



Environmental Services, Inc.

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92 007 - 0000 0000

**SUMMARY REPORT
ARROYO SCHOOL
15701 LORENZO AVENUE
SAN LORENZO, CALIFORNIA**

L&W Project 5186
September 14, 1992

Prepared for
San Lorenzo Unified School District
15510 Usher Street
San Lorenzo, CA

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15701 LORENZO AVENUE
SAN LORENZO, CA

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INTRODUCTION

Purpose and Scope

This report presents and summarizes the procedures and results of the installation of one downgradient monitoring well and the further profiling of the horizontal and vertical limits of the spread of soil contamination at Arroyo School, 15701 Lorenzo Avenue, San Lorenzo, California. The work was performed in response to the Alameda County Health Care Agency's order of July 9, 1992. A Work plan published by L&W Environmental Services on July 24, detailed the work to be performed. Also, this report presents the results of the quarterly groundwater monitoring episode conducted in July 1992

The work conducted and described in this report consists of:

Drilling and sampling four borings to provide additional data on the horizontal and vertical spread of contamination in the soil

Converting one of the four borings into a downgradient Groundwater Monitoring Well.

Analyzing the soil samples obtained from the borings for heating oil contamination.

Sampling the three previously installed Groundwater Monitoring Wells (MW1, MW2, and MW3) on the quarterly schedule and the sampling of the newly installed groundwater monitoring well (MW4).

Background

One 6000 gallon underground heating oil tank was removed from the site on January 3, 1991. Soil samples taken from the tank excavation during the tank removal indicated that a high level of diesel contamination existed in the soil. In the L & W report dated February 16, 1991, it was recommended that a soil and groundwater investigation be conducted and a program of groundwater monitoring be carried out.

The following chronology summarizes the various activities related to the tank removal, soil and groundwater investigation and groundwater monitoring at the site:

- 01/03/91 6000 gallon fuel tank removed.
- 01/16/91 Borings 1 through 6 drilled.
- 01/25/91 Borings 7 through 11 drilled.
- 01/28/91 Borings 12 through 13 drilled.
- 01/31/91 Monitoring wells MW 1 through MW 3 installed.
- 02/07/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 03/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.

- 04/16/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 07/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 10/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 01/03/92 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 04/14/92 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 07/09/92 Alameda County Health Care Services Agency Order for additional work published
- 07/21/92 Monitoring wells MW 1 through MW 3 monitored and sampled.
- 07/24/92 Work Plan for one additional well and three profile borings published by L&W.
- 08/10/92 Borings B14, B15, B16 and MW4 drilled and sampled. Boring MW4 converted to groundwater monitoring well MW4.
- 09/11/92 Monitoring Well MW 4 monitored and sampled.

Site Description

The Arroyo School is located at 15701 Lorenzo Avenue, San Lorenzo, California. The school is on the west side of Lorenzo Avenue, between Enrico and Grant Avenues. The Vicinity Map, Figure 1, shows the general location of the site. The location of the former tank excavation, monitoring wells, borings, and nearby buildings are shown on the Site Plan, Figure 2 of Appendix A.

WORK ACCOMPLISHED

Subsurface Investigation

On August 10, 1992 four borings, B14, B15, B16 and MW4 were drilled at the locations shown on Figure 2 of Appendix A. Upon completion of drilling MW4, the boring was converted to a 2 inch diameter Groundwater Monitoring Well

The borings were advanced with a CME 75 drill rig using 8 inch outside, 3 3/4 inch inside diameter hollow stem augers. Samples were obtained at 5 foot intervals by driving a California (2.5 inch diameter split-barrel) sampler containing brass tubes into the "undisturbed" soil beyond the augers. Driving energy was provided by a 140 pound hammer falling 30 inches in accordance with ASTM procedures. The California sampler and brass tubes were cleaned between samples using soap, TSP, and two clear water rinses to prevent cross or down-hole contamination. All down-hole equipment was steam cleaned prior to arriving on site. As samples were obtained, they were logged, sealed with teflon, taped, labeled, entered on a Chain-of-Custody form and stored in an ice chest containing ice. Logs of soil and groundwater conditions encountered in all of the borings were continually maintained. All the samples were then delivered to a California State Certified Laboratory.

Boring locations are shown on the Site Plan, Figure 2 of Appendix A. Results of the analyses are tabulated and discussed in a later section of this report. Boring logs showing the precise soil conditions and sample locations are presented on Figures 3 through 6 of Appendix A.

Monitoring Well Installation

One groundwater monitoring well (MW4) was installed at the site on August 10, 1992. The location is shown on the Site Plan, Figure 2. Construction details of the monitoring well are presented on Figure 7 of Appendix A. The State Water Well Form required for all groundwater monitoring wells is included in Appendix C.

The newly installed monitoring well was developed, purged and sampled on September 11, 1992. The other three monitoring wells installed at the site had been measured and sampled on July 21, 1992. 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. A water sample was then taken from each well using a disposable, factory packaged bailer. The water samples were then decanted into appropriate glass containers, labeled, entered on a Chain of Custody form and delivered to a California State Certified laboratory for the required analyses. All equipment used in the sampling operations was decontaminated before use by cleaning in soapy water, a trisodium phosphate (TSP) rinse, and two clear water rinses.

FINDINGS

Soil and Groundwater Conditions

The soil conditions encountered at the site during drilling are shown in the Boring Logs, Figures 3 through 6 of Appendix A. Based on this investigation and past subsurface investigations, the site is underlain in about half of the boring locations by about one foot of gravel and sand fill with varying amounts of clay and silt. At about half of the boring locations, dark gray or brown silt was below the fill layer (if present), from about 1 foot to as much as 7 feet below the ground surface. In other borings, either only clay or silt was encountered from near, or at the surface to the bottom of the borings, which was from 15 to 25 feet. Other boring profiles showing several layers of silt; clay; and gravel, sand, silt/clay layers, each one or two feet thick. In B9, a sand layer was present from about 3 to 4 feet below the ground surface. In MW4, thinly-bedded medium grained sand lenses were interbedded with clay at 20 feet below the ground surface.

Groundwater was encountered in boring MW1 at about 10 feet, and in MW2 and MW3 at about 17 feet below ground surface during previous drilling. Groundwater was encountered at about 14 feet during the drilling conducted on August 10, 1992.

Soil Analytical Results

A total of eleven soil samples were analyzed for Total Petroleum Hydrocarbons as Diesel (TPH-D) and Aromatic Volatile Hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene--BTEX) by EPA Method 8020; and Total Oil and Grease (TOG). The analytical results of soil samples taken on August 10, 1992 are tabulated below.

