

AGI

TECHNOLOGIES

Quarterly Groundwater Monitoring
4300 San Pablo Avenue
Emeryville, California

May 18, 1995

Prepared for :

City of Emeryville
Redevelopment Agency
2200 Powell Street, 12th Street
Emeryville, California 94608

AGI Project No. 15,681.004.04



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ENVIRONMENTAL
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Hazardous Materials Division
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Attention: Ms. Susan L. Hugo

Project: 4300 San Pablo Avenue, Emeryville Number: 15,681.004.04

Subject: Quarterly Groundwater Monitoring

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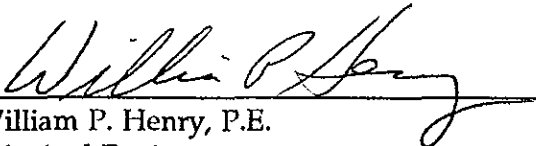
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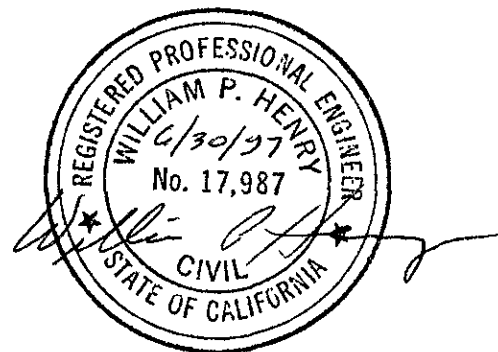
City of Emeryville
Redevelopment Agency
2200 Powell Street, 12th Floor
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QUARTERLY GROUNDWATER MONITORING
4300 SAN PABLO AVENUE
EMERYVILLE, CALIFORNIA

May 18, 1995

by


William P. Henry, P.E.
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1.0 INTRODUCTION

1.1 GENERAL

This report describes the actions conducted during quarterly groundwater monitoring performed by AGI Technologies (AGI) on behalf of the City of Emeryville Redevelopment Agency (Agency), at 4300 San Pablo Avenue in Emeryville, California. Our scope of services consisted of purging and sampling four monitoring wells, monitoring groundwater levels in seven monitoring wells, analyzing groundwater samples for petroleum hydrocarbons, determining the direction of groundwater flow, and reporting the results. AGI presented a Work Plan dated May 9, 1994 to the Alameda County Health Care Services Agency (ACHCSA) to perform the above services. The Work Plan was approved by the ACHCSA in a letter dated June 1, 1994.

The Work Plan was based upon information from the following sources:

- Correspondence from Subsurface Consultants Inc. (SCI) dated March 1, May 24, June 23, and September 22, 1993.
- A letter from the ACHCSA dated August 6, 1993.
- Data gathered during the installation of upgradient well MW7 on March 3, 1994.
- Our understanding of local, state, and federal laws and regulations.

The Work Plan also included a Health and Safety Plan (HASP) to address personnel and public safety during performance of work at the site.

1.2 BACKGROUND

The site is located at the northeast corner of the intersection of San Pablo Avenue and 43rd Street in Emeryville, California, as shown on Figure 1, Vicinity Map, and Figure 2, Site Plan. The site is bounded by residential property to the east, a U. S. Post Office to the north, San Pablo Avenue to the west, and 43rd Street to the south. The site is currently used for vehicle parking.

The site was formerly occupied by service stations from about 1926 to 1966, and a car wash from about 1969 to 1990. After 1936, the service station had four 550-gallon gasoline underground storage tanks (USTs), which were removed prior to 1990. The removed USTs were located beneath the sidewalks along San Pablo Avenue (2) and 43rd Street (2).

Soil samples were obtained by others from the native soil/tank backfill interface at the former UST locations and analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and diesel (TPH-D); and benzene, ethylbenzene, toluene, and xylenes (BETX). TPH-G and TPH-D concentrations in soil samples from the former UST locations along San Pablo Avenue ranged up to 57 mg/kg. TPH-G and TPH-D concentrations in soil samples from the 43rd

Street UST locations ranged up to 490 mg/kg. As part of remediation efforts by others, approximately 250 cubic yards (cy) of contaminated soil were removed from the 43rd Street location. Soil was excavated to a clean-up level of 300 mg/kg. The contaminated excavated soil was remediated by solid phase treatment to TPH-G and TPH-D concentrations less than 1 mg/kg. Approximately one-third of the remediated soil was reused as backfill on-site. The rest was disposed of at a Class III landfill. Prior to backfilling, about 2,500 gallons of contaminated water was removed from the excavation and disposed of off-site.

Six groundwater monitoring wells were installed by others at the site and monitored intermittently since June 1990. Contaminant concentrations in water samples from the wells have ranged as follow: TPH-G, <0.05 to 1.8 mg/L; TPH-D, <0.05 to 2.8 mg/L; benzene, <0.5 to 5.3 ug/L; ethylbenzene, <0.5 to 3.2 ug/L; toluene, <0.5 to 3.9 ug/L, and xylenes; <0.5 to 6.9 ug/L. The depth to groundwater has ranged from approximately 3 to 11 feet below ground surface. The direction of groundwater flow has been consistently to the northwest. Prior to the June 30, 1994 monitoring event, AGI installed an additional well (MW7) to assess upgradient conditions.

2.0 FIELD EXPLORATION AND MONITORING

2.1 PURPOSE

The purposes of our services include the following:

- Monitoring groundwater levels and gradient direction.
- Monitoring groundwater quality at the site.
- Determining appropriate remedial action, if necessary, based upon the results of monitoring.

2.2 SCOPE OF SERVICES

Our specific scope of services includes the following:

- Monitoring groundwater levels in seven monitoring wells.
- Collecting and analyzing groundwater samples from four wells (MW4, MW5, MW6, and MW7) on a quarterly basis for one year.
- Preparing quarterly reports documenting groundwater monitoring procedures, and results of sample analyses. The reports include analytical test data, chain-of-custody documentation, and a site plan indicating the groundwater flow direction. Recommendations based upon the data collected during quarterly monitoring are to be presented in the final quarterly report.

2.3 GROUNDWATER MONITORING

2.3.1 Elevation Survey

On July 25, 1994, AGI performed a level survey to establish top of casing elevations for the new and existing monitoring wells. A fire hydrant located on the northeast corner of San Pablo Avenue and 43rd Street was used as the datum point for the survey. All monitoring well elevations are referenced to the fire hydrant which is assumed to be 100.00 feet above Mean Sea Level.

