

*Dr*



# Environmental Services, Inc.

2111 Jennings Street, San Francisco, CA 94124-3224, Phone (415) 822-4555 FAX (415) 822-5290

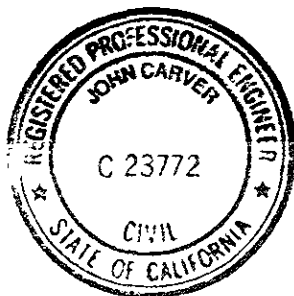
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## GROUNDWATER MONITORING OCTOBER, 1991 ARROYO SCHOOL SAN LORENZO, CALIFORNIA

L & W Project 5186D  
November 15, 1991

Prepared for  
San Lorenzo Unified School District

*George Wilson*  
\_\_\_\_\_  
George Wilson  
Vice President



*John Carver*  
\_\_\_\_\_  
John Carver  
Civil Engineer 23772

## GROUNDWATER MONITORING

### Purpose

This report summarizes and presents the results of the quarterly monitoring of three wells at the Arroyo School in San Lorenzo, California. This report, when forwarded to the Alameda County Health Care Services Agency and the Regional Water Quality Control Board (RWQCB), San Francisco Region, will serve as a progress report for the three month period ending October 31, 1991. Those items which have been completed since submission of L&W Environmental Services, Inc.'s last report are highlighted below.

### Chronology

The following list summarizes site-related work done to date:

- 1/3/91 6000 gallon fuel tank removed.
- 1/16/91 Borings 1 through 6 drilled.
- 1/25/91 Borings 7 through 11 drilled.
- 1/28/91 Borings 12 through 13 drilled.
- 1/31/91 Monitoring wells MW 1 through MW 3 installed.
- 2/7/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 3/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 4/16/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 7/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 10/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.

### Site Description

The area investigated is at the Arroyo School located at 15701 Lorenzo Avenue in San Lorenzo, California. The site investigated is an essentially level paved area with only minimal slope to provide surface drainage. Figure 1 in Appendix A is a site plan showing the location of Arroyo School in relation to the nearby streets. The tank which was removed was located between the maintenance boiler room portion of the building and temporary class rooms. This general location is in the approximate middle of the school complex.

### Work Performed

The three monitoring wells installed at the site were measured and sampled on October 15, 1991. The depth to water in each well was measured and a preliminary sample was observed for free product or the presence of a hydrocarbon sheen. Each well was then purged of at least four well volumes or until groundwater temperature, pH, and conductivity were measured and found to be approximately stable on three successive readings. Wells were purged using either an air lift pump or with a teflon bailer. The bailer and all measuring and sampling equipment were decontaminated before use in each

well by cleaning in soapy water, a trisodium phosphate (TSP) rinse, and two clear water rinses. Samples were recovered from each well using a disposable bailer.

The wells were monitored for depth to groundwater and the presence of free product on October 15, 1991. The observations made to date are as follows:

#### SUMMARY OF GROUNDWATER MEASUREMENTS

Well No.	Date Measured	Top of Casing Elevation	Thickness of Free Product (feet)	Depth to Groundwater (feet)	Piezometric Surface Elevation
MW1	2/07/91	100.00	NONE	11.42	88.58
MW2	2/07/91	100.03	NONE	11.27	88.76
MW3	2/07/91	100.17	NONE	11.44	88.73
MW1	3/15/91	100.00	NONE	10.16	89.84
MW2	3/15/91	100.03	NONE	10.16	89.87
MW3	3/15/91	100.17	NONE	10.48	89.69
MW1	4/16/91	100.00	NONE	10.44	89.56
MW2	4/16/91	100.03	NONE	10.50	89.53
MW3	4/16/91	100.17	NONE	10.72	89.45
MW1	7/15/91	100.00	NONE	12.06	87.94
MW2	7/15/91	100.03	NONE	12.04	87.99
MW3	7/15/91	100.17	NONE	12.20	87.97
MW1	10/15/91	100.00	NONE	12.50	87.50
MW2	10/15/91	100.03	NONE	12.48	87.55
MW3	10/15/91	100.17	NONE	12.60	87.57

The water samples were stored in appropriate containers, labeled and transported in ice chests under Chain-Of-Custody protocol to a California State Certified Laboratory for analysis. Chain-Of-Custody forms are included in Appendix B. Each sample was tested for Total Petroleum Hydrocarbons as Diesel (TPH-D); Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX); and Total Oil and Grease (TOG). The following table summarizes the laboratory analyses results to date.