SOIL SAMPLES FROM BORINGS

Sample Identification	Date	TPH-D (ppm)	BTEX (ppm)	TOG (ppm)
5186-MW4-15	08/10/92	50	ND/0.24/ND/0.008	165
5186-MW4-20	08/10/92	ND	ND/0.07/ND/ND	ND
5186-B14-5	08/10/92	ND	ND/0.47/ND/ND	ND
5186-B14-10	08/10/92	4.8	ND/0.06/ND/ND	ND
5186-B14-15	08/10/92	ND	ND/0.04/ND/ND	ND
5186-B15-5	08/10/92	ND	ND/0.030/ND/ND	ND
5186-B15-10	08/10/92	20	ND/0.14/ND/ND	ND
5186-B15-15	08/10/92	3.1	ND/0.007/ND/ND	ND
5186-B16-5	08/10/92	ND	ND/0.02/ND/ND	55
5186-B16-10	08/10/92	210	ND/0.05/ND/ND	975
5186-B16-15	08/10/92	8.1	ND/0.020/ND/ND	ND

Notes: TPH-D Total Petroleum Hydrocarbons as Diesel
 BTEX Benzene, Toluene, Ethylbenzene, Xylenes
 ND Not Detected at or above the Method Detection Limit
 ppm Parts per million

Groundwater Monitoring Results

Monitoring Wells MW1 through MW3 were monitored and sampled on July 21, 1992 as part of the quarterly sampling requirements. Groundwater monitoring well MW4 was monitored for depth to groundwater and the presence of free product on September 11, 1992. All groundwater observations made to date are summarized below:

Well No.	Date Measured	Top of Casing Elevation	Thickness of Free Product (feet)	Depth to Groundwater	Piezometric Surface Elevation (feet)
MW1	02/07/91	100.00	NONE	11.42	88.58
MW2	02/07/91	100.03	NONE	11.27	88.76
MW3	02/07/91	100.17	NONE	11.44	88.73
MW1	03/15/91	100.00	NONE	10.16	89.84
MW2	03/15/91	100.03	NONE	10.16	89.87
MW3	03/15/91	100.17	NONE	10.48	89.69
MW1	04/16/91	100.00	NONE	10.44	89.56
MW2	04/16/91	100.03	NONE	10.50	89.53
MW3	04/16/91	100.17	NONE	10.72	89.45

Well No.	Date Measured	Top of Casing Elevation	Thickness of Free Product (feet)	Depth to Groundwater	Piezometric Surface Elevation (feet)
MW1	07/15/91	100.00	NONE	12.06	87.94
MW2	07/15/91	100.03	NONE	12.04	87.99
MW3	07/15/91	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
MW1	01/03/92	100.00	NONE	11.52	88.48
MW2	01/03/92	100.03	NONE	11.53	88.50
MW3	01/03/92	100.17	NONE	11.70	88.47
MW1	04/14/92	100.00	NONE	10.23	89.77
MW2	04/14/92	100.03	NONE	10.24	89.79
MW3	04/14/92	100.17	NONE	10.50	89.67
MW1	07/21/92	100.00	NONE	11.96	88.04
MW2	07/21/92	100.03	NONE	11.96	88.07
MW3	07/21/92	100.17	NONE	12.08	88.09
MW4	09/11/92	100.20	NONE	12.84	87.36

The groundwater gradient for the measurements taken during each monitoring episode was calculated, plotted and presented in each separate Monitoring Report. Those gradients including a gradient based on the July 21 and September 11 monitoring are summarized below. Figure 8 of Appendix A is a graphic representation of the groundwater gradient.

Date	Direction of Gradient	Slope of Gradient
02/07/91	24° west of north	0.59 feet per 100 feet
03/15/91	46° east of north	0.18 feet per 100 feet
04/16/91	82° east of north	0.16 feet per 100 feet
07/15/91	10° west of north	0.17 feet per 100 feet
10/15/91	40° west of north	0.14 feet per 100 feet
01/03/92	32° west of north	0.29 feet per 100 feet
04/14/92	69° east of north	0.25 feet per 100 feet
07/21/92 and 09/11/92	23° east of north	2.1 feet per 100 feet

Groundwater Analytical Results

The groundwater samples were 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
MW1	01/03/92	0.14	ND/ND/ND/ND	ND
MW2	01/03/92	ND	ND/ND/ND/ND	ND
MW3	01/03/92	0.065	ND/ND/ND/ND	ND
MW1	04/14/92	ND	ND/23/ND/ND	ND
MW2	04/14/92	ND	ND/0.7/ND/ND	ND
MW3	04/14/92	ND	ND/ND/ND/ND	ND
MW1	07/21/92	ND	ND/ND/ND/ND	ND
MW2	07/21/92	ND	ND/ND/ND/ND	ND
MW3	07/21/92	ND	ND/ND/ND/ND	ND
MW4	09/11/92	0.1	ND/ND/ND/ND	ND

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

Discussion

The four borings drilled August 8, 1992 provided additional data used in profiling the horizontal and vertical spread of heating oil related contaminant in the soil. The TPH-D results have been plotted along with previous data and the spread on contamination at the 10 foot and 15 foot depths are shown on Figures 9 and 10 of Appendix A. No contamination has been encountered at the five foot depth. and waster is encountered in all borings at between 15 and 20 feet below ground surface.

Monitoring Well MW4 was installed within 15 feet of the previous tank location in a down gradient direction. The initial sampling of this well indicates that there is some TPH-D in the groundwater.

The four groundwater Monitoring Wells should be measured and sampled on a quarterly basis to determine if there is continue impact on the groundwater. The next monitoring episode should be in October, 1992 and then every three months.

Additional soil borings are required to further delineate the non-detectable limits of the fuel oil soil contamination. These borings should be conducted before the end of 1992.

Report Distribution

Copies of this report are being forwarded to:

Mr. Scott O. Seery
Alameda County Health Care Services Agency
Hazardous Materials Division
80 Swan Way, Rm. 200
Oakland, CA 94621

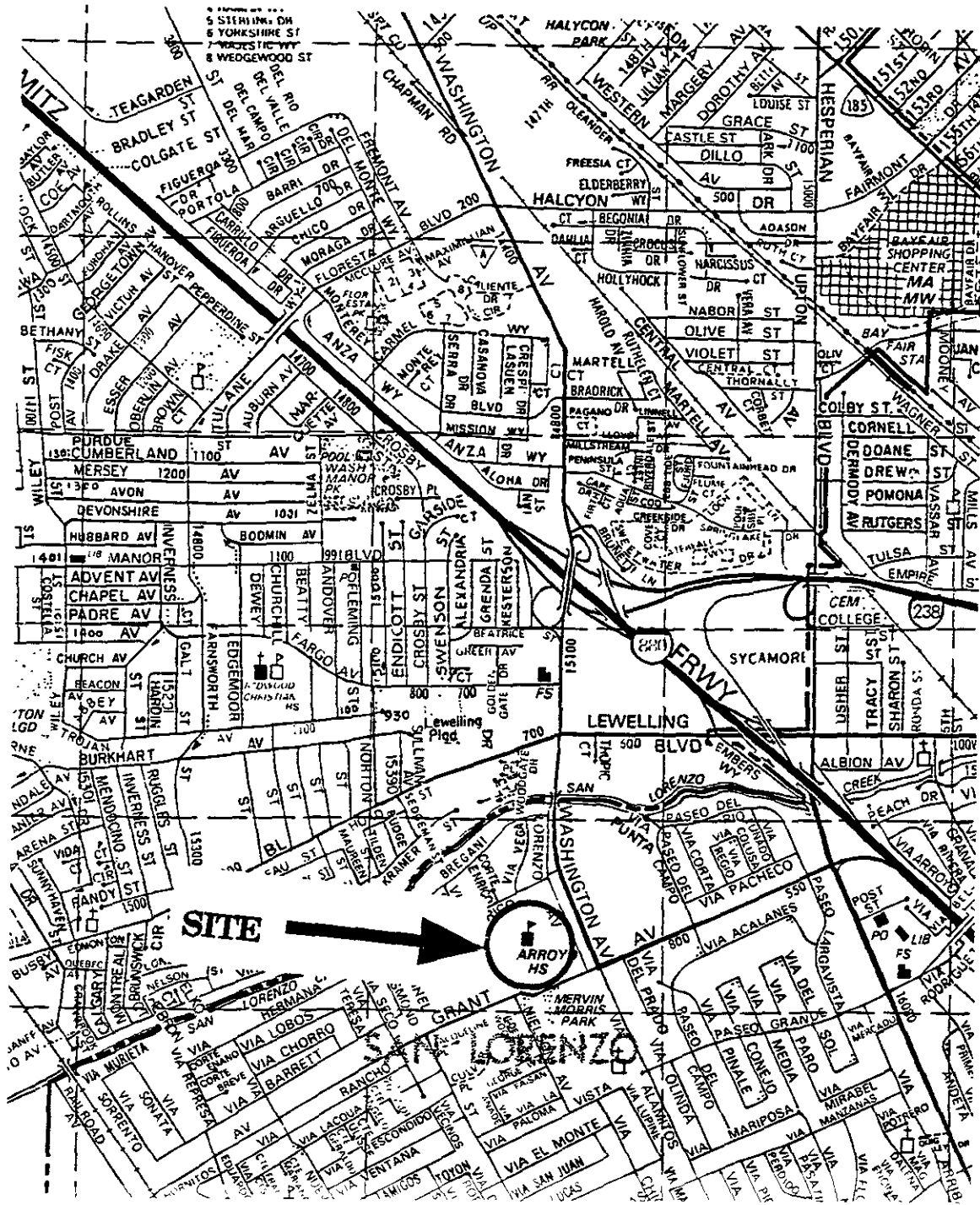
California Regional Water Quality Control Board
San Francisco Bay Region
Toxics Cleanup Division
2101 Webster Street, Suite 500
Oakland, CA 94162