2.3.2 Groundwater Elevations and Sample Collection

Prior to sampling, the groundwater level in each of the seven monitoring wells was measured to a precision of 0.01 feet using an electronic water level indicator. Positive pressure was noted in MW1 and MW6 upon removal of the well caps. Prior to measuring

groundwater levels in these two wells, we allowed water levels to equilibrate to static level. Prior to each measurement, the portion of the water level indicator that was submerged in the well was cleaned with a mild detergent solution and rinsed with de-ionized water. Groundwater contours calculated from the data are presented on Figure 2. Historical groundwater elevations for wells at the site are summarized in Table 1.

Groundwater samples were collected on March 25, 1995 from monitoring wells MW4, MW5, MW6, and MW7. Prior to sampling, the groundwater was visually inspected to assess the presence of floating product. AGI attempted to purge a minimum of three well volumes from each well prior to sampling. The four monitoring wells dried prior to purging three well volumes, and were allowed to recharge prior to sampling. During purging the discharge water from each well was measured for pH, temperature, and electrical conductivity. Samples were collected from the four wells, using clean disposable polyethylene bailers and decanted into clean 40-milliliter glass vials and 1-liter glass bottles. Groundwater sampling procedures are described in Appendix B.

2.3.3 Sample Handling and Analytical Testing

Groundwater samples were placed in the appropriate containers for the analytical tests performed. All samples were placed on "blue ice" in a cooler, and kept cool until delivery to the analytical laboratory. Sample handling was documented using Chain-of-Custody records. Copies of the Chain-of-Custody records are included in Appendix C.

The samples were submitted to Chromalab, Inc., a California Department of Health Services certified analytical laboratory. The samples were analyzed for TPH-D and TPH-G (EPA 8015 modified), and BETX (EPA 8020).

Results indicate the presence of gasoline-range hydrocarbons and BETX in samples collected from MW5. No TPH-D was detected in any of the samples collected. No TPH-G or BETX were detected in samples collected from MW4, MW6, and MW7. Table 2 presents a summary of analytical results. A copy of the analytical report is presented in Appendix C.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Water levels in all seven monitoring wells exhibited a rise, ranging from 0.38 feet at MW4 to 2.32 feet at MW6, since the December 1994 monitoring event. Water levels in wells MW1 through MW6 decreased between the April, 1993 and September 1994 monitoring events, but have increased in the subsequent two events. The water level in MW7 has risen since the June 1994 monitoring event. During the June 1994 event, a groundwater high point was detected in the vicinity of MW1. This high point was not present during the subsequent three quarterly monitoring events, and appears to have been a temporary condition. During the December 1994 monitoring event, an apparent groundwater ridge was detected in the vicinity of MW2, MW3, and MW4, and a groundwater low point was detected in the vicinity of MW5. The apparent ridge was also present during the March 1995 monitoring event.

The general direction of groundwater flow across the site was to the southwest. The December 1994 and March 1995 monitoring events occurred immediately following periods of heavy precipitation. The potential deviation in the vicinity of MW5 during these two events may be due to a temporary response to the heavy precipitation.

Results of groundwater monitoring in December 1994 indicate the presence of gasoline-range hydrocarbons in groundwater near the former UST locations at the west side of the site. For the second consecutive monitoring event, no diesel-range hydrocarbons were detected in the samples collected. No hydrocarbons were detected in samples collected from the upgradient (MW7) or downgradient (MW6) monitoring wells. The results comprise a general decrease or steady state condition from concentrations detected during previous monitoring events. Data from previous events indicate that some source material may remain at the site.

The following is a summary of current conditions at the site:

- MW1: Petroleum hydrocarbons were present in samples collected during each of six monitoring events performed between June 1990 and April 1993. Diesel concentrations ranged from 0.32 mg/l (April 1993) to 1.90 mg/l (June 1990). Gasoline concentrations ranged from 0.15 mg/l (December 1991) to 1.00 mg/l (April 1993). BETX concentrations ranged from below the laboratory reporting limit to 0.0069 mg/l xylenes (January 1993).
- MW2: Petroleum hydrocarbons were present in samples collected during the two monitoring events performed (June 1990 and December 1990). Diesel was detected at 2.80 mg/l in June 1990. Samples collected in December 1990 were not analyzed for diesel. Gasoline was detected at concentrations of 1.80 mg/l (June 1990) and 1.60 mg/l (December 1990). BETX concentrations ranged from below the laboratory reporting limits to 0.0038 xylenes (December 1990).
- MW3: Ethylbenzene was detected at the laboratory reporting limit during the June 1990 monitoring event. No petroleum hydrocarbons were detected during the December 1990 event. This well has not been sampled since 1990.

- MW4: No diesel has been detected in samples collected for the past two quarterly monitoring events. Diesel was detected in the preceding five events, at concentrations ranging from 0.09 mg/l (September 1994) to 0.66 mg/l (June 1994). No gasoline has been detected during the past four quarterly monitoring events. Gasoline was detected in two of the four preceding events, at 0.30 mg/l (December 1990) and 0.5 mg/l (April 1993). Benzene and ethylbenzene have not been detected during the past four events. Benzene was detected only once during the past eight events, at 0.001 mg/l (April 1993). Ethylbenzene was detected only twice during the past eight events, at 0.0006 mg/l (December 1990) and 0.0021 mg/l (April 1993). No toluene or xylenes were detected during three of the past four quarterly monitoring events. Toluene and xylenes concentrations detected during the December 1994 were only slightly above the laboratory reporting limits.
- MW5: No diesel has been detected in samples collected for the past two quarterly monitoring events. Diesel was detected in the preceding six events, at concentrations ranging from 0.12 mg/l (September 1994) to 0.77 mg/l (June 1994). Gasoline has been detected during each monitoring event since December 1990. Benzene and toluene concentrations have been below the laboratory reporting limits for four of the past five quarterly monitoring events. Concentrations of BETX detected have ranged from below the laboratory reporting limits (benzene: 6 of 9 events; toluene: 5 of 9 events) to 0.0065 mg/l xylenes (January 1993). Current petroleum hydrocarbon concentrations are within the historical range detected, with increases and decreases occurring between December 1990 and March 1995.
- MW6: No petroleum hydrocarbons have been detected in samples collected for the past four quarterly monitoring events. Concentrations of diesel and BETX detected during previous monitoring events were at or slightly above the laboratory reporting limits.
- MW7: No petroleum hydrocarbons have been detected in samples collected since March 11, 1994. This well was not present during previous monitoring events.

Based upon the information contained in this report, we believe no immediate remedial action is required at the site. Continued monitoring may be necessary to further evaluate contaminants detected during the past four quarterly monitoring events and their migration potential. We recommend the monitoring requirements be modified to include the following:

- Monitoring of MW1 and MW2 on an annual basis (quarterly for groundwater level), including collection and analysis of samples for diesel, gasoline, and BETX. If monitoring indicates no significant change in hydrocarbon concentrations since the previous monitoring events, no additional monitoring should be performed.
- Monitoring of groundwater levels in MW3 on a quarterly basis. No sample collection or analysis.

