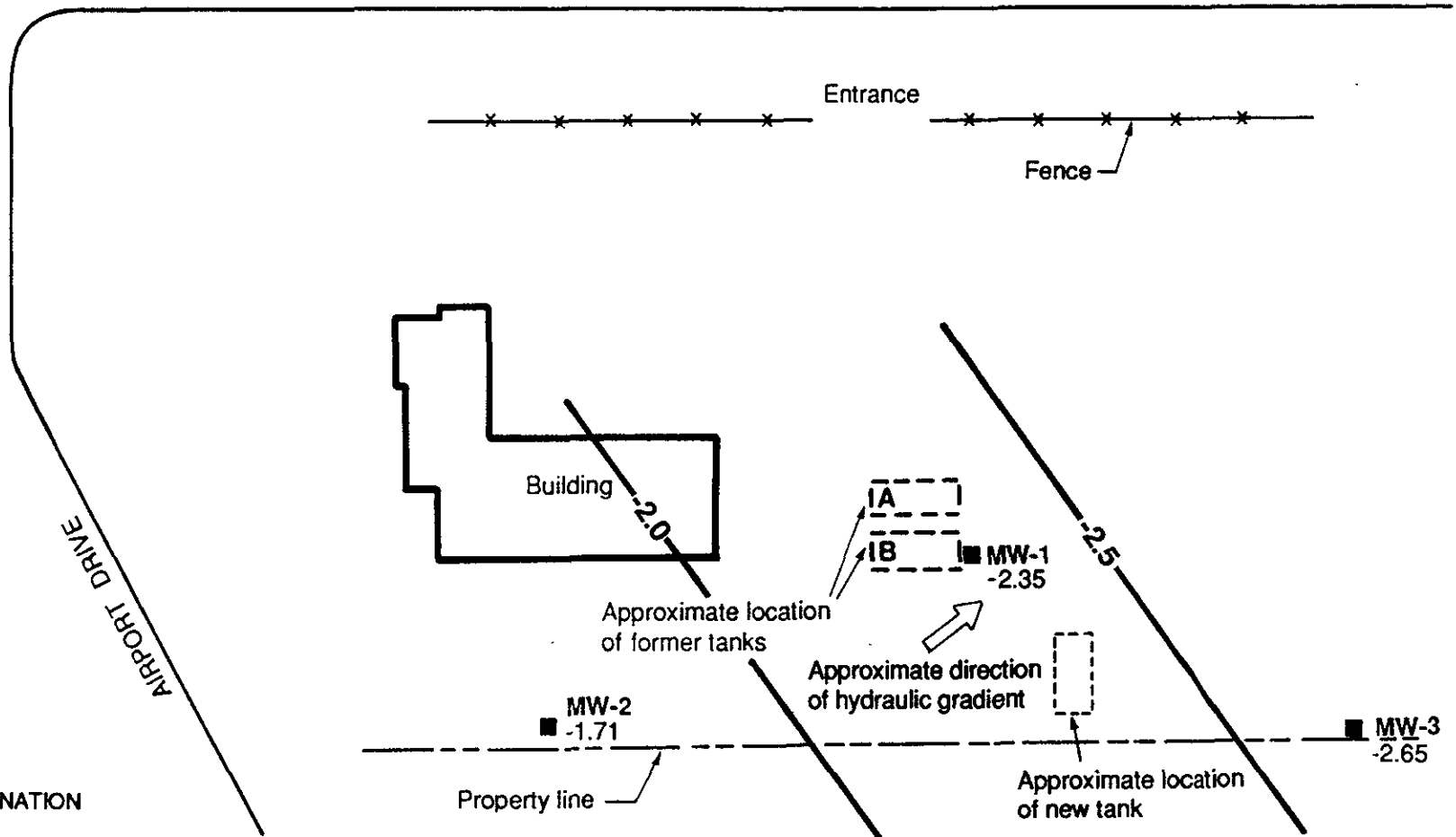
- MW-1 ■ Location of monitoring well with elevation of potentiometric surface on December 17, 1990 (ft. NGVD) -2.58
- Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet

Source: Adapted from Blaine Tech Services, Inc.
 Sampling Report 890825M1, dated August 25, 1989



POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER DECEMBER 17, 1990 Avis Rent a Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 5