APPENDIX A
FIGURES 1 THROUGH 10

SUMMARY REPORT

SUMMARY REPORT
ARROYO SCHOOL
15701 LORENZO AVENUE
SAN LORENZO, CALIFORNIA

L&W Project 5186
September 14, 1992



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San Francisco, California

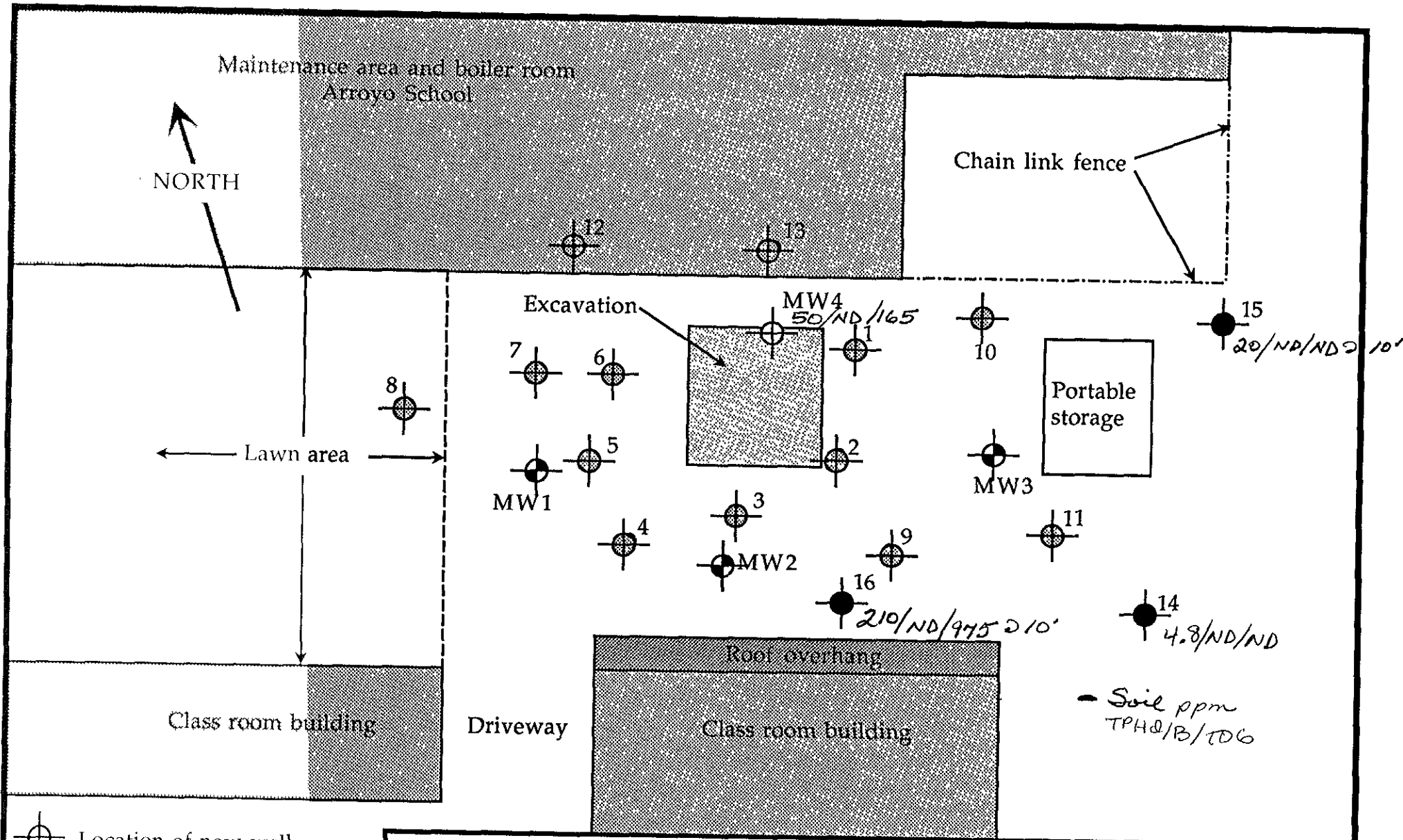
Vicinity Map
Arroyo High School
San Lorenzo, California

Project Number: 5186

Drawn by: JNC

September, 1992


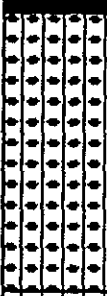





Figure Number: 1



- Soil ppm
TPH/B/TOG

- ⊕ Location of new well
- ⊙ Location of previous well
- Location of new boring
- ⊕ Location of previous boring

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		SITE PLAN Arroyo School San Lorenzo, California	
Project Number: 5186	By: JNC	Scale: 1" = 20'	September, 1992
			Figure Number: 2

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	4 inches of asphalt
5186-B14-5	16	GM	1300		5	Brown GRAVEL, SAND, AND SILT; medium dense, moist.
		ML				Brown SILT, very stiff, moist, slight plasticity.
		GM				Brown GRAVEL, SAND, AND SILT; loose to medium dense, moist.
5186-B14-10	10	ML	1310		10	Gray SILT, stiff, moist, slight to low plasticity.
		GC				Light brown GRAVEL, SAND, AND CLAY; loose to medium dense.
5186-B14-15	15	CL	1320		15	Brown silty CLAY, stiff to very stiff, moist, medium plasticity.

Boring drilled 8/10/92 using 8 inch hollow stem auger and CME 75 drill rig.
 Boring terminated at 15 feet. Groundwater encountered at approximately 14.0 feet.