- Monitoring of MW4 and MW5 on a semi-annual basis (quarterly for groundwater level), including collection and analysis of samples at MW4 for diesel, and at MW5 for diesel, gasoline, and BETX. If monitoring indicates no significant change in hydrocarbon concentrations since the previous monitoring events, no additional monitoring should be performed.
- Monitoring of groundwater levels in MW6 and MW7 on a quarterly basis. No sample collection or analysis.

If monitoring indicates significant contaminant concentration increases or evidence of migration, alternative actions would be evaluated to address site conditions. If no indication of contaminant concentration increases or evidence of migration is detected, we believe no remediation would be necessary at the site, and further reduction in monitoring requirements would be appropriate. If no evidence of migration or contaminant concentration increases are detected, following a two-year period using the above monitoring scope, we believe no further monitoring should be required, and the site be given "no further action" status.

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Quality Assurance/Technical Review

by:



John B. Adams
Environmental Scientist

TABLES

Table 1
Groundwater Elevation Monitoring Data

4300 San Pablo Avenue
Emeryville, California

Monitoring Well	Measurement Date	Groundwater Elevation Monitoring Data		
		Field Measurement Data		Groundwater Elevation (feet)
		DTW Below TOC (feet)	TOC Elevation*	
MW1	06/06/90	5.33	101.13	95.80
	06/11/90	5.52	101.13	95.61
	06/18/90	5.50	101.13	95.63
	06/22/90	6.18	101.13	94.95
	06/29/90	6.50	101.13	94.63
	10/30/90	9.10	101.13	92.03
	12/11/90	7.18	101.13	93.95
	12/26/90	7.90	101.13	93.23
	01/02/91	8.27	101.13	92.86
	07/10/91	8.00	101.13	93.13
	09/13/91	9.16	101.13	91.97
	12/24/91	7.29	101.13	93.84
	01/27/93	3.60	101.13	97.53
	04/30/93	5.14	101.13	95.99
	06/30/94	5.91	98.67	92.76
	09/23/94	8.00	98.67	90.67
	12/24/94	6.95	98.67	91.72
03/25/95	5.53	98.67	93.14	
MW2	06/06/90	7.15	101.49	94.34
	06/11/90	6.98	101.49	94.51
	06/18/90	7.04	101.49	94.45
	06/22/90	7.60	101.49	93.89
	06/29/90	9.96	101.49	91.53
	10/30/90	10.66	101.49	90.83
	12/11/90	9.88	101.49	91.61
	12/26/90	9.19	101.49	92.30
	01/02/91	9.65	101.49	91.84
	07/10/91	9.40	101.49	92.09
	09/13/91	NM	101.49	NM
	12/24/91	9.19	101.49	92.30
	01/27/93	4.84	101.49	96.65
	04/30/93	6.74	101.49	94.75
	06/30/94	7.29	99.00	91.71
	09/23/94	9.21	99.00	89.79
	12/24/94	5.59	99.00	93.41
03/25/95	4.21	99.00	94.79	
MW3	06/06/90	6.22	100.20	93.98
	06/11/90	6.50	100.20	93.70
	06/18/90	6.49	100.20	93.71
	06/22/90	7.11	100.20	93.09
	06/29/90	9.34	100.20	90.86
	10/30/90	10.11	100.20	90.09
	12/11/90	9.36	100.20	90.84
	12/26/90	9.00	100.20	91.20
	01/02/91	9.28	100.20	90.92
	07/10/91	8.94	100.20	91.26
	09/13/91	9.93	100.20	90.27
	12/24/91	9.02	100.20	91.18
	01/27/93	3.90	100.20	96.30
	04/30/93	5.85	100.20	94.35
	06/30/94	7.80	97.77	89.97
	09/23/94	8.65	97.77	89.12
	12/24/94	5.45	97.77	92.32
03/25/95	3.21	97.77	94.56	

Table 1 (cont.)
Groundwater Elevation Monitoring Data
 4300 San Pablo Avenue
 Emeryville, California

Monitoring Well	Measurement Date	Groundwater Elevation Monitoring Data		
		Field Measurement Data		Groundwater Elevation (feet)
		DTW Below TOC (feet)	TOC Elevation*	
MW4	12/26/90	6.93	100.25	93.32
	01/02/91	7.31	100.25	92.94
	07/10/91	7.12	100.25	93.13
	09/13/91	8.53	100.25	91.72
	12/24/91	6.70	100.25	93.55
	01/27/93	3.29	100.25	96.96
	04/30/93	4.74	100.25	95.51
	06/30/94	6.12	97.80	91.68
	09/23/94	7.57	97.80	90.23
	12/24/94	4.20	97.80	93.60
	03/25/95	3.82	97.80	93.98
MW5	12/26/90	7.74	99.54	91.80
	01/02/91	7.95	99.54	91.59
	07/10/91	6.48	99.54	93.06
	09/13/91	7.07	99.54	92.47
	12/24/91	9.65	99.54	89.89
	01/27/93	4.80	99.54	94.74
	04/30/93	5.21	99.54	94.33
	06/30/94	6.48	97.08	90.60
	09/23/94	7.68	97.08	89.40
	12/24/94	7.17	97.08	89.91
	03/25/95	6.52	97.08	90.56
MW6	12/26/90	9.20	99.26	90.06
	01/02/91	9.40	99.26	89.86
	07/10/91	8.66	99.26	90.60
	09/13/91	9.95	99.26	89.31
	12/24/91	9.61	99.26	89.65
	01/27/93	5.17	99.26	94.09
	04/30/93	5.92	99.26	93.34
	06/30/94	7.31	96.82	89.51
	09/23/94	9.13	96.82	87.69
	12/24/94	5.77	96.82	91.05
	03/25/95	3.45	96.82	93.37
MW7	03/11/94	6.44	99.76	93.32
	06/30/94	8.52	99.76	91.24
	09/23/94	6.35	99.76	93.41
	12/24/94	5.74	99.76	94.02
	03/25/95	4.18	99.76	95.58

Notes:

- * - 06/06/90 through 04/30/93: Elevation reference was top of curb at fire hydrant on 43rd Street.
- 06/30/94: Elevation reference was top of hydrant in sidewalk at NE corner of 43rd/San Pablo intersection.
- DTW - Depth to water.
- TOC - Top of monitoring well casing (data beginning 3/11/94 is based upon 7/25/94 resurveyed TOC elevations).
- NM - Not measured.