RESULTS OF GROUNDWATER ANALYSES

Well Sample	Date	TPH-D (ppm)	BTEX (ppb)	TOG (ppm)
MW1	2/07/91	0.3	ND/ND/ND/ND	ND
MW2	2/07/91	ND	ND/ND/ND/ND	ND
MW3	2/07/91	0.3	ND/ND/ND/ND	ND
MW1	3/15/91	ND	ND/ND/ND/ND	ND
MW2	3/15/91	ND	ND/ND/ND/ND	ND
MW3	3/15/91	0.055	ND/ND/ND/ND	ND
MW1	4/16/91	0.20	ND/ND/ND/ND	ND
MW2	4/16/91	ND	ND/ND/ND/ND	ND
MW3	4/16/91	ND	ND/ND/ND/ND	ND
MW1	7/15/91	ND	ND/0.3/ND/ND	ND
MW2	7/15/91	ND	ND/ND/ND/ND	ND
MW3	7/15/91	ND	ND/ND/ND/ND	ND
MW1	10/15/91	0.080	ND/ND/ND/ND	ND
MW2	10/15/91	ND	ND/ND/ND/ND	ND
MW3	10/15/91	ND	ND/ND/ND/ND	ND

Notes: (ppm) parts per million.  
(ppb) parts per billion.  
ND Not detected at or above limit of detection.

**Analytical Certificates**

Original certificates from a California certified laboratory for the most recent groundwater analyses are attached in Appendix B. Copies of the Chain-of-Custody are also included in Appendix B.

**Discussion**

The difference between groundwater elevations in the monitoring wells is very slight being less than 0.40 feet across a distance of about 250 feet, thus indicating a very flat groundwater gradient. Under such conditions, the groundwater gradient may change direction more frequently and be much more sensitive to measurement accuracy than in an area that has a higher gradient.

The groundwater flow direction as indicated by measurements taken on February 7, 1991 was to the southeast. Measurements taken on March 15, 1991 indicated that the groundwater flow direction had moved to the northeast. Measurements taken during April, 1991 indicate that the groundwater flow direction had moved to the north-northeast. Measurements taken during July, 1991 indicate that the groundwater flow direction had moved once again, this time to the northwest. The October, 1991 elevation readings indicate that the gradient remains to the northwest. Refer to Figure 2 of Appendix A, which shows the well locations and the calculated groundwater gradient.

Levels of TPH-D, BTEX, and TOG were found to occur at non-detectable concentrations in water samples from all wells, except in the sample from MW1, which contained 0.08 parts per million of TPH-D.

#### **Proposed Future Work**

We recommend that the monitoring of the three groundwater wells be continued on a quarterly schedule. Each water sample should be analyzed for TPH-D, BTEX, and TOG. The next scheduled episode should occur in January, 1992.