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2111 Jennings Street
 San Francisco, California

Log of Boring Number: B14

Sheet 1 of 1

Arroyo High School
 San Lorenzo, California

Project Number: 5186

Date: September, 1992

Figure Number 3

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	4 inches of asphalt
5186-B15-5	12	GM	1350		5	Brown GRAVEL, SAND, AND SILT; medium dense, moist. Same.
		ML				Dark gray SILT, medium stiff, moist, slight plasticity.
		GM				Brown GRAVEL, SAND, AND SILT; loose, moist.
5186-B15-10	6	ML	1400		10	Dark gray SILT, medium stiff, moist, slight plasticity.
5186-B15-15	13	ML	1410		15	Same, but stiff and wet.

Boring drilled 8/10/92 using 8 inch hollow stem auger and CME 75 drill rig.
Boring terminated at 15 feet. Groundwater encountered at approximately 14.0 feet.

L & W Environmental Services, Inc.

2111 Jennings Street
San Francisco, California

Log of Boring Number: B15


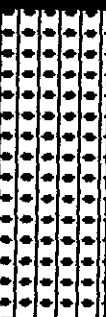


Sheet 1 of 1

Arroyo High School
San Lorenzo, California

Project Number: 5186

Date: September, 1992

Figure Number 4

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	4 inches of asphalt
5186-B16-5	12	GM	1450		5	Brown GRAVEL, SAND, AND SILT; medium dense, moist.
5186-B16-10	7	ML	1600		10	Brown to dark gray SILT, medium stiff, moist, slight plasticity.
5186-B16-15	16	ML	1610		15	Same, but very stiff and wet.

Boring drilled 8/10/92 using 8 inch hollow stem auger and CME 75 drill rig.
 Boring terminated at 15 feet. Groundwater encountered at approximately 14.0 feet.

L & W Environmental Services, Inc.

2111 Jennings Street
 San Francisco, California

Log of Boring Number: B16


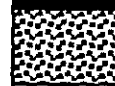
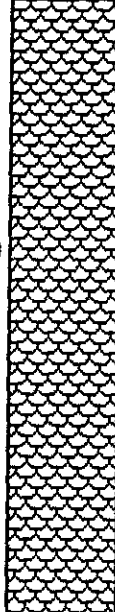
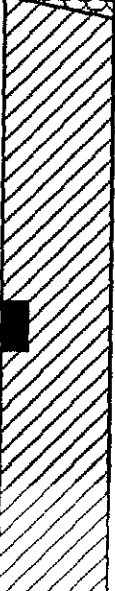
Sheet 1 of 1

Arroyo High School
 San Lorenzo, California

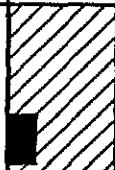
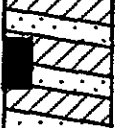

Project Number: 5186

Date: September, 1992

Figure Number 5

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
5186-MW4-15	19	FILL	1110		0	4 inches of asphalt
						4 inches concrete
					5	Controlled Density FILL
		FILL	1120		10	Controlled Density FILL
		CL	1130		15	Dark gray sandy silty CLAY, very stiff, moist, medium to low plasticity.

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		Log of Boring Number: MW 4 Sheet 1 of 2 Arroyo High School San Lorenzo, California	
Project Number: 5186		Date: September, 1992	Figure Number 6

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
5186-MW4-15	19	CL	1130		15	Dark gray sandy silty CLAY, very stiff, moist, medium to low plasticity.
5186-MW4-15	32	CL/ SP	1140		20	Same, with thinly-bedded (about 1/4 inch) lenses of medium grained SAND. Clay was hard and moist; sand was dense and wet.
	8	ML	1150		25	Brown SILT, loose, medium stiff to stiff, wet.

Boring drilled 8/10/92 using 8 inch hollow stem auger and CME 75 drill rig.
 Boring terminated at 24 feet and converted to MW4 on 08/10/92.
 Groundwater encountered at approximately 19.5 feet.

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2111 Jennings Street
 San Francisco, California