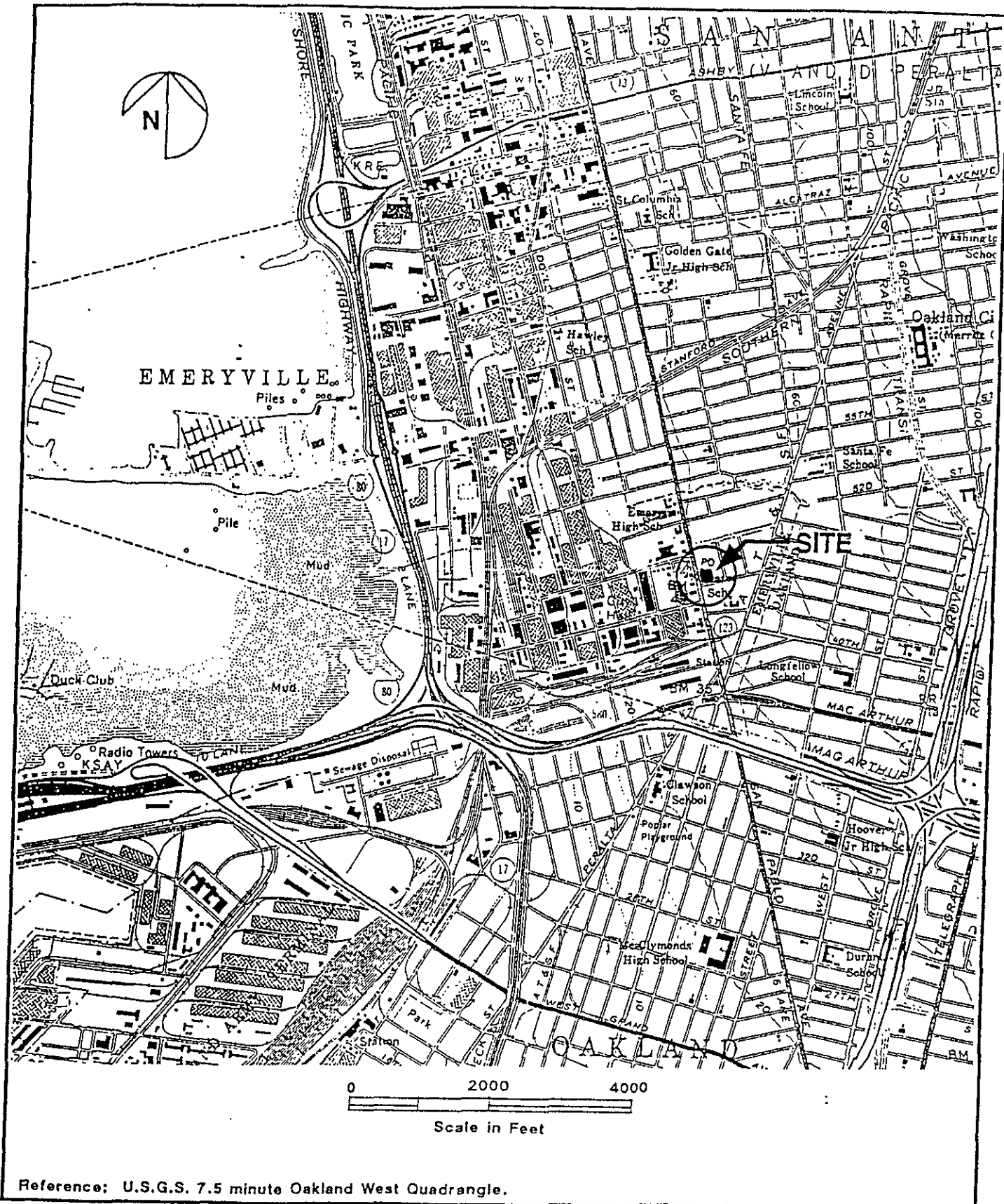
Table 2
Summary of Chemical Analyses - Groundwater
 4300 San Pablo Avenue
 Emeryville, California

Sample ID	Date Sampled	EPA METHOD					
		8015 MODIFIED		8020			
		TPH-D (mg/l)	TPH-G (mg/l)	B (mg/l)	E (mg/l)	T (mg/l)	X (mg/l)
MW1	06/11/90	1.90	0.94	0.0053	0.0018	0.0018	0.0019
	12/11/90	NA	0.26	0.0005	<0.0005	0.0008	0.0007
	09/13/91	0.38	0.33	<0.0005	0.0005	0.0018	0.0022
	12/24/91	0.41	0.15	<0.0005	<0.0005	<0.0005	<0.0005
	01/27/93	0.40	0.94	0.0030	0.0021	0.0039	0.0069
	04/30/93	0.32	1.00	0.0019	0.0019	0.0005	0.0044
MW2	06/11/90	2.80	1.80	<0.0005	0.0005	<0.0005	<0.0005
	12/11/90	NA	1.60	0.0030	0.0021	0.0025	0.0038
MW3	06/11/90	<0.05	<0.05	<0.0005	0.0005	<0.0005	<0.0005
	12/11/90	NA	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW4	12/10/90	NA	0.30	<0.0005	0.0006	0.0011	0.0013
	09/13/91	0.18	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	12/24/91	0.65	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	04/30/93	0.35	0.5	0.0010	0.0021	<0.0005	0.0035
	06/30/94	0.66	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	09/23/94	0.09	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	12/24/94	<0.05	<0.05	<0.0005	<0.0005	0.0007	0.0009
	03/25/95	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW5	12/10/90	NA	0.42	<0.0005	0.0015	<0.0005	0.0028
	09/16/91	0.20	1.20	0.0006	0.0023	0.0033	0.0051
	12/24/91	0.82	0.66	<0.0005	0.0015	0.0010	0.0032
	01/27/93	0.49	0.77	0.0012	0.0032	0.0018	0.0065
	04/30/93	0.45	0.93	<0.0005	0.0020	<0.0005	0.0020
	06/30/94	0.77	0.62	<0.0005	0.0014	<0.0005	0.0019
	09/23/94	0.12	0.31	<0.0005	0.0019	<0.0005	0.0024
	12/24/94	<0.05	0.20	<0.0005	0.0005	<0.0005	0.0011
	03/25/95	<0.05	0.44	0.0005	0.0016	0.0006	0.0019
MW6	12/11/90	NA	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	09/13/91	0.11	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	12/24/91	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	01/27/93	0.06	<0.05	0.0007	0.0007	0.0019	0.0031
	04/30/93	0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	06/30/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	09/23/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	12/24/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	03/25/95	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
MW7	03/11/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	06/30/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	09/23/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	12/24/94	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
	03/25/95	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.0005
Laboratory Reporting Limit		0.05	0.05	0.0005	0.0005	0.0005	0.0005

Notes:

- TPH-D - Total petroleum hydrocarbons quantified as diesel fuel.
- TPH-G - Total petroleum hydrocarbons quantified as gasoline.
- B - Benzene.
- E - Ethylbenzene.
- T - Toluene.
- X - Total xylenes.
- NA - Not analyzed.