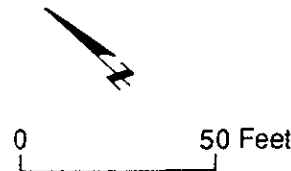
NEIL ARMSTRONG WAY



EXPLANATION

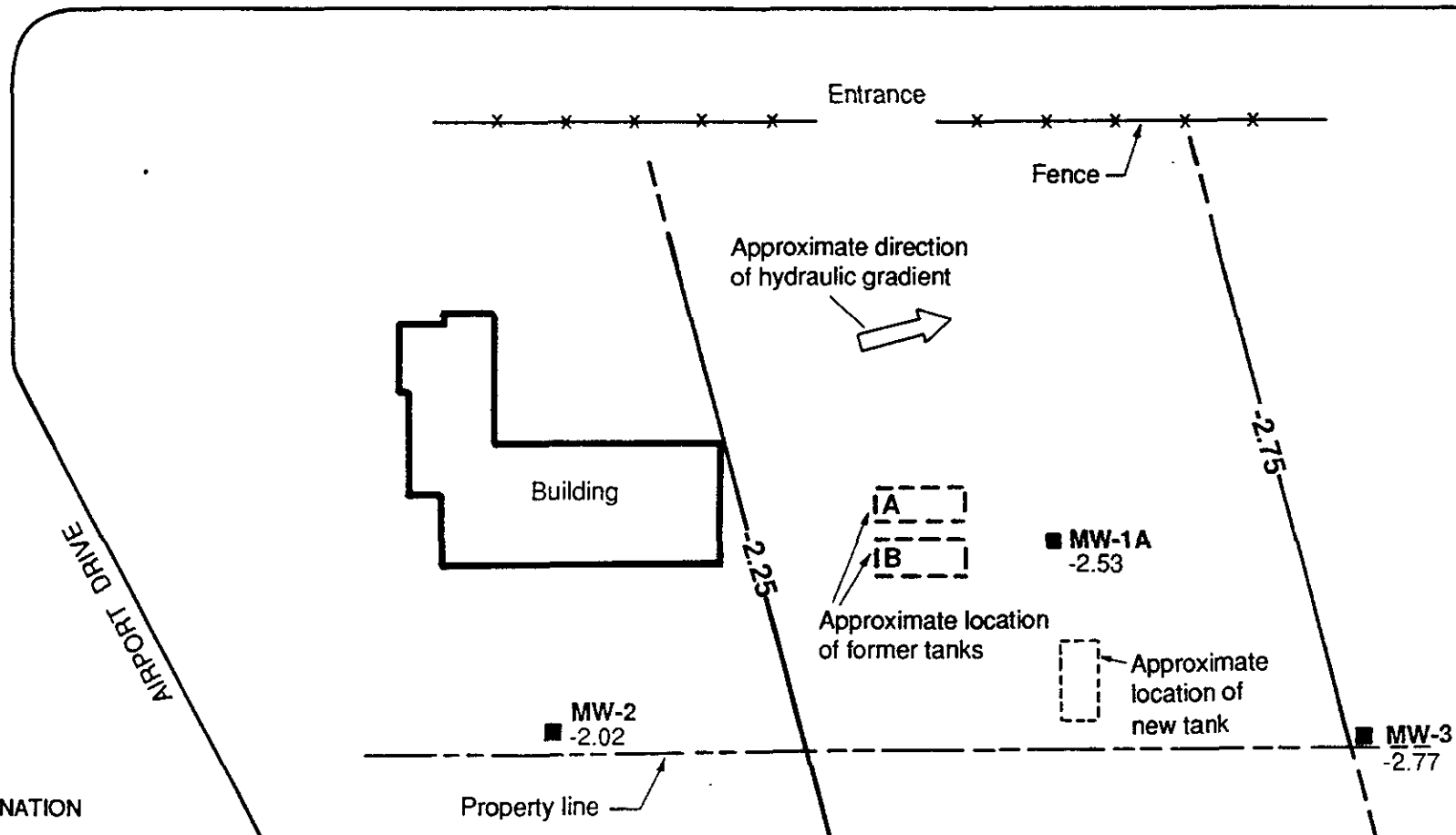
- MW-1 ■ Location of monitoring well with elevation of potentiometric surface on February 26, 1991 (ft. NGVD)
- Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet

Source: Adapted from Blaine Tech Services, Inc. Sampling Report 890825M1, dated August 25, 1989



POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER FEBRUARY 26, 1991 Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 6

NEIL ARMSTRONG WAY



EXPLANATION

MW-2 ■ Location of monitoring well with elevation of potentiometric surface -2.02