Log of Boring Number: MW 4

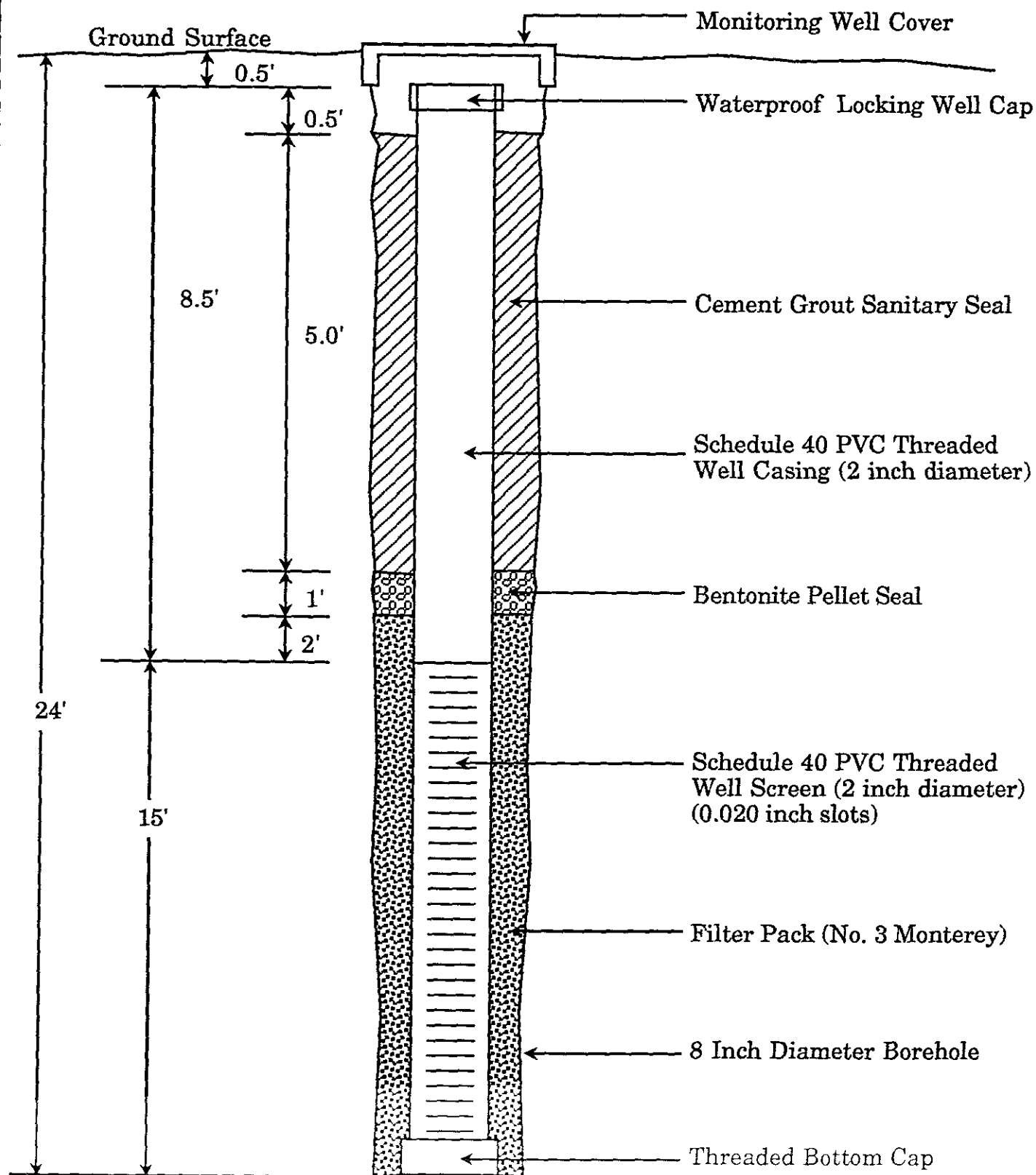
Sheet 2 of 2

Arroyo High School
 San Lorenzo, California

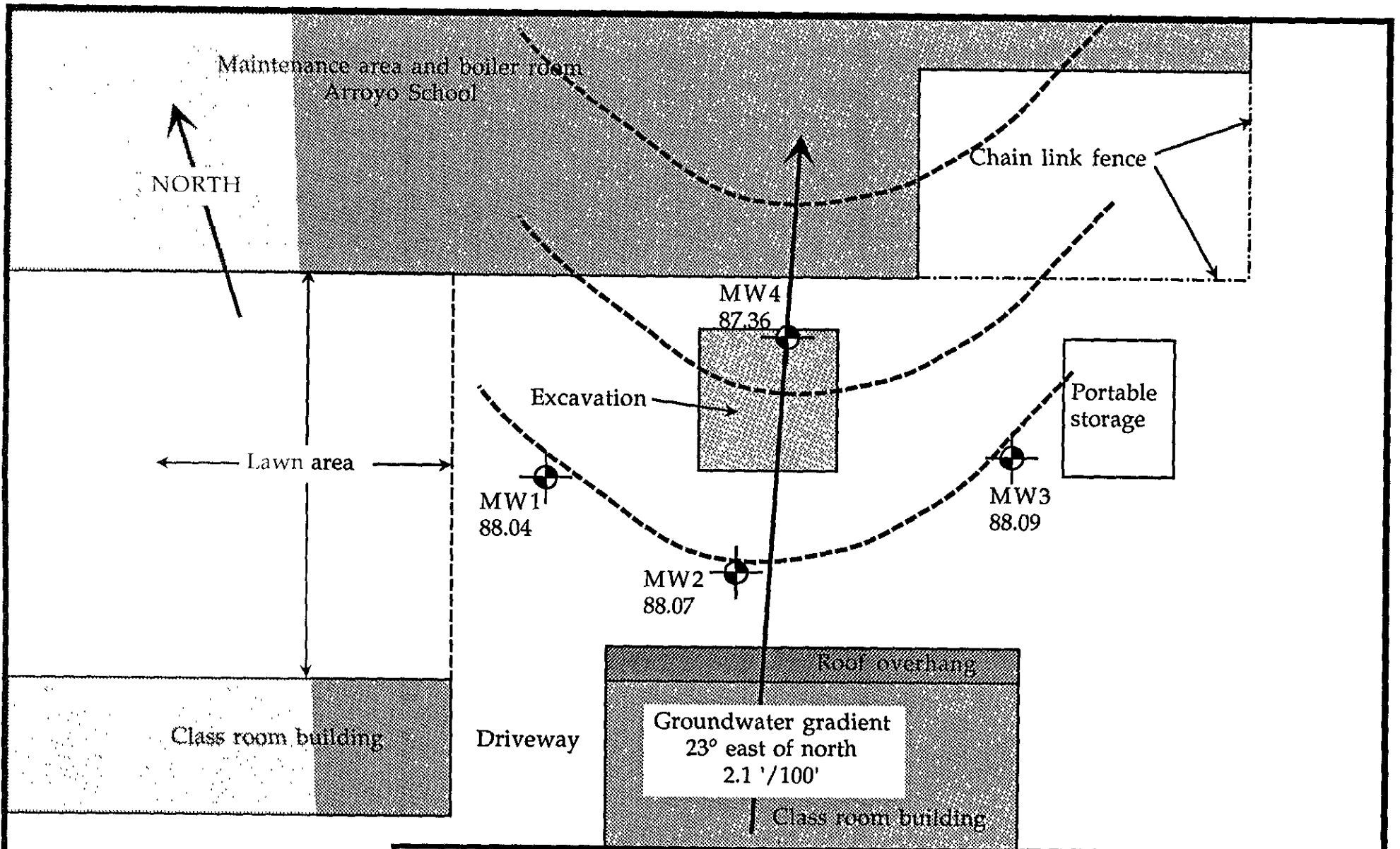
Project Number: 5186



Date: September, 1992

Figure Number 6

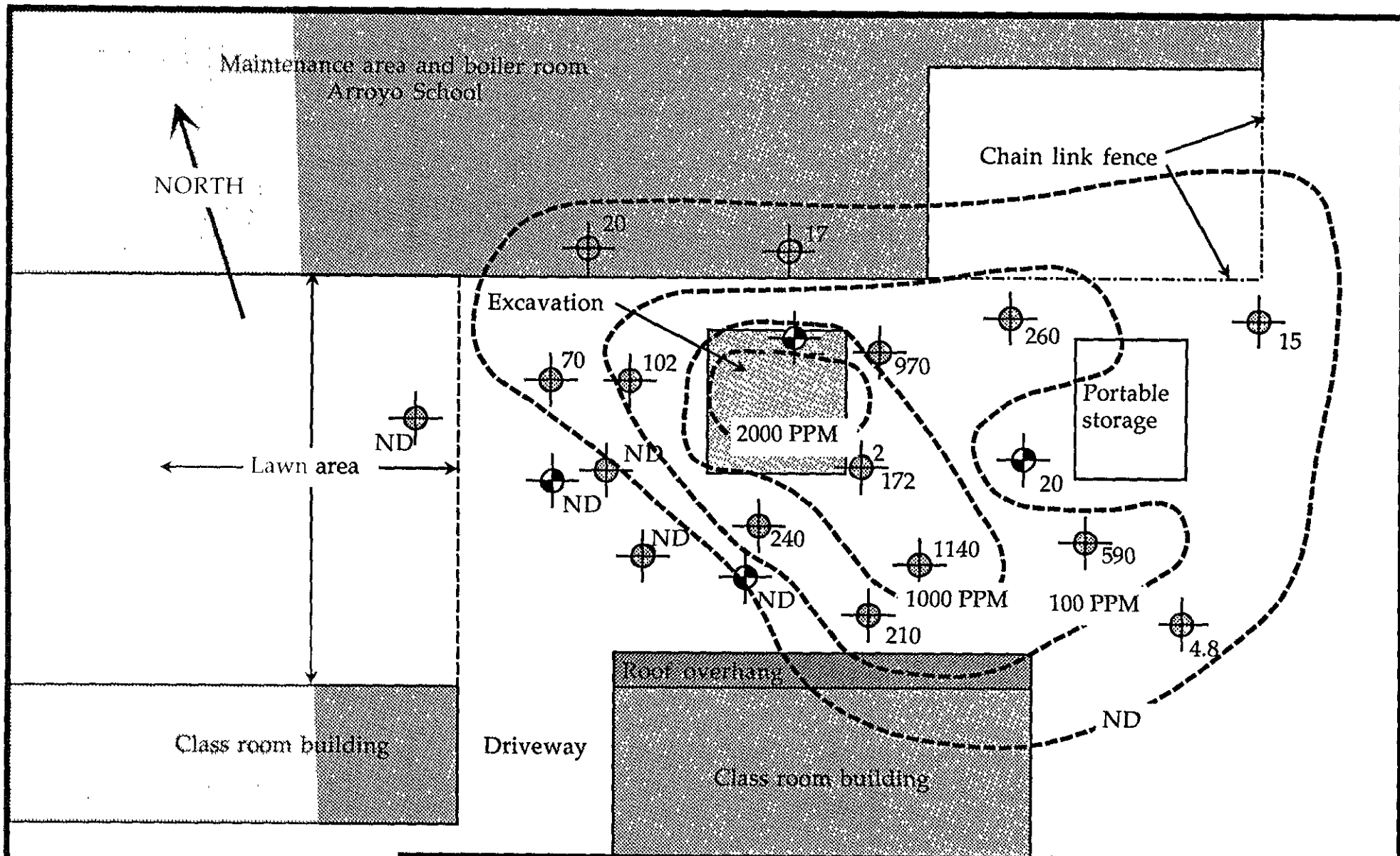


L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	Monitoring Well 4 Installation Detail	Project Number 5186
	Arroyo School San Lorenzo, California	Date: September, 1992 Figure Number 7



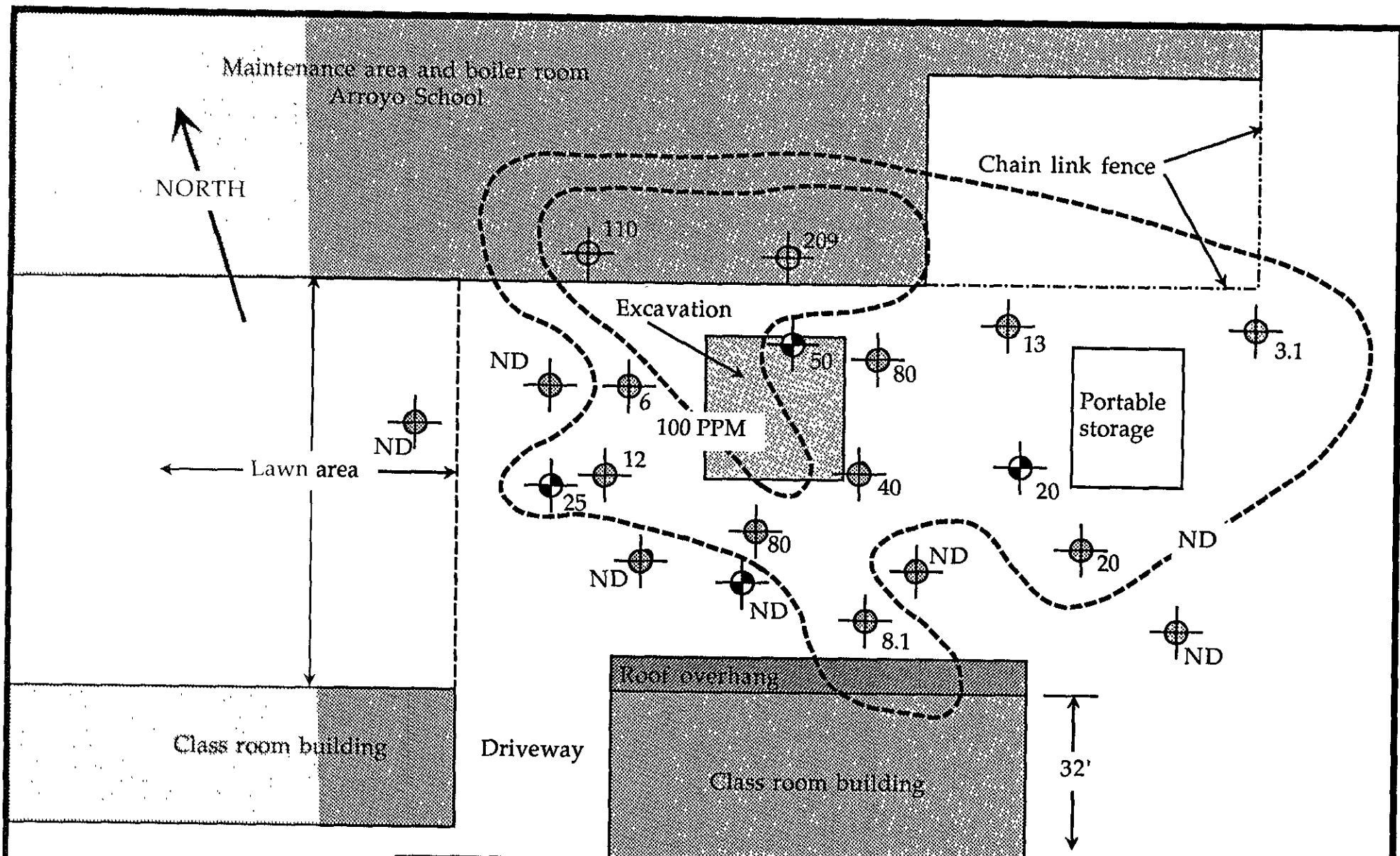
 Location of monitoring well
 Contours of equal groundwater surface elevation

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		GROUNDWATER GRADIENT September, 1992 Arroyo School San Lorenzo, California	
Project Number: 5186	By: JNC	Scale: 1" = 20'	September, 1992 Figure Number: 8



- Contours of equal TPH-D concentration in ppm
- Location of previous well and TPH-D in ppm
- Location of previous boring and TPH-D in ppm

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		EQUAL CONCENTRATION CONTOURS TPH-D at 10 feet Arroyo School San Lorenzo, California		
Project Number: 5186	By: JNC	Scale: 1" = 20'	September, 1992	Figure Number: 9