FIGURES

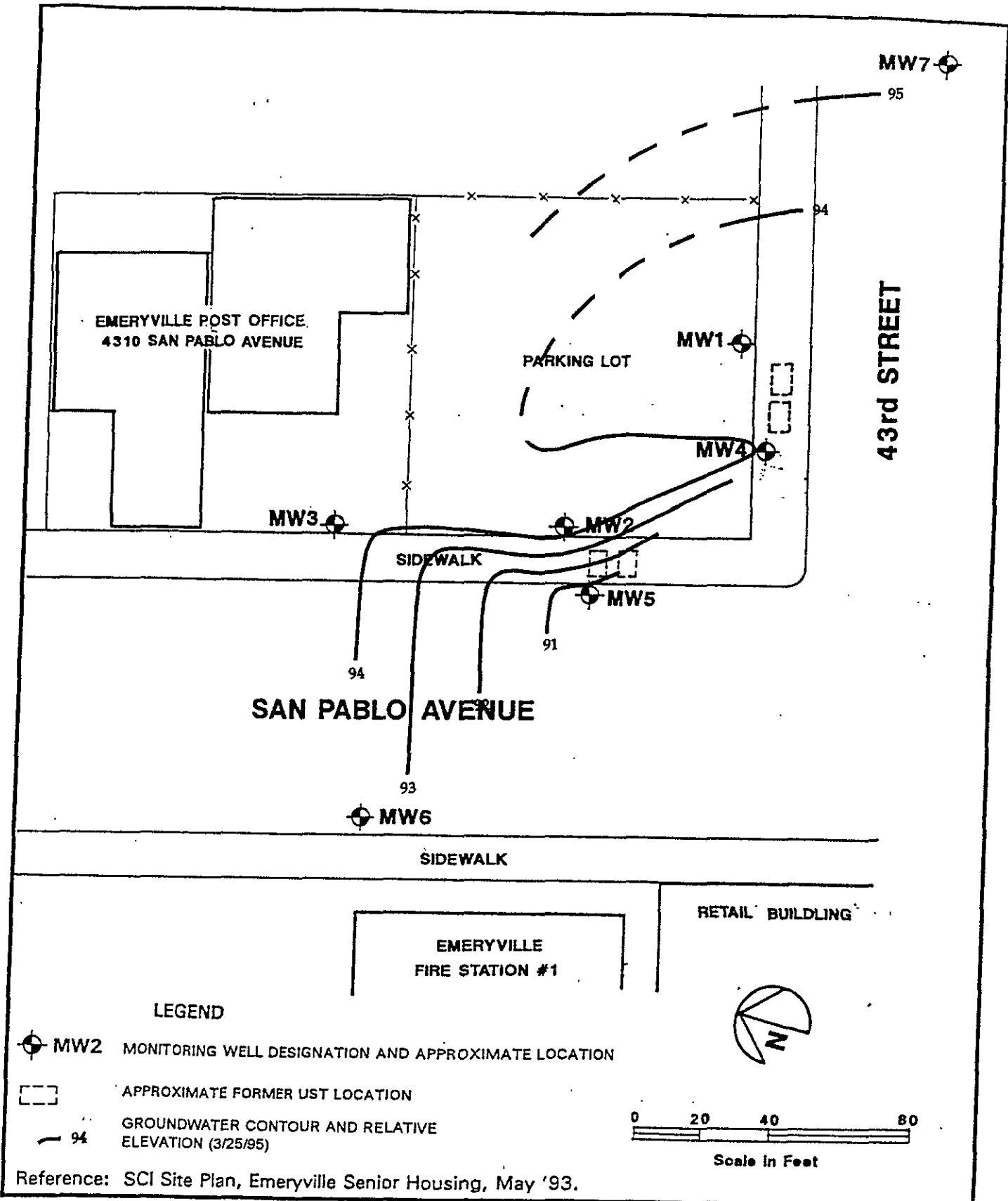


AGI
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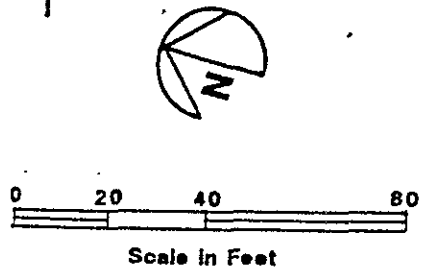
Vicinity Map
Emeryville Redevelopment Agency
4300 San Pablo Avenue
Emeryville, California

FIGURE
1

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,681.004.04	DH				



- LEGEND**
- MW2 MONITORING WELL DESIGNATION AND APPROXIMATE LOCATION
 - APPROXIMATE FORMER UST LOCATION
 - 94 GROUNDWATER CONTOUR AND RELATIVE ELEVATION (3/25/95)



Reference: SCI Site Plan, Emeryville Senior Housing, May '93.

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Site Plan
Emeryville Redevelopment Agency/
4300 San Pablo Avenue
Emeryville, California

FIGURE
2

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,681.004.04	DH				

APPENDIX A

FIELD EXPLORATION DATA

GROUNDWATER SAMPLING RECORD

Applied Geotechnology Inc.

WELL NO. Mw4

SAMPLE NO. Mw4

Project Emeryville / 4300 San Pablo Date 3-25-95
 Project No. 15681.004 Sampled By JSA
 Location Emeryville Reviewed By _____

PURGING	Depth to Water: <u>3.82 / TD = 20.0</u>		Time: <u>11:20</u>					
	Water Volume in Casing: <u>2.8</u>		Water Volume in Sand Pack: <u>—</u>					
	Volume Purged: <u>5.0</u>		Purged Time (from/to): <u>1200-1205</u>					
	Purging Method: <u>Centrifugal Suction</u>		Purge Volume Measurement Method: <u>BUCKET</u>					
	Parameter Monitoring (pH, Conductivity, Temperature):							
	TIME	CUMULATIVE VOLUME (gal)	READING <u>TEMP</u>	TIME	CUMULATIVE VOLUME (gal)	READING <u>EC</u>	TIME	CUMULATIVE VOLUME (gal)
1203	3.0	61.5			835.			7.30
1205	5.0	62.3			812.			7.38
DRY @ 5.0 gal.								