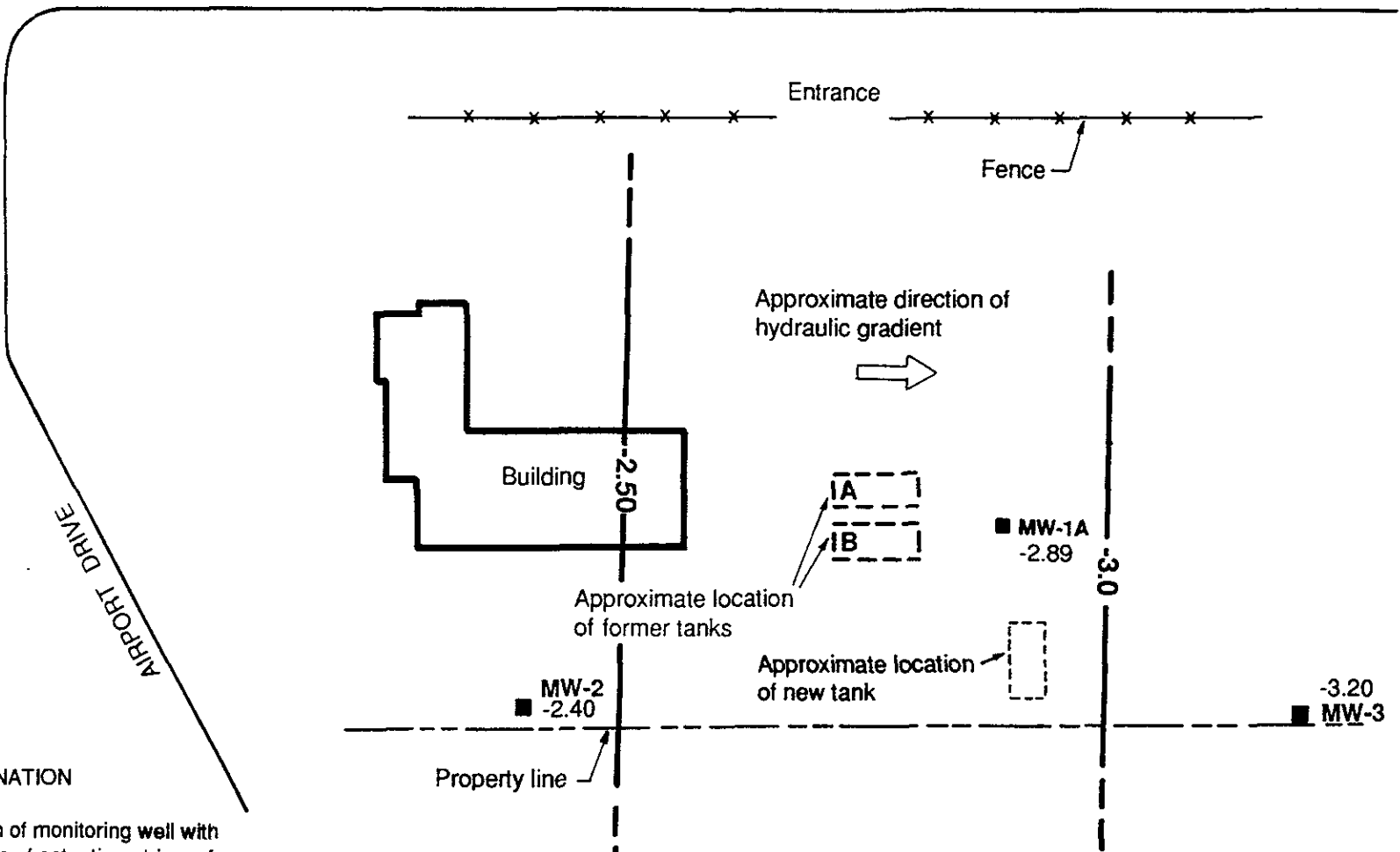
— Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet

Source: Adapted from Blaine Tech Services, Inc. Sampling Report 890825M1, dated August 25, 1989

0 50 Feet

POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER JULY 17, 1991 Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 7

NEIL ARMSTRONG WAY



EXPLANATION

- MW-2 ■ Location of monitoring well with elevation of potentiometric surface
- Line of equal elevation of potentiometric surface (ft. NGVD), contour interval 0.5 feet

Source: Adapted from Blaine Tech Services, Inc. Sampling Report 890825M1, dated August 25, 1989

POTENTIOMETRIC SURFACE OF SHALLOW GROUND WATER OCTOBER 18, 1991 Avis Rent A Car System, Inc. Facility Oakland International Airport Oakland, California		
McCulley, Frick & Gilman, Inc.	Project No. 90-2143	Figure 8

APPENDIX A

**Laboratory Report and Chain-of-Custody Record
for
Ground-Water Samples**

Analytical Report

RECEIVED

NOV 14 1991

McCULLY, FRICK
& GILMAN, INC.

LOG NO: E91-10-440

Received: 18 OCT 91

Mailed: NOV 13 1991

Mr. Jeffrey Gilman
McCulley, Frick & Gilman, Inc
5, Third Street, Suite 400
San Francisco, CA 94103

Project: 90-2143

REPORT OF ANALYTICAL RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED		
10-440-1	MW-2	18 OCT 91		
10-440-2	MW-3	18 OCT 91		
10-440-3	MW-1A	18 OCT 91		
PARAMETER		10-440-1	10-440-2	10-440-3
Base/Neutral Ext. (EPA-625)				
Date Analyzed		10.31.91	10.31.91	10.31.91
Date Extracted		10.25.91	10.25.91	10.25.91
1,2,4-Trichlorobenzene, ug/L		<2	<2	<2
1,2-Dichlorobenzene, ug/L		<2	<2	<2
1,2-Diphenylhydrazine, ug/L		<10	<10	<10
1,3-Dichlorobenzene, ug/L		<2	<2	<2
1,4-Dichlorobenzene, ug/L		<2	<2	<2
2,4-Dinitrotoluene, ug/L		<20	<20	<20
2,6-Dinitrotoluene, ug/L		<5	<5	<5
2-Chloronaphthalene, ug/L		<2	<2	<2
2-Methylnaphthalene, ug/L		<2	<2	<2
3,3'-Dichlorobenzidine, ug/L		<20	<20	<20
4-Bromophenylphenylether, ug/L		<5	<5	<5
4-Chlorophenylphenylether, ug/L		<5	<5	<5
Acenaphthene, ug/L		<2	<2	<2
Acenaphthylene, ug/L		<2	<2	<2
Anthracene, ug/L		<2	<2	<2
Benzidine, ug/L		<200	<200	<200
Benzo(a)anthracene, ug/L		<2	<2	<2
Benzo(a)pyrene, ug/L		<2	<2	<2
Benzo(b)fluoranthene, ug/L		<2	<2	<2
Benzo(g,h,i)perylene, ug/L		<2	<2	<2
Benzo(k)fluoranthene, ug/L		<2	<2	<2
Butylbenzylphthalate, ug/L		<10	<10	<10
Chrysene, ug/L		<2	<2	<2

Analytical Report

RECEIVED

NOV 14 1991

McCULLY, FRICK
& GILMAN, INC.

LOG NO: E91-10-440

Received: 18 OCT 91

Mr. Jeffrey Gilman
McCulley, Frick & Gilman, Inc
5, Third Street, Suite 400
San Francisco, CA 94103

Project: 90-2143

REPORT OF ANALYTICAL RESULTS

Page 2

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED		
10-440-1	MW-2	18 OCT 91		
10-440-2	MW-3	18 OCT 91		
10-440-3	MW-1A	18 OCT 91		
PARAMETER		10-440-1	10-440-2	10-440-3
Di-n-octylphthalate, ug/L		<10	<10	<10
Dibenzo(a,h)anthracene, ug/L		<2	<2	<2
Dibutylphthalate, ug/L		<10	<10	<10
Diethylphthalate, ug/L		<10	<10	<10
Dimethylphthalate, ug/L		<10	<10	<10
Fluoranthene, ug/L		<2	<2	<2
Fluorene, ug/L		<2	<2	<2
Hexachlorobenzene, ug/L		<2	<2	<2
Hexachlorobutadiene, ug/L		<5	<5	<5
Hexachlorocyclopentadiene, ug/L		<50	<50	<50
Hexachloroethane, ug/L		<10	<10	<10
Indeno(1,2,3-c,d)pyrene, ug/L		<2	<2	<2
Isophorone, ug/L		<5	<5	<5
N-Nitrosodimethylamine, ug/L		<5	<5	<5
N-Nitrosodiphenylamine, ug/L		<5	<5	<5
N-Nitrosodi-n-propylamine, ug/L		<5	<5	<5
Nitrobenzene, ug/L		<2	<2	<2
Naphthalene, ug/L		<2	<2	<2
Phenanthrene, ug/L		<2	<2	<2
Pyrene, ug/L		<2	<2	<2
Bis(2-chloroethoxy)methane, ug/L		<5	<5	<5
Bis(2-chloroethyl)ether, ug/L		<2	<2	<2
Bis(2-chloroisopropyl)ether, ug/L		<5	<5	<5
Bis(2-ethylhexyl)phthalate, ug/L		<20	<20	<20

Analytical Report

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NOV 14 1991

McCULLY, FRICK
& GILMAN, INC.

LOG NO: E91-10-440

Received: 18 OCT 91

Mr. Jeffrey Gilman
McCulley, Frick & Gilman, Inc
5, Third Street, Suite 400
San Francisco, CA 94103

Project: 90-2143

REPORT OF ANALYTICAL RESULTS

Page 3

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED		
10-440-1	MW-2	18 OCT 91		
10-440-2	MW-3	18 OCT 91		
10-440-3	MW-1A	18 OCT 91		
PARAMETER		10-440-1	10-440-2	10-440-3
TPH-Volatile/BTEX				
Date Analyzed		10.30.91	10.30.91	10.30.91
Dilution Factor, Times		1	1	1
Benzene, ug/L		<0.5	<0.5	<0.5
Ethylbenzene, ug/L		<0.5	<0.5	<0.5
Toluene, ug/L		<0.5	<0.5	2.3
Total Xylene Isomers, ug/L		<0.5	<0.5	<0.5
C6 to C12 Hydrocarbons, ug/L		<50	<50	<50



Analytical Report

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LOG NO: E91-10-440

Received: 18 OCT 91

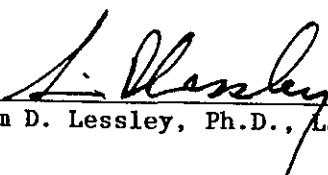
Mr. Jeffrey Gilman
McCulley, Frick & Gilman, Inc
5, Third Street, Suite 400
San Francisco, CA 94103

Project: 90-2143

REPORT OF ANALYTICAL RESULTS

Page 4

LOG NO	SAMPLE DESCRIPTION, BLANK WATER SAMPLES	DATE SAMPLED
10-440-4	Trip Blank	16 OCT 91
PARAMETER	10-440-4	
TPH-Volatile/BTEX		
Date Analyzed	10.30.91	
Dilution Factor, Times	1	
Benzene, ug/L	<0.5	
Ethylbenzene, ug/L	<0.5	
Toluene, ug/L	<0.5	
Total Xylene Isomers, ug/L	<0.5	
C6 to C12 Hydrocarbons, ug/L	<50	


Sim D. Lessley, Ph.D., Laboratory Director

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BATCH QC REPORT: Definitions and Terms

Accuracy	The ability of a procedure to determine the "true" concentration of an analyte
Precision	The reproducibility of a procedure demonstrated by the agreement between analyses performed on either duplicates of the same sample or a pair of duplicate spikes
Batch	A group of samples analyzed sequentially using the same calibration curve, reagents, and instrument
Laboratory Control Standard (LCS)	Laboratory reagent water spiked with known compounds and subjected to the same procedures as the samples. The LCS thus indicates the accuracy of the analytical method and, because it is prepared from a different source than the standard used to calibrate the instrument, it also serves to double-check the calibration
Matrix QC	Quality control tests performed on actual client samples. For most inorganic analyses, the laboratory uses a pair of duplicate samples and a spiked sample. For most organic analyses, the laboratory uses a pair of spiked samples (duplicate spikes)
LC Result	Laboratory result of an LCS analysis
LT Result	Expected result, or true value, of the LCS analysis
R1, R2 Result:	Result of the analysis of replicate aliquots of a sample, with R1 indicating the first analysis of the sample and R2 its corresponding duplicate; used to determine precision
S1, S2 Result	Result of the analysis of replicate spiked aliquots, with S1 indicating one spike of the sample and S2 the second spike; used to determine precision and accuracy
R Bar Result	The average of replicate analysis results
S Bar Result:	The average of spike analysis results
True value	The theoretical, or expected, result of a spike sample analysis
Percent Recovery	The percentage of analyte recovered. For LCS, the percent recovery calculation is: $LC + LT \times 100$ For spike recoveries, the percent recovery calculation is: $\frac{(S \text{ Bar} - \text{Sample Concentration})}{\text{Spike Amount}} \times 100$
Relative Percent Difference (RPD)	Calculated using one of the following: $\frac{(R1 - R2) \times 100}{(R1 + R2) + 2} \qquad \frac{(S1 - S2) \times 100}{(S1 + S2) + 2}$
Blank Result	The result of the analysis of a method blank, which is reagent water that is analysed using the same reagents, instruments and procedures as the samples in a batch; used to determine laboratory contamination
Reporting Detection Limit (RDL)	BCA-assigned limit based on—but not the same as—method detection limits (MDLs) determined using EPA guidelines

: ORDER PLACED FOR CLIENT: McCulley, Frick & Gilman, Inc 9110440 :
: BC ANALYTICAL : EMVL LAB : 12:55:39 13 NOV 1991 - P. 1 :

SAMPLES...	SAMPLE DESCRIPTION..	DETERM.....	DATE....	METHOD.....	EQUIP.	BATCH	ID.NO
			ANALYZED				
9110440*1	MW-2	GAS.5030.BTEX	10.30.91	5030/8015	516-19	239	7867
		BNA.625.BN	10.31.91	625	517-02	215	3002
9110440*2	MW-3	GAS.5030.BTEX	10.30.91	5030/8015	516-19	239	7867
		BNA.625.BN	10.31.91	625	517-02	215	3002
9110440*3	MW-1A	GAS.5030.BTEX	10.30.91	5030/8015	516-19	239	7867
		BNA.625.BN	10.31.91	625	517-02	215	3002
9110440*4	Trip Blank	GAS.5030.BTEX	10.30.91	5030/8015	516-19	239	7867

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McCULLEY, FRICK
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Notes: Equipment = BC Analytical identification number for a
particular piece of analytical equipment.

ID.NO = BC Analytical employee identification number of
analyst.

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BATCH QC REPORT
ORDER: E9110440

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McCULLY, FRICK
& GILMAN, INC.

DATE REPORTED : 11/13/91

Page 1

LABORATORY CONTROL STANDARDS

PARAMETER	DATE ANALYZED	BATCH NUMBER	LC RESULT	LT RESULT	UNIT	PERCENT RECOVERY
TPH-Volatile/BTEX						
Dilution Factor	10.30.91	239	1	1	Times	100
Benzene	10.30.91	239	26	20	ug/L	130
Ethylbenzene	10.30.91	239	25	20	ug/L	125
Toluene	10.30.91	239	26	20	ug/L	130
Total Xylene Isomers	10.30.91	239	66	60	ug/L	110
C6 to C12 Hydrocarbons	10.30.91	239	250	230	ug/L	109
B/N,A Ext.Pri.Poll. (EPA-625)						
Dilution Factor	10.30.91	215	1	1	Times	100
1,2,4-Trichlorobenzene	10.30.91	215	32	50	ug/L	64
1,4-Dichlorobenzene	10.30.91	215	31	50	ug/L	62
2,4-Dinitrotoluene	10.30.91	215	49	50	ug/L	98
2-Chlorophenol	10.30.91	215	66	100	ug/L	66
4-Chloro-3-methylphenol	10.30.91	215	67	100	ug/L	67
4-Nitrophenol	10.30.91	215	89	100	ug/L	89
Acenaphthene	10.30.91	215	39	50	ug/L	78
N-Nitrosodi-n-propylamine	10.30.91	215	35	50	ug/L	70
Phenol	10.30.91	215	67	100	ug/L	67
Pentachlorophenol	10.30.91	215	77	100	ug/L	77
Pyrene	10.30.91	215	34	50	ug/L	68

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NOV 14 1991

McCULLEY, FRICK
& GILMAN, INC.

DATE REPORTED : 11/13/91

Page 1

MATRIX QC PRECISION (DUPLICATE SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	S1 RESULT	S2 RESULT	UNIT	RELATIVE ZDIFF
TPH-Volatile/BTEX						
Dilution Factor	10.30.91	239	1	1	Times	0
Benzene	10.30.91	239	25	25	ug/L	0
Ethylbenzene	10.30.91	239	24	24	ug/L	0
Toluene	10.30.91	239	25	26	ug/L	4
Total Xylene Isomers	10.30.91	239	63	64	ug/L	2
C6 to C12 Hydrocarbons	10.30.91	239	240	250	ug/L	4
TPH-Volatile/BTEX						
Dilution Factor	10.30.91	239	1	1	Times	0
Benzene	10.30.91	239	25	25	ug/L	0
Ethylbenzene	10.30.91	239	24	26	ug/L	8
Toluene	10.30.91	239	26	25	ug/L	4
Total Xylene Isomers	10.30.91	239	65	60	ug/L	8
C6 to C12 Hydrocarbons	10.30.91	239	250	250	ug/L	0

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BATCH QC REPORT
ORDER: E9110440

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McCULLLEY, FRICK
& GILMAN, INC.

DATE REPORTED : 11/13/91

Page 1

MATRIX QC ACCURACY (SPIKES)

PARAMETER	DATE ANALYZED	BATCH NUMBER	SBAR RESULT	TRUE RESULT	RBAR RESULT	UNIT	PERCENT RECOVERY
TPH-Volatile/BTEX							
Benzene	10.30.91	239	25	20	<0.5	ug/L	125
Ethylbenzene	10.30.91	239	24	20	<0.5	ug/L	120
Toluene	10.30.91	239	25.5	20	<0.5	ug/L	128
Total Xylene Isomers	10.30.91	239	63.5	60	<0.5	ug/L	106
C6 to C12 Hydrocarbons	10.30.91	239	245	230	<50	ug/L	107
TPH-Volatile/BTEX							
Benzene	10.30.91	239	25	20	<0.5	ug/L	125
Ethylbenzene	10.30.91	239	25	20.7	<0.5	ug/L	121
Toluene	10.30.91	239	25.5	20.5	<0.5	ug/L	124
Total Xylene Isomers	10.30.91	239	62.5	60	1.9	ug/L	104
C6 to C12 Hydrocarbons	10.30.91	239	250	230	<50	ug/L	109

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& GILMAN, INC.

DATE REPORTED : 11/13/91

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METHOD BLANKS AND REPORTING DETECTION LIMIT (RDL)

PARAMETER	DATE ANALYZED	BATCH NUMBER	BLANK RESULT	RDL	UNIT	METHOD
TPH-Volatile/BTEX						
Benzene	10.30.91	239	0	0.5	ug/L	5030/8015
Ethylbenzene	10.30.91	239	0.2	0.5	ug/L	5030/8015
Toluene	10.30.91	239	0.2	0.5	ug/L	5030/8015
Total Xylene Isomers	10.30.91	239	0.06	0.5	ug/L	5030/8015
C6 to C12 Hydrocarbons	10.30.91	239	2	50	ug/L	5030/8015
B/N,A Ext.Pri.Poll. (EPA-625)						
1,2,4-Trichlorobenzene	10.30.91	215	0	2	ug/L	625
1,2-Dichlorobenzene	10.30.91	215	0	2	ug/L	625
1,2-Diphenylhydrazine	10.30.91	215	0	10	ug/L	625
1,3-Dichlorobenzene	10.30.91	215	0	2	ug/L	625
1,4-Dichlorobenzene	10.30.91	215	0	2	ug/L	625
2,4,5-Trichlorophenol	10.30.91	215	0	10	ug/L	625
2,4,6-Trichlorophenol	10.30.91	215	0	10	ug/L	625
2,4-Dichlorophenol	10.30.91	215	0	5	ug/L	625
2,4-Dimethylphenol	10.30.91	215	0	5	ug/L	625
2,4-Dinitrophenol	10.30.91	215	0	20	ug/L	625
2,4-Dinitrotoluene	10.30.91	215	0	20	ug/L	625
2,6-Dinitrotoluene	10.30.91	215	0	5	ug/L	625
2-Chloronaphthalene	10.30.91	215	0	2	ug/L	625
2-Chlorophenol	10.30.91	215	0	5	ug/L	625
2-Methyl-4,6-dinitrophenol	10.30.91	215	0	20	ug/L	625
2-Methylnaphthalene	10.30.91	215	0	2	ug/L	625
2-Methylphenol (o-Cresol)	10.30.91	215	0	5	ug/L	625
2-Nitroaniline	10.30.91	215	0	20	ug/L	625
2-Nitrophenol	10.30.91	215	0	5	ug/L	625
3,3'-Dichlorobenzidine	10.30.91	215	0	20	ug/L	625
3-Nitroaniline	10.30.91	215	0	20	ug/L	625
4-Bromophenylphenylether	10.30.91	215	0	5	ug/L	625
4-Chloro-3-methylphenol	10.30.91	215	0	10	ug/L	625
4-Chloroaniline	10.30.91	215	0	10	ug/L	625
4-Chlorophenylphenylether	10.30.91	215	0	5	ug/L	625
4-Methylphenol (p-Cresol)	10.30.91	215	0	10	ug/L	625
4-Nitroaniline	10.30.91	215	0	20	ug/L	625
4-Nitrophenol	10.30.91	215	0	50	ug/L	625
Acenaphthene	10.30.91	215	0	2	ug/L	625
Acenaphthylene	10.30.91	215	0	2	ug/L	625

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ORDER: E9110440

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& GILMAN, INC.

DATE REPORTED : 11/13/91

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METHOD BLANKS AND REPORTING DETECTION LIMIT (RDL)

PARAMETER	DATE ANALYZED	BATCH NUMBER	BLANK RESULT	RDL	UNIT	METHOD
Aniline	10.30.91	215	0	20	ug/L	625
Anthracene	10.30.91	215	0	2	ug/L	625
Benzidine	10.30.91	215	0	200	ug/L	625
Benzo(a)anthracene	10.30.91	215	0	2	ug/L	625
Benzo(a)pyrene	10.30.91	215	0	2	ug/L	625
Benzo(b)fluoranthene	10.30.91	215	0	2	ug/L	625
Benzo(g,h,i)perylene	10.30.91	215	0	2	ug/L	625
Benzo(k)fluoranthene	10.30.91	215	0	2	ug/L	625
Benzyl alcohol	10.30.91	215	0	10	ug/L	625
Benzoic acid	10.30.91	215	0	50	ug/L	625
Butylbenzylphthalate	10.30.91	215	0	10	ug/L	625
Chrysene	10.30.91	215	0	2	ug/L	625
Di-n-octylphthalate	10.30.91	215	0	10	ug/L	625
Dibenzo(a,h)anthracene	10.30.91	215	0	2	ug/L	625
Dibenzofuran	10.30.91	215	0	5	ug/L	625
Dibutylphthalate	10.30.91	215	0	10	ug/L	625
Diethylphthalate	10.30.91	215	0	10	ug/L	625
Dimethylphthalate	10.30.91	215	0	10	ug/L	625
Fluoranthene	10.30.91	215	0	2	ug/L	625
Fluorene	10.30.91	215	0	2	ug/L	625
Hexachlorobenzene	10.30.91	215	0	2	ug/L	625
Hexachlorobutadiene	10.30.91	215	0	5	ug/L	625
Hexachlorocyclopentadiene	10.30.91	215	0	50	ug/L	625
Hexachloroethane	10.30.91	215	0	10	ug/L	625
Indeno(1,2,3-c,d)pyrene	10.30.91	215	0	2	ug/L	625
Isophorone	10.30.91	215	0	5	ug/L	625
N-Nitrosodimethylamine	10.30.91	215	0	5	ug/L	625
N-Nitrosodiphenylamine	10.30.91	215	0	5	ug/L	625
N-Nitrosodi-n-propylamine	10.30.91	215	0	5	ug/L	625
Nitrobenzene	10.30.91	215	0	2	ug/L	625
Naphthalene	10.30.91	215	0	2	ug/L	625
Phenanthrene	10.30.91	215	0	2	ug/L	625
Phenol	10.30.91	215	0	10	ug/L	625
Pentachlorophenol	10.30.91	215	0	20	ug/L	625
Pyrene	10.30.91	215	0	2	ug/L	625
Bis(2-chloroethoxy)methane	10.30.91	215	0	5	ug/L	625
Bis(2-chloroethyl)ether	10.30.91	215	0	2	ug/L	625