- Contours of equal TPH-D concentration in ppm
- Location of previous well and TPH-D in ppm
- Location of previous boring and TPH-D in ppm

L & W Environmental Services, Inc.		EQUAL CONCENTRATION CONTOURS	
2111 Jennings Street San Francisco, California		TPH-D at 15 feet Arroyo School San Lorenzo, California	
Project Number: 5186	By: JNC	Scale: 1" = 20'	September, 1992
			Figure Number: 10

APPENDIX B
ANALYTICAL DATA

SUMMARY REPORT

SUMMARY REPORT
ARROYO SCHOOL
15701 LORENZO AVENUE
SAN LORENZO, CALIFORNIA

L&W Project 5186
September 14, 1992

CHAIN OF CUSTODY

SAMPLERS: (Signature)

Edil Bruns

PROJECT NAME: (Print)

ARROYO HIGH SCHOOL

JOB NUMBER:

5186D

DESCRIPTION:

Quarterly Well Monitoring MW4

ADDRESS:

15701 LORENZO AVE

ANALYSIS REQUESTED

TOTAL PETROLEUM HYDROCARBONS DIESEL
BTEX
VOC - EPA 8240

TOTAL OIL AND GREASE

TETRAETHYL LEAD
EPA - 8270

METALS

REMARK

CROSS REFERENCE NUMBER

DATE

TIME

SOIL

WATER

SAMPLE LOCATION

5186D-mw4

9-11-92

1330

X

12.09 FT INTO MW4

X

X

X

3 Ltr 2 Vol

RELINQUISHED BY: (Signature)

Edil Bruns

DATE

9-11-92

TIME

11:00

RELINQUISHED BY: (Signature)