SAMPLING	Sampling Method: <u>Bailer</u>		Time Sampled: <u>12:20</u>		
	SAMPLE CONTAINER	PRESERVED BY	AT WHAT pH	FILTER TYPE	COOLED BY
	<u>3 x 40ml VOA</u>	<u>HCL</u>	<u>< 2</u>	—	<u>BLUE ICE</u>
<u>2 x 1L GLASS- Amber</u>	<u>NP</u>	—	—	" "	

SAMPLE DATA	Appearance/Odor: <u>CLOUDY / NONE</u>	
	pH (last stabilized) <u>7.38</u>	Temperature (°C): <u>°F 62.3</u>
	Eh (millivolts)	Conductivity (micromhos/cm): <u>812.</u>
	Other:	

DISPOSITION	Chain of Custody (yes/no):		Chain of Custody No.: <u>21181</u>		
	Duplicate Sample No.:		Replicate Sample Nos.:		
	ANALYTIC LAB	Lab Name: <u>CHROMALAB INC.</u>		Date Sent to Lab: <u>3-27-95</u>	
		Shipment Method: <u>HAND</u>			
	SPLIT WITH	Name(s):			
Organization(s):					
Other:					

Comments: _____

GROUNDWATER SAMPLING RECORD

Applied Geotechnology Inc.

WELL NO. MWS

SAMPLE NO. MWS

Project <u>Emeryville / 4300 San Pablo</u>	Date <u>3-25-95</u>
Project No. <u>15681.004</u>	Sampled By <u>FBA</u>
Location <u>Emeryville</u>	Reviewed By _____

PURGING	Depth to Water: <u>6.52 / TD = 20.0</u>		Time: <u>10:55</u>						
	Water Volume in Casing: <u>2.4</u>		Water Volume in Sand Pack: <u>—</u>						
	Volume Purged: <u>5.0</u>		Purged Time (from/to): <u>1238-1242</u>						
	Purging Method: <u>Centrifugal Suction</u>		Purge Volume Measurement Method: <u>BUCKET</u>						
	Parameter Monitoring (pH, Conductivity, Temperature):								
	TIME	CUMULATIVE VOLUME (gal)	READING TEMP	TIME	CUMULATIVE VOLUME (gal)	READING EC	TIME	CUMULATIVE VOLUME (gal)	READING pH
	1240	2.5	54.7			685.			7.57
	1242	5.0	53.9			670.			7.61
		<u>7.8</u>		<u>DR 7 @ 5:09 AM</u>					

SAMPLING	Sampling Method: <u>BAILER</u>		Time Sampled: <u>1255</u>		
	SAMPLE CONTAINER	PRESERVED BY	AT WHAT pH	FILTER TYPE	COOLED BY
	<u>3 x 40ml VOA</u>	<u>HCL</u>	<u>22</u>	<u>—</u>	<u>BLUE ICE</u>
	<u>2 x 1L Amb-Gl</u>	<u>AP</u>	<u>—</u>	<u>—</u>	<u>↓</u>

SAMPLE DATA	Appearance/Odor: <u>CLOUDY / NONE</u>	
	pH (last stabilized) <u>7.61</u>	Temperature (°C): <u>°F 53.9</u>
	Eh (millivolts)	Conductivity (micromhos/cm): <u>670.</u>
	Other:	

DISPOSITION	Chain of Custody (<input checked="" type="checkbox"/> yes / no):		Chain of Custody No.: <u>21181</u>		
	Duplicate Sample No.:		Replicate Sample Nos.:		
	ANALYTIC LAB	Lab Name: <u>CHROMALAB INC.</u>		Date Sent to Lab: <u>3-27-95</u>	
		Shipment Method: <u>HAND</u>			
	SPLIT WITH	Name(s):			
		Organization(s):			
Other:					

Comments: _____

GROUNDWATER SAMPLING RECORD

Applied Geotechnology Inc.

WELL NO. MW6

SAMPLE NO. MW6

Project <u>Emeryville / 4300 San Pablo</u>	Date <u>3-25-95</u>
Project No. <u>15681.004</u>	Sampled By <u>JBA</u>
Location <u>Emeryville</u>	Reviewed By _____

PURGING	Depth to Water: <u>3.45 / TP-20.</u>		Time: <u>11:15</u>	
	Water Volume in Casing: <u>2.9</u>		Water Volume in Sand Pack: <u>—</u>	
	Volume Purged: <u>8.0</u>		Purged Time (from/to): <u>1318-1322</u>	
	Purging Method: <u>Centrifugal Suction</u>		Purge Volume Measurement Method: <u>BUCKET</u>	
	Parameter Monitoring (pH, Conductivity, Temperature):			

TIME	CUMULATIVE VOLUME (gal)	READING TEMP	TIME	CUMULATIVE VOLUME (gal)	READING EC	TIME	CUMULATIVE VOLUME (gal)	READING pH
1320	3.0	65.6			947.			7.85
1321	6.0	66.2			982.			7.58
1322	8.0	66.5			959.			7.58
<u>DRY @ 8.0 gal</u>								

SAMPLING	Sampling Method: <u>Bailer</u>		Time Sampled: <u>1340</u>		
	SAMPLE CONTAINER	PRESERVED BY	AT WHAT pH	FILTER TYPE	COOLED BY
	<u>3x 40ml VOA</u>	<u>HCL</u>	<u><2</u>	<u>—</u>	<u>BLUE ICE</u>

SAMPLE DATA	Appearance/Odor: <u>CLEAR / NONE</u>	
	pH (last stabilized) <u>7.58</u>	Temperature (°C): <u>°F 66.5</u>
	Eh (millivolts)	Conductivity (micromhos/cm): <u>959.</u>
	Other:	

DISPOSITION	Chain of Custody (<u>yes</u>) / no):		Chain of Custody No.: <u>21181</u>		
	Duplicate Sample No.:		Replicate Sample Nos.:		
	ANALYTIC LAB	Lab Name: <u>CHROMALAB INC.</u>		Date Sent to Lab: <u>3-27-95</u>	
		Shipment Method: <u>HAND</u>			
	SPLIT WITH	Name(s):			
	Organization(s):				
Other:					

Comments: _____

GROUNDWATER SAMPLING RECORD

Applied Geotechnology Inc.