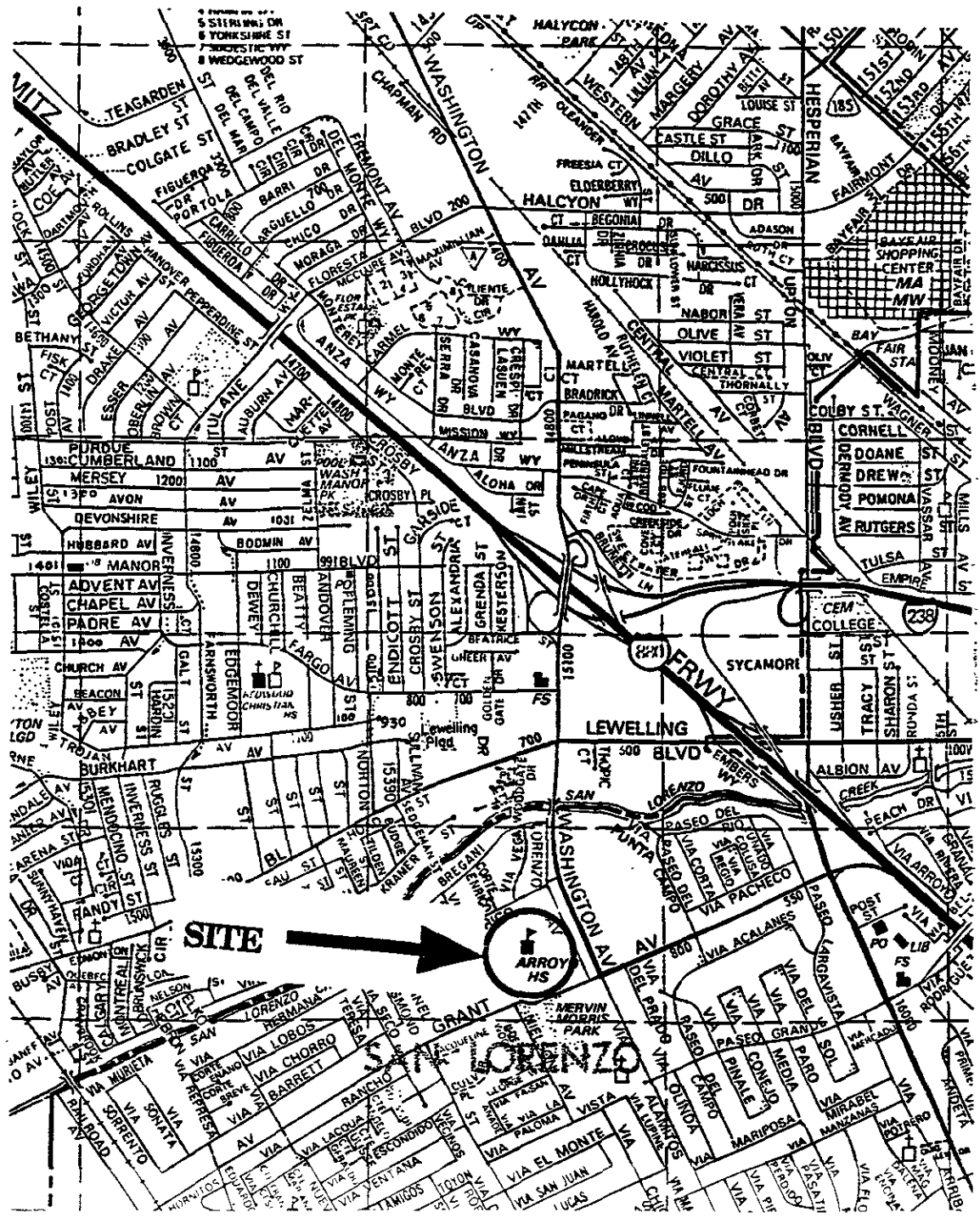
**APPENDIX A**

Figures 1 through 2

**GROUNDWATER MONITORING**

**ARROYO HIGH SCHOOL  
SAN LORENZO, CALIFORNIA**

L&W Project 5186D  
November 15, 1991



L & W Environmental Services, Inc.

2111 Jennings Street  
San Francisco, California

Site Plan

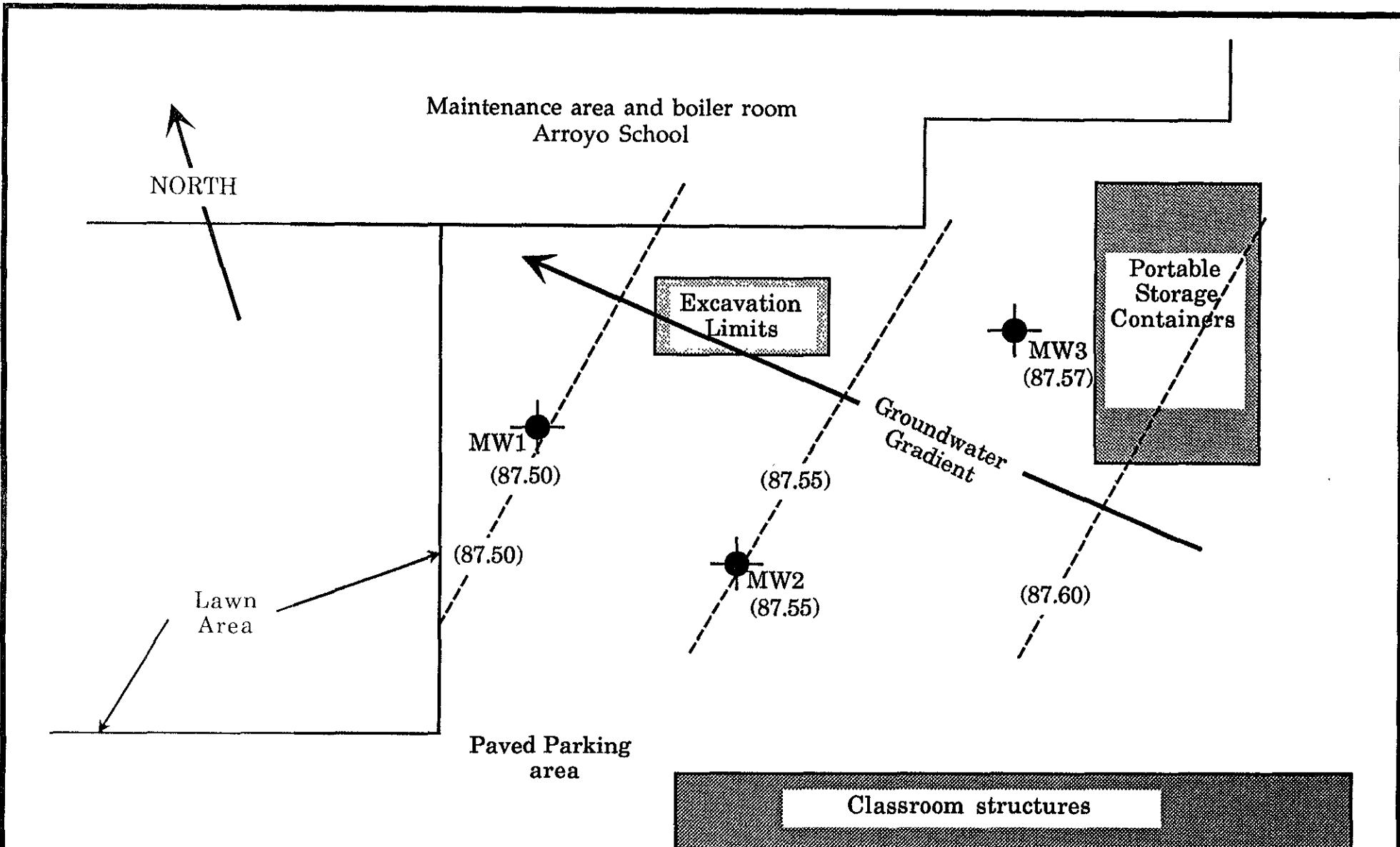
Arroyo High School  
San Lorenzo, California

Project Number: 5186D

Drawn by: JNC

Date: November, 1991

Figure Number: 1



Scale 1" = 20'

--- Lines of equal ground-water elevation

● Approximate monitoring well location and ground-water elevation.

<b>L &amp; W Environmental Services, Inc.</b> 2111 Jennings Street San Francisco, California		<b>GROUNDWATER GRADIENT</b> <b>Arroyo School</b> San Lorenzo, California	
Project Number: 5186D	Drawn by: JNC	Date: November, 1991	Figure Number: 2



**APPENDIX B**

Laboratory Certificates and Chain of Custody Forms

**GROUNDWATER MONITORING**

**ARROYO HIGH SCHOOL  
SAN LORENZO, CALIFORNIA**

L&W Project 5186D  
November 15, 1991

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (415) 222-3002

FAX (415) 222-1251

### CERTIFICATE OF ANALYSIS

STATE LICENSE NO. E 750

Received: 10/16/91

Reported: 11/11/91

Job #: 72918

Attn: George Wilson  
L & W Environmental  
2111 Jennings Street  
San Francisco, CA 94124

Project: Arroyo High School  
Grant Avenue, San Lorenzo  
Matrix: Water

Total Petroleum Hydrocarbon Analysis  
DHS Extraction Method (LUFT)  
 $\mu\text{g/L}$

<u>Lab ID</u>	<u>Client ID</u>	<u>Diesel</u>	<u>MDL</u>
72918-1	5186D-MW1	80	50
72918-2	5186D-MW2	ND<50	50
72918-3	5186D-MW3	ND<50	50

QA/QC: Spike Recovery for Diesel: 97%

MDL: Method Detection Limit. Compound below this level would not be detected.

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Jaime Chow  
Laboratory Director

JC/td

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (415) 222-3002

FAX (415) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. E 750

Received: 10/16/91

Reported: 11/11/91

Job #: 72918

Attn: George Wilson  
L & W Environmental  
2111 Jennings Street  
San Francisco, CA 94124

Project: Arroyo High School  
Grant Avenue, San Lorenzo  
Matrix: Water

Aromatic Volatile Hydrocarbon Analysis  
EPA Method 602  
 $\mu\text{g/L}$

<u>Lab ID</u>	<u>Client ID</u>	<u>Benzene</u>	<u>MDL</u>	<u>Toluene</u>	<u>MDL</u>
72918-1	5186D-MW1	ND<0.3	0.3	ND<0.3	0.3
72918-2	5186D-MW2	ND<0.3	0.3	ND<0.3	0.3
72918-3	5186D-MW3	ND<0.3	0.3	ND<0.3	0.3

<u>Lab ID</u>	<u>Client ID</u>	<u>Ethyl- benzene</u>	<u>MDL</u>	<u>Xylenes</u>	<u>MDL</u>
72918-1	5186D-MW1	ND<0.3	0.3	ND<0.6	0.6
72918-2	5186D-MW2	ND<0.3	0.3	ND<0.6	0.6
72918-3	5186D-MW3	ND<0.3	0.3	ND<0.6	0.6

QA/QC: Spike Recovery for Toluene: 115%  
Spike Recovery for Xylene: 105%  
Spike Recovery for Xylene: 104%

MDL: Method Detection Limit. Compound below this level would not be detected.

Jaime Chow  
Laboratory Director

JC/td

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (415) 222-3002

FAX (415) 222-1251

**CERTIFICATE OF ANALYSIS**

STATE LICENSE NO. E 750

Received: 10/16/91

Reported: 11/11/91

Job #: 72918

Attn: George Wilson  
L & W Environmental  
2111 Jennings Street  
San Francisco, CA 94124

Project: Arroyo High School  
Grant Avenue, San Lorenzo  
Matrix: Water

Total Oil and Grease  
EPA Method 503A  
mg/L

<u>Lab ID</u>	<u>Client ID</u>	<u>Oil and Grease</u>	<u>MDL</u>
72918-1	5186D-MW1	ND<5	5
72918-2	5186D-MW2	ND<5	5
72918-3	5186D-MW3	ND<5	5

QA/QC: Spike Recovery: 96%

MDL: Method Detection Limit. Compound below this level would not be detected.

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Jaime Chow  
Laboratory Director

JC/td

# CHAIN OF CUSTODY

DIESEL

**SAMPLERS: (Signature)** *[Signature]*

**PROJECT NAME:** ARROYO HIGH SCHOOL **JOB NUMBER:** 5186D

**DESCRIPTION:** Quarterly Ground Water Monitoring

**ADDRESS:** ARROYO SCHOOL GRANT AVE. SAN LORENZO

**ANALYSIS REQUESTED**

TOTAL PETROLEUM HYDROCARBONS  
BTEX & E  
VOC - EPA 8240  
TOTAL OIL & GREASE  
TETRAETHYL LEAD

CROSS REFERENCE NUMBER	DATE	TIME	SOIL	WATER	STATION LOCATION	TOTAL PETROLEUM HYDROCARBONS	BTEX & E	VOC - EPA 8240	TOTAL OIL & GREASE	TETRAETHYL LEAD	REMARKS
5186D-MW1	10-15-91	12:20		X	12.52 ft into MW1	X	X	X			3 Litr 2 UoA
5186D-MW2	10-15-91	12:30		X	1248 ft. into MW2	X	X	X			3 Litr 2 UoA
5186D-MW3	10-15-91	12:40		X	12.6 ft. into MW3	X	X	X			3 Litr 2 UoA

**RELINQUISHED BY: (Signature)**

**DATE** 10-15-91

**RECEIVED BY: (Signature)**

**DATE** 10-15-91

**RELINQUISHED BY: (Signature)**

**TIME** 1600

*[Signature]*

**TIME** 1600

**RELINQUISHED BY: (Signature)**

**DATE** 10/16/91

**RECEIVED BY: (Signature)**

**DATE** 10-16-91

**RELINQUISHED BY: (Signature)**

**TIME** 15:30

*[Signature]*

**TIME** 15:30

**RELINQUISHED BY: (Signature)**

**DATE** 10-16-91

**RECEIVED BY: (Signature)**

**DATE** 10-16-91

**RELINQUISHED BY: (Signature)**

**TIME** 1730

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**TIME** 1730

**RELINQUISHED BY: (Signature)**

**DATE** \_\_\_\_\_

**RECEIVED FOR LABORATORY BY: (Signature)**

**DATE** \_\_\_\_\_

**RELINQUISHED BY: (Signature)**

**TIME** \_\_\_\_\_

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**TIME** \_\_\_\_\_