L&W STORAGE

DATE

9-14-92

TIME

18:00

RELINQUISHED BY: (Signature)

Edil Bruns
Rabinder Sidhu

DATE

9-14-92

TIME

6:00P

RELINQUISHED BY: (Signature)

Rabinder Sidhu

DATE

9/14/92

TIME

7:00PM

RELINQUISHED BY: (Signature)

Surinder Sidhu

DATE

09/15/92

TIME

8AM

RECEIVED BY: (Signature)

L&W STORAGE

DATE

9-11-92

TIME

1600

RECEIVED BY: (Signature)

Edil Bruns
Rabinder Sidhu

DATE

9-14-92

TIME

1800

RECEIVED BY: (Signature)

RECEIVED BY: (Signature)

Surinder Sidhu

DATE

9-14-92

TIME

6:00PM

RECEIVED BY: (Signature)

Kulwinder Sidhu

DATE

9/15/92

TIME

7PM

DATE

9/15/92

TIME

8AM

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (510) 222-3002

FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

Received: 09/15/92
Extraction: 09/22/92
Reported: 09/29/92
Job #: 73898

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

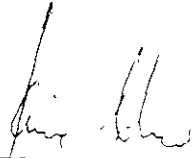
Project: Arroyo High School
15701 Lorenzo Avenue
Matrix: Water

Total Petroleum Hydrocarbon Analysis
DHS Extraction Method (LUFT)
mg/L

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Diesel</u>	<u>MDL</u>
73898-1	5186D-MW4	0.10	0.05

QA/QC: Spike Recovery: 87%

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



Jaime Chow
Laboratory Director

JC/td

Precision Analytical Laboratory, Inc.

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CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

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

Received: 09/15/92
Reported: 09/29/92
Job #: 73898

Project: Arroyo High School
15701 Lorenzo Avenue
Matrix: Water

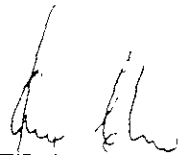
Aromatic Volatile Hydrocarbon Analysis
EPA Method 602
 $\mu\text{g/L}$

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Benzene</u>	<u>MDL</u>	<u>Toluene</u>	<u>MDL</u>
73898-1	5186D-MW4	ND<0.3	0.3	ND<0.3	0.3

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Ethyl- benzene</u>	<u>MDL</u>	<u>Xylenes</u>	<u>MDL</u>
73898-1	5186D-MW4	ND<0.3	0.3	ND<0.6	0.6

QA/QC: Spike Recovery for Benzene: 83%
Spike Recovery for Toluene: 103%
Spike Recovery for Xylenes: 92%

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



Jaime Chow
Laboratory Director

JC/td

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STATE LICENSE NO. 1150

Received: 09/15/92

Reported: 09/29/92

Job #: 73898

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

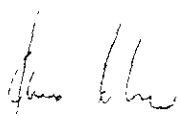
Project: Arroyo High School
15701 Lorenzo Avenue
Matrix: Water

Total Oil and Grease Analysis
EPA Method 5520B
mg/L

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Total Oil and Grease</u>	<u>MDL</u>
73898-1	5186D-MW4	ND<5	5

QA/QC: Spike Recovery: 91.7%

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



Jaime Chow
Laboratory Director

JC/td

CHAIN OF CUSTODY

SAMPLERS: (Signature) *Michael J. Kilian*
 PROJECT NAME: (Print) *Arroyo School* JOB NUMBER: *5186*
 DESCRIPTION: *Soil Samples*
 ADDRESS: *15701 Lorenzo Ave, San Lorenzo, CA.*

ANALYSIS REQUESTED		TOTAL PETROLEUM HYDROCARBONS (Diesel)	BTEX	VOC - EPA 8240	TOTAL OIL AND GREASE	TETRAETHYL LEAD	EPA - 8270	METALS	REMARKS
5186-MW4-15		X	X		X				
5186-MW4-20		X	X		X				
5186-B14-5		X	X		X				
5186-B14-10		X	X		X				
5186-B14-15		X	X		X				
5186-B15-5		X	X		X				
5186-B15-10		X	X		X				
5186-B15-15		X	X		X				
5186-B16-5		X	X		X				
5186-B16-10		X	X		X				
5186-B16-15		X	X		X				

RELINQUISHED BY: (Signature) *Michael J. Kilian*
 RELINQUISHED BY: (Signature) _____
 RELINQUISHED BY: (Signature) _____
 RELINQUISHED BY: (Signature) _____
 RELINQUISHED BY: (Signature) _____

DATE *8/11/92*
 TIME *8:30 am*
 DATE _____
 TIME _____
 DATE _____
 TIME _____
 DATE _____
 TIME _____
 DATE _____
 TIME _____

RECEIVED BY: (Signature) *Michael J. Kilian*
 RECEIVED BY: (Signature) _____
 RECEIVED BY: (Signature) _____
 RECEIVED BY: (Signature) _____
 RECEIVED BY: (Signature) _____

DATE *8/11/92*
 TIME *8:30 am*
 DATE _____
 TIME _____
 DATE _____
 TIME _____
 DATE _____
 TIME _____
 DATE _____
 TIME _____

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (510) 222-3002

FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

Received: 08/21/92
Extraction: 08/22/92
Reported: 09/02/92
Job #: 73817

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

Project: Arroyo School
15701 Lorenzo Avenue
San Lorenzo, CA

Matrix: Soil

Total Petroleum Hydrocarbon Analysis
DHS Extraction Method (LUFT)
mg/Kg

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Diesel</u>	<u>MDL</u>
73817-1	5186-MW4-15	50	10.0
73817-2	5186-MW4-20	ND<1.0	1.0
73817-3	5186-B14-5	ND<1.0	1.0
73817-4	5186-B14-10	4.8	1.0
73817-5	5186-B14-15	ND<1.0	1.0
73817-6	5186-B15-5	ND<1.0	1.0
73817-7	5186-B15-10	20	10.0
73817-8	5186-B15-15	3.1	1.0
73817-9	5186-B16-5	ND<1.0	1.0
73817-10	5186-B16-10	210	10.0
73817-11	5186-B16-15	8.1	1.0

QA/QC: Spike Recovery: 110%

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



Jaime Chow
Laboratory Director

JC/td

Precision Analytical Laboratory, Inc.

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FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

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

Received: 08/21/92
Reported: 09/02/92
Job #: 73817

Project: Arroyo School
15701 Lorenzo Avenue
San Lorenzo, CA

Matrix: Soil

Aromatic Volatile Hydrocarbon Analysis
EPA Method 8020
mg/Kg

Table with 6 columns: Lab I.D., Client I.D., Benzene, MDL, Toluene, MDL. Rows 1-6 showing data for various samples.

Table with 6 columns: Lab I.D., Client I.D., Ethylbenzene, MDL, Xylene, MDL. Rows 1-6 showing data for various samples.

QA/QC: Spike Recovery for Benzene: 108%
Spike Recovery for Toluene: 112%
Spike Recovery for Xylene: 109%

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

Signature of Jaime Chow
Jaime Chow
Laboratory Director

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

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FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

Attn: George Wilson
L & W Environmental Services, Inc.