WELL NO. MW7

SAMPLE NO. MW7

Project <u>EMERYVILLE / 4300 San Pablo</u>	Date <u>3-25-95</u>
Project No. <u>15681-004.04</u>	Sampled By <u>JDA</u>
Location <u>EMERYVILLE</u>	Reviewed By _____

PURGING	Depth to Water: <u>4.18 / TD = 15.0</u>		Time: <u>1124</u>					
	Water Volume in Casing: <u>1.9</u>		Water Volume in Sand Pack: <u>—</u>					
	Volume Purged: <u>4.0</u>		Purged Time (from/to): <u>1130-1136</u>					
	Purging Method: <u>CENTRIFUGAL SUCTION</u>		Purge Volume Measurement Method: <u>BUCKET</u>					
	Parameter Monitoring (pH, Conductivity, Temperature):							
	TIME	CUMULATIVE VOLUME (gal)	READING TEMP	TIME	CUMULATIVE VOLUME (gal)	READING EC	TIME	CUMULATIVE VOLUME (gal)
1133	2.0	64.9			2800.			8.02
1136	4.0	65.2			2620.			7.92
	<u>6.0</u>		<u>DRY @ 4.0 gal.</u>					

SAMPLING	Sampling Method: <u>BAILER</u>		Time Sampled: <u>1150</u>		
	SAMPLE CONTAINER	PRESERVED BY	AT WHAT pH	FILTER TYPE	COOLED BY
	<u>3x 40mL VOA</u>	<u>HCL</u>	<u>< 2</u>	<u>—</u>	<u>BLUE ICE</u>
	<u>2x 1L Amb-Glass</u>	<u>NP</u>	<u>—</u>	<u>—</u>	<u>↓ ↓</u>

SAMPLE DATA	Appearance/Odor: <u>CLEAR / NONE</u>	
	pH (last stabilized) <u>7.92</u>	Temperature (°C): °F <u>65.2</u>
	Eh (millivolts)	Conductivity (micromhos/cm): <u>2620.</u>
	Other:	

DISPOSITION	Chain of Custody (<u>yes</u>) no: _____		Chain of Custody No.: <u>21181</u>		
	Duplicate Sample No.: _____		Replicate Sample Nos.: _____		
	ANALYTIC LAB	Lab Name: <u>CHROMALAB INC</u>		Date Sent to Lab: <u>3/27/95</u>	
		Shipment Method: <u>LAND</u>			
	SPLIT WITH	Name(s): _____ Organization(s): _____			
Other: _____					

Comments: _____

APPENDIX B

GROUNDWATER MONITORING PROCEDURES

APPENDIX B

GROUNDWATER MONITORING PROCEDURES

INTRODUCTION

The following sections describe procedures which are followed during groundwater monitoring at sites undergoing investigation, remediation, or quarterly monitoring. Site-specific variations may be implemented, with the approval of the project manager, based upon site conditions, client or regulatory agency requirements, or other factors, provided the quality of data collected is not in any way reduced.

GROUNDWATER MONITORING PROCEDURES

Elevation Survey

Following well installation, the top of each well casing was surveyed using an on-site benchmark with an assumed elevation of 100.00 feet. Depth to groundwater from the survey mark at the casing top was measured in each well on June 30, 1994.

Well Development

After sufficient time was allowed for a well cover seal to harden, the well is developed using surge-and-pump techniques. Surge-and-pump techniques utilized consisted of the following:

- The screened portion of the well is flushed using an approximately two-inch-diameter surge block. A minimum of 40 surge strokes are used across the full screen length to remove sediment which may have settled in the well screen slots.
- Collected sediment at the base of the well is removed. A high-volume centrifugal suction pump is used to remove water with suspended sediment and sediment at the well base. Pumping of the well continues until the water removed is relatively sediment-free.

The above steps are repeated until the well is functioning properly, settled sediment is completely removed, and suspended sediment is relatively constant during pumping.

Water Level Measurements

Prior to beginning each sampling event, the depth to groundwater is measured in each monitoring well. Measurements are taken from a survey mark or the highest point on the top of each well casing and obtained to the nearest hundredth of a foot using an electronic water level meter. Water level measurements are recorded on a separate field sampling

record for each well. The total depth of each well is also measured to the nearest one-half foot and recorded on the field sampling record. These measurements are used to calculate the minimum purge volume for each well and to prepare groundwater contour maps.

Groundwater Sampling Procedures

Following collection of water level measurement data, each well that is not considered low yielding is purged of a minimum three well casing volumes of water prior to sample collection. During purging, the pH, temperature, and specific conductance of the pump discharge is monitored using a calibrated electronic monitoring device. The well is considered fully purged when the pH, temperature, and specific conductance of the purge water have stabilized, or when the well is pumped dry (low-yield wells only). Immediately following purging of each well, samples are collected using a two-inch diameter positive displacement bladder pump or bailer constructed of stainless steel and Teflon. For low-yield wells, samples are collected following approximately 80 percent recovery or within 24 hours after purging. If the height of the water column within a well is insufficient to maintain proper pump operation, the sample is collected using a pre-cleaned new disposable bailer or a bailer constructed of stainless steel and/or Teflon materials.

Samples are collected in appropriate EPA-approved containers based upon the analyses required. When samples are collected for several different analyses, the samples most sensitive to field conditions are collected first, followed by less sensitive samples (in descending order). Following collection, each sample is placed on "Blue Ice" in a chilled cooler prior to transport to a certified laboratory for analysis.

Following sample collection, the pump, hose, and/or bailer is immediately decontaminated. Decontamination consists of steam cleaning exposed surfaces of the pump, hose, and/or bailer, then thoroughly rinsing each piece of equipment with steamed water. To decontaminate the interior of the bladder pump and hose, a minimum of 40 pump volumes of steamed water are flushed through the pump prior to its subsequent use. Alternatively, the following procedures are used:

- Step 1: Rinse and preclean in potable water.
- Step 2: Wash in solution of laboratory-grade non-phosphate-based soap and potable water.
- Step 3: Dip rinse in potable water.
- Step 4: Rinse with distilled water.

All solutions are renewed between sampling. Scrub brushes and nylon scrubbers are used during all steps. All equipment is air dried, when possible, and held in clean plastic bags between sampling.

Quality Assurance

The following steps are taken, as appropriate, during each groundwater sampling event to assure the quality of samples collected and field data recorded:

- Based upon review of the most recent historical analytical data from each well, a monitoring sequence is determined in order to prevent potential cross-contamination of the monitoring wells. The sequence is determined by the level of contamination in each well, and progresses from least contaminated to most contaminated. If a well is inaccessible in its sequence, an attempt is made to obtain access to the well. If obtaining access will cause significant delay of the monitoring event, the well is skipped and placed in a secondary sequence. The skipped well is not returned to until later when decontamination of the sampling equipment has been verified with analysis of an equipment blank sample, or new equipment is used. The procedure for equipment blank sample collection is described later in this section.
- To assure the accuracy of field parameter measurements, calibration of the pH and specific conductance monitoring devices is performed each day prior to commencing sampling activities. A single-point calibration is used to verify proper function of the specific conductance meter, and a three-point calibration is used to ensure proper pH meter operation. If the calibration check indicates either meter is out of calibration, the meter(s) is recalibrated prior to use. No calibration of the electronic thermometer is required for proper use during groundwater sampling.
- The actual purge volume removed from each well depends upon the stability of pH, specific conductance, and temperature readings from the pump discharge water. The stabilization variance limits employed during monitoring for these parameters are 0.1 pH units, 10 percent specific conductance, and one (1) degree Fahrenheit. Readings are taken following removal of one well casing volume and each successive well casing volume. If these parameters do not stabilize following removal of the minimum purge volume, additional casing volumes are removed until stabilization is achieved.
- During sample collection, the flow rate of the pump is reduced in order to minimize disturbance of the sample upon collection. For samples collected with a bailer, a bottom emptying device is used when appropriate, to limit the loss of volatile organic compounds. After the sample is collected, volatile organic analysis (VOA) vials are checked for the presence of headspace. Samples with headspace are emptied and a replacement sample is collected. For pre-preserved VOA vials, a replacement vial is used. Following sample collection, each sample is labeled and placed in a chilled cooler for transport to the laboratory within 24 hours, when possible. Samples retained for more than a 24 hour period are placed in a locked refrigerator until transport to the laboratory. Only those samples collected one day prior to a holiday or weekend day, or from a remote location, are retained for more than 24 hours.

- Chain-of-custody documentation accompanies all samples collected and submitted to the laboratory. The original chain-of-custody documents remain with the samples until analyzed, and a copy of each is retained in AGI's files. The chain-of-custody indicates the sample identification number as shown on the sample label, number of sample containers, analyses required, date and time of collection, sampler's initials, and the relinquishing and receiving signatures of persons in control of sample handling following collection until delivery to the laboratory.
- Quality assurance samples are collected to verify the effectiveness of sample collection, handling, analysis, and equipment decontamination procedures. A pump blank sample is submitted for analysis prior to each monitoring event and secondary sampling sequence to ensure the cleanliness of the pump prior to its use for sampling. The pump blank consists of clean water which has been passed through the pump and collected from the pump discharge. A pump blank sample is not collected when new disposable bailers are used to collect samples. A trip blank sample is prepared and submitted to the laboratory with each group of samples as a check against potential contamination resulting from sample handling. Trip blanks consist of clean water contained in 40 ml VOA vials carried with the samples throughout the day. One equipment rinsate sample is typically collected during each monitoring event to ensure proper decontamination of sampling equipment. Rinsate samples consist of clean water collected from the pump discharge or bailer following sampling of a contaminated well and decontamination of the equipment. Duplicate samples are collected, as appropriate, during each monitoring event as a check of analytical accuracy. Duplicate samples are collected from selected wells, labeled with a fictitious sample identification number recorded on the sampling record, and submitted to the laboratory for analysis. Results of quality assurance sample analyses are presented with the data summary for the monitoring event. Due to the small number of samples collected during the sampling event, no quality assurance samples were collected.
- Following each day of sampling, field notes and the sampling record are reviewed to ensure the completeness and accuracy of documentation of sampling activities. Review includes verification of sample identification numbers, purge volumes, field monitoring parameter stability, and chain-of-custody documentation. Special notations regarding outside factors, such as wind direction, ambient temperature, and fugitive odors, which may affect sample integrity, are evaluated in conjunction with review of analytical data.
- During the monitoring event, field personnel evaluate the condition of each well with regard to well integrity and record findings on the sample record. These findings are tabulated and presented with or prior to the data summary report. The table provides the well identification number, condition, and any recommended actions necessary to preserve well integrity.
- Results of analytical testing are reviewed for accuracy and any anomalies that occur, based upon historical data. The review includes evaluation of results in conjunction with recorded field data and chain-of-custody documentation, comparing current and historical data, and validation of data using chromatograms and associated QA/QC

procedures and results supplied by the laboratory. Any suspect results which cannot be validated through review of field or laboratory data review are immediately brought to the attention of the project manager and recommended actions to mitigate the problem are determined.

- Corrective action procedures are employed for field, laboratory, and program attributes when conditions or data require such action. Corrective actions based upon field data are recommended if such action is deemed necessary to preserve the integrity of wells or to prevent problems in obtaining representative samples from the selected wells included in the monitoring program. Corrective actions based upon laboratory data are recommended if inherent problems with analytical results occur during implementation of the monitoring program. Any necessary adjustments in the monitoring frequency or analytical schedules are recommended based upon results of the monitoring program and the status of remediation.

Containment and Disposal of Purge Water

Purge water removed from the wells during groundwater sampling are contained in 55-gallon DOT-rated drums for later treatment or disposal following receipt of analytical results. A 500-gallon tank trailer, or other approved container is used when large volumes of purge water are collected, or site conditions or the client dictate.

APPENDIX C

ANALYTICAL REPORTS

CHROMALAB, INC.

Environmental Services (SDB)

April 3, 1995

Submission #: 9503386

AGI TECHNOLOGIES

Atten: John Adams

Project: EMERYVILLE/SAN PABLO

Project#: 15681.004

Received: March 27, 1995

re: 4 samples for Gasoline and BTEX analysis.

Matrix: WATER

Sampled: March 25, 1995

Run#: 6022

Analyzed: April 3, 1995

Method: EPA 5030/8015M/602/8020

Spl #	CLIENT	SMPL ID	Gasoline (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)
82578	MW4		N.D.	N.D.	N.D.	N.D.	N.D.
82579	MW5		0.44	0.5	0.6	1.6	1.9
82580	MW6		N.D.	N.D.	N.D.	N.D.	N.D.
82581	MW7		N.D.	N.D.	N.D.	N.D.	N.D.
Reporting Limits			0.05	0.5	0.5	0.5	0.5
Blank Result			N.D.	N.D.	N.D.	N.D.	N.D.
Blank Spike Result (%)			97	106	109	115	111

Jack Welly
Chemist

Ali Kharrazi
Organic Manager

CHROMALAB, INC.

Environmental Services (SDB)

April 3, 1995

Submission #: 9503386

AGI TECHNOLOGIES

Atten: John Adams

Project: EMERYVILLE/SAN PABLO
Received: March 27, 1995

Project#: 15681.004

re: 4 samples for Diesel analysis.

Sampled: March 25, 1995 Matrix: WATER Extracted: March 31, 1995
Method: EPA 3510/8015M Run#: 6018 Analyzed: April 1, 1995

Spl #	CLIENT SMPL ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE RESULT (%)
82579	MW5	N.D.	50	N.D.	89
<i>Note: Compounds in the Diesel range do not match any of our petroleum hydrocarbon standard profiles. Compared to our Diesel standard, amount is 190 ug/L.</i>					
82581	MW7	N.D.	50	N.D.	89

Sampled: March 25, 1995 Matrix: WATER Extracted: March 31, 1995
Method: EPA 3510/8015M Run#: 6018 Analyzed: April 3, 1995

Spl #	CLIENT SMPL ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE RESULT (%)
82578	MW4	N.D.	50	N.D.	89
82580	MW6	N.D.	50	N.D.	89

Sirirat Chullakorn

Sirirat (Sindy) Chullakorn
Chemist

Ali Khanzadi

Ali Khanzadi
Organic Manager