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BATCH QC REPORT
ORDER: E9110440

NOV 14 1991
McCULLY, FRICK
& GILMAN, INC.

DATE REPORTED : 11/13/91

Page 3

METHOD BLANKS AND REPORTING DETECTION LIMIT (RDL)

PARAMETER	DATE ANALYZED	BATCH NUMBER	BLANK RESULT	RDL	UNIT	METHOD
Bis(2-chloroisopropyl)ether	10.30.91	215	0	5	ug/L	625
Bis(2-ethylhexyl)phthalate	10.30.91	215	3.8	20	ug/L	625

CHAIN-OF-CUSTODY RECORD AND REQUEST FOR ANALYSIS

McCULLY, FRICK & GILMAN, INC.

NO. _____

3300 Arapahoe Ave., Suite 218
Boulder, CO 80303
TEL: (303) 447-1823
FAX: (303) 447-1836

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McCULLY, FRICK
& GILMAN, INC.

5818 Balcones Dr., Suite 202
Austin, TX 78731
TEL: (512) 371-1667
FAX: (512) 454-4126

LOG # 9110440

5 Third St., Suite 400
San Francisco, CA 94103
TEL: (415) 495-7110
FAX: (415) 495-7107

PROJECT No.: 90-2143 PROJECT NAME: Avis-Oakland Int'l Airport PAGE: 1 OF: 1
 SAMPLER (Signature): K.B. Alexander DATE: 10/13/91
 METHOD OF SHIPMENT: _____ CARRIER/WAYBILL NO. _____ DESTINATION: BC Analytical
 SPECIAL INSTRUCTIONS/HAZARDS: _____

SAMPLES											ANALYSIS REQUEST															
Lab No.	Sample Identification	Sample Collection		Matrix*	Preservation						Containers*			Methods						Handling			REMARKS (Special handling procedures, specific analytical methods, observations, etc.)			
		DATE	TIME		HCL	HNO ₃	H ₂ SO ₄	COLD	NONE	OTHER	VOL. (ml)	TYPE*	No.	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	TPH as Gasoline	TPH as Diesel	BTEX	EPA 8310 (PNA)	HOLD		RUSH	STANDARD	
	MW-2	10/18	1245	AQ	✓			✓			40	G	3				✓	✓						✓		
-1	MW-2	10/18	1245					✓			1000	G	2						✓						✓	
	MW-3	10/18	1330		✓			✓			40	G	3				✓	✓							✓	
-2	MW-3	10/18	1330					✓			1000	G	2						✓						✓	
	MW-1A	10/18	1425		✓			✓			40	G	3				✓	✓							✓	
-3	MW-1A	10/18	1425					✓			1000	G	2						✓						✓	
-4	trip blank	10/16	-	AQ	✓			✓			40	G	2				✓	✓							✓	

TOTAL NUMBER OF CONTAINERS

17

LABORATORY COMMENTS/ CONDITION OF SAMPLES

RELINQUISHED BY:					RECEIVED BY:		
SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	SIGNATURE	PRINTED NAME	COMPANY
<u>K.B. Alexander</u>	<u>K.B. Alexander</u>	<u>MFG</u>	<u>10/18/91</u>	<u>1540</u>	<u>P. D'ONGHAM</u>	<u>P. D'ONGHAM</u>	<u>BCIT</u>
LABORATORY							

*KEY: Matrix AO-aqueous NA-nonaqueous SO-soil SL-sludge P-petroleum A-air OT-other Containers P-plastic G-glass T-terlon B-brass OT-other

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