Received: 08/21/92
Reported: 09/02/92
Job #: 73817

Project: Arroyo School
15701 Lorenzo Avenue
San Lorenzo, CA
Matrix: Soil

Aromatic Volatile Hydrocarbon Analysis
EPA Method 8020
mg/Kg

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Benzene</u>	<u>MDL</u>	<u>Toluene</u>	<u>MDL</u>
73817-7	5186-B15-10	ND<0.005	0.005	0.14	0.005
73817-8	5186-B15-15	ND<0.005	0.005	0.007	0.005
73817-9	5186-B16-5	ND<0.005	0.005	0.02	0.005
73817-10	5186-B16-10	ND<0.005	0.005	0.05	0.005
73817-11	5186-B16-15	ND<0.005	0.005	0.020	0.005

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Ethyl- benzene</u>	<u>MDL</u>	<u>Xylene</u>	<u>MDL</u>
73817-7	5186-B15-10	ND<0.005	0.005	ND<0.005	0.005
73817-8	5186-B15-15	ND<0.005	0.005	ND<0.005	0.005
73817-9	5186-B16-5	ND<0.005	0.005	ND<0.005	0.005
73817-10	5186-B16-10	ND<0.005	0.005	ND<0.005	0.005
73817-11	5186-B16-15	ND<0.005	0.005	ND<0.005	0.005

QA/QC: Spike Recovery for Benzene: 108%
Spike Recovery for Toluene: 112%
Spike Recovery for Xylene: 109%

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

Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

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CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

Received: 08/21/92

Reported: 09/02/92

Job #: 73817

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

Project: Arroyo School
15701 Lorenzo Avenue
San Lorenzo, CA

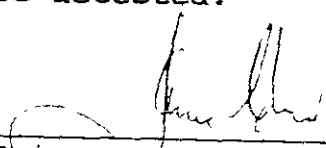
Matrix: Soil

Total Oil and Grease Analysis
EPA Method 5520E
mg/Kg

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Total Oil and Grease</u>	<u>MDL</u>
73817-1	5186-MW4-15	165	50
73817-2	5186-MW4-20	ND<50	50
73817-3	5186-B14-5	ND<50	50
73817-4	5186-B14-10	ND<50	50
73817-5	5186-B14-15	ND<50	50
73817-6	5186-B15-5	ND<50	50
73817-7	5186-B15-10	ND<50	50
73817-8	5186-B15-15	ND<50	50
73817-9	5186-B16-5	55	50
73817-10	5186-B16-10	975	50
73817-11	5186-B16-15	ND<50	50

QA/QC: Spike Recovery: 103%

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

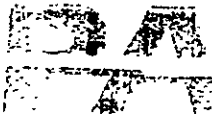

Jaime Chow
Laboratory Director

JC/td

CHAIN OF CUSTODY

SAMPLERS: (Signature) <i>[Signature]</i>					ANALYSIS REQUESTED							
PROJECT NAME: (Print) <i>LORENZO USD (ARROYO)</i>					JOB NUMBER: <i>5186D</i>							
DESCRIPTION: <i>Quarterly Ground Water Monitoring</i>					TOTAL PETROLEUM HYDROCARBONS DIESEL BTEX VOC - EPA 8240 TOTAL OIL AND GREASE TETRAETHYL LEAD EPA - 8270 METALS							
ADDRESS: <i>15701 LORENZO AVE.</i>												
CROSS REFERENCE NUMBER	DATE	TIME	SOIL	WATER	SAMPLE LOCATION	TOTAL PETROLEUM HYDROCARBONS DIESEL	BTEX	VOC - EPA 8240	TOTAL OIL AND GREASE	TETRAETHYL LEAD EPA - 8270	METALS	REMARKS
5186D-mw1	7-21-92	1125	X	X	12.02 FT INTO MW1	X	X	X				3lit 200m
5186D-mw2	7-21-92	1140	X	X	12.02 FT INTO MW2	X	X	X				3lit 200m
5186D-mw3	7-21-92	1155	X	X	12.14 FT INTO MW3	X	X	X				3lit 200m

RELINQUISHED BY: (Signature) <i>[Signature]</i>	DATE <i>7-21-92</i>	RECEIVED BY: (Signature) <i>Surinder Sidhu</i>	DATE <i>7-21-92</i>
RELINQUISHED BY: (Signature) <i>Surinder Sidhu</i>	DATE <i>08/08/92</i>	RECEIVED BY: (Signature) <i>Surinder Sidhu</i>	DATE <i>08/08/92</i>
RELINQUISHED BY: (Signature)	DATE	RECEIVED BY: (Signature)	DATE
RELINQUISHED BY: (Signature)	DATE	RECEIVED BY: (Signature)	DATE
RELINQUISHED BY: (Signature)	DATE	RECEIVED BY: (Signature)	DATE



Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (510) 222-3002

FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

Received: 08/08/92
Extraction: 08/24/92
Reported: 08/26/92
Job #: 73768

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

Project: Lorenzo Unified School District (Arroyo)
15701 Lorenzo Avenue
Matrix: Water

Total Petroleum Hydrocarbon Analysis
DHS Extraction Method (LUFT)
mg/L

Table with 4 columns: Lab I.D., Client I.D., Diesel, MDL. Rows show results for samples 73768-1, 73768-2, and 73768-3.

QA/QC: Spike Recovery: 106%

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

Handwritten signature of Jaime Chow

Jaime Chow
Laboratory Director

JC/td



Precision Analytical Laboratory, Inc.

4136 LAKESIDE DRIVE, RICHMOND, CA 94806

PHONE (510) 222-3002

FAX (510) 222-1251

CERTIFICATE OF ANALYSIS

STATE LICENSE NO. 1150

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

Received: 08/08/92
Reported: 08/26/92
Job #: 73768

Project: Lorenzo Unified School District (Arroyo)
15701 Lorenzo Avenue
Matrix: Water

Aromatic Volatile Hydrocarbon Analysis
EPA Method 602
µg/L

Table with 6 columns: Lab I.D., Client I.D., Benzene, MDL, Toluene, MDL. Rows 1-3 show data for Benzene and Toluene at various client sites.

Table with 6 columns: Lab I.D., Client I.D., Ethyl-benzene, MDL, Xylene, MDL. Rows 1-3 show data for Ethyl-benzene and Xylene at various client sites.

QA/QC: Spike Recovery for Benzene: 91%
Spike Recovery for Toluene: 103%
Spike Recovery for Xylene: 89%

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

Handwritten signature of Jaime Chow

Jaime Chow
Laboratory Director

JC/td



Precision Analytical Laboratory, Inc.

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STATE LICENSE NO. 1150

Received: 08/08/92
 Reported: 08/26/92
 Job #: 73768

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

Project: Lorenzo Unified School District (Arroyo)
 15701 Lorenzo Avenue
 Matrix: Water

Total Oil and Grease Analysis
 EPA Method 5520B
 mg/L

<u>Lab I.D.</u>	<u>Client I.D.</u>	<u>Total Oil and Grease</u>	<u>MDL</u>
73768-1	5186D-MW1	ND<5	5
73768-2	5186D-MW2	ND<5	5
73768-3	5186D-MW3	ND<5	5

QA/QC: Spike Recovery: 94%

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

Jaime Chow
 Laboratory Director

JC/td

APPENDIX C
WATER WELL FORMS

SUMMARY REPORT

SUMMARY REPORT
ARROYO SCHOOL
15701 LORENZO AVENUE
SAN LORENZO, CALIFORNIA

L&W Project 5186
September 14, 1992

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED