6/23/95 Rec'd BC

Epigene International
CONSULTING GEOLOGISTS

June 9, 1995

Mr. Barney Chan
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 9402-6577

Subject: Proposed Remedial Action Plan for Site Located at 2301 East 12th Street, Oakland

Dear Mr. Chan,

The subject site is located at the southwest corner of the intersection of East 12th Street and 23rd Avenue in Oakland. A location map for the site is presented on Figure 1. The site is occupied by a "L" shaped building with the remainder of the site paved with asphalt. A site plan is presented on Figure 2. The site is presently vacant. Past land use has been automotive repair.

Four underground storage tanks were removed from the site in December of 1990 and February of 1991. A tank closure report based on the available data and documentation was prepared by Epigene International on August 31, 1993. The tanks were reported to be: 1) a 6000 gallon diesel tank; 2) a 1000 gallon leaded gasoline tank; and 3) two 1000 gallon waste oil tanks. The approximate tank locations are shown on Figure 2.

The results of the analysis for the soil samples collected during the tank removal indicated that there was significant contamination below the site. Based on these data the Alameda County Department of Environmental Health requested that monitoring wells be installed to assess the impact on the groundwater. Three wells (MW-1, MW-2 and MW-3) were installed by Artesian Environmental Consultants as documented in their report dated August 1992. The well locations are shown on Figure 2.

Groundwater contamination was detected in the wells. Quarterly monitoring of the wells has been carried-out by Epigene since November of 1992. Additional monitoring wells (MW-4, MW-5 and MW-6) were installed in May of 1994 to better characterize the extent of groundwater contamination in the site area. The installation of these wells were documented in a report by Epigene International. The well locations are shown on Figure 2. The results of the groundwater analysis are summarized by well in Tables 1 - 7.

A 4 inch diameter groundwater extraction well identified as EW-1 was also installed in May of 1994. The location of the well is at the northeast corner of the former waste oil tanks as shown on Figure 2.

Two soil borings were also drilled in the area of the former 6000 gallon diesel tank in May of 1994. The borings are shown as B-1 and B-2 on Figure 2. The results of the soil analysis from these borings indicated relatively minor soil contamination above the groundwater level. Based on these data and the relatively high groundwater level below the site area, it was decided that the major impact of the contamination was on the groundwater and that would be the focus of the site remediation. This was discussed and generally agreed to with representatives of the Alameda County Department of Environmental Health.

The direction of the groundwater gradient based on both contouring and calculation of three-point problems has been consistently north to north-northwest since the installation of the additional wells in May of 1994. Well MW-2 has continued to be an anomaly with a higher groundwater level than adjacent wells. This probably accounts for the inconsistent gradients that were obtained using only wells MW-1, MW-2 and MW-3 prior to the installation of the new wells.

Groundwater contamination has been detected in the two down-gradient wells, MW-4 and MW-5. Therefore, additional characterization of the site is required to define the edge of the plume. It is proposed that two additional monitoring wells be installed down-gradient of the existing wells to define the edge of the plume. The wells would have to be located on the City of Oakland park across 23rd Avenue from the site. The new wells will be approximately 75 feet north-northwest of MW-4 and MW-5.

2 addnl DG wells

Well MW-6 was intended to be an up-gradient well. Significant levels of contamination have been detected in the well (see Table 1F). An additional well will be installed in the up-gradient direction as close to the existing building as possible. A review will be made to assess whether or not there are any sumps or other shallow contamination sources within the building.

1 addnl upgrad

Groundwater remediation consists of three basic methods: 1) do nothing and allow the natural breakdown of the hydrocarbons; 2) insitu treatment of the groundwater; and 3) remove the groundwater by pumping and treat on the surface. The relatively high levels of contamination present in the groundwater below the site precludes the first option. Insitu treatment is typically some form of bioremediation where a selected strain of bacteria is introduced into the aquifer, generally with an oxygen source and nutrients. The success rate of bioremediation varies from very high to complete failures. The technique appears to be most successful in relatively coarse-grained aquifers (ie medium to coarse sands). Given the fine-grained nature of the sediments underlying site (primarily clayey silts) and the logistical constraints of having a significant portion of the plume on City of Oakland right-of-way, this technique is not recommended for the main plume area. Bioremediation may be appropriate for the down-gradient edge of the plume, depending on the results of the proposed additional site characterization.

Pump and surface treatment of the water is therefore the option available for the site. Various techniques were considered for the treatment of the water after if was pumped from the ground. These include: 1) removal of the water in a tank truck by a properly licensed treatment facility such as Evergreen Environmental Services; 2) bioremediation in shallow reservoirs on the site; 3) systems that rely on separation and combustion of the hydrocarbons; 4) carbon sorption systems; 5) air-stripping; and 6) osmotic-type filter systems. Removal of the water has a number of benefits but the long-term costs are very high. This may be considered on a short-term basis as the remediation system is being installed and tested. Surface bioremediation of water is still somewhat experimental in nature and typically requires a fairly large working area. Given the limited size of the site, this technique could significantly impact future use of the site. Combustion units are expensive to lease and operate. They are best suited to areas with significant floating product. Air-stripping with direct discharge to the atmosphere is generally no longer allowed in the Bay Area. Air-stripping with carbon sorption units on the air discharge is possible but more expensive than carbon sorption units for groundwater. Osmotic filter systems are also expensive and are best suited for removing relatively high concentrations of solvents in water.

Based on a review of the remediation alternatives, carbon sorption was selected as the most cost-efficient and dependable technique for the site. It is recommended that the unit be installed within the existing building on the site, in the northern most bay as shown on Figure 3. The inside installation will allow complete use of the parking area and prevent vandalism which could be a significant problem in the site area. It would also preclude the need for obtaining City of Oakland permits which may be required for an exterior installation.

Heavy metals have not been detected in any of the wells that would impact on the remediation system. The only compound detected that may pose a problem for the carbon sorption unit is vinyl chloride which is present in low amounts in MW-6 and MW-5. The proposed carbon sorption unit is a four canister system as shown on Figure 4. This should allow for a long enough holding time to remove the vinyl chloride.

At the initiation of the system, EW-1 would be fitted with a dedicated pump with a discharge line and electrical connections buried in a shallow trench into the remediation area as shown on Figure 3. The control for the pump would also be located inside the building. Pump test data collected after the well was installed indicate that the well will be able to maintain a pumping rate of approximately 1/2 gallon per minute. The data also indicated that the cone of depression would eventually extend to the north side of 23rd Avenue. It is proposed that an additional extraction well be installed on the northeast corner of the excavation for the 6000 gallon tank as shown on Figure 3. The new extraction well would be installed after the system was in operation. It would be a 6 inch diameter well that would significantly increase the remediation rate for the site. The outlet from the two wells would be connected together with anti-siphon valves to prevent backflow into the wells.

new extraction well

It is presently proposed that a 5000 gallon holding tank be installed at the discharge of the carbon canisters. If the water meets EBMUB requirements, it will be discharged into the sanitary sewer. The system will be designed to allow pumping of the water in the holding tank back through the system. A sampling schedule will be prepared to comply with EBMUB requirements. After the system has been operating for several months, possible alternatives for reuse of the water will be explored.

Epigene and the property owner are prepared to initiate the system as soon as possible after your review and comments.

Should you have any questions and/or require additional information, please contact the undersigned.

Sincerely,

REGISTERED GEOLOGIST
JOHN N. ALT
№ 1136
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

John N. Alt
Certified Engineering Geologist

Table 1A - Summary of Groundwater analysis for MW-1

Analysis	7/27/92	11/6/92	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94
TPH Gasoline	1800	8000	5600	4800	8400	7800		9000	10000
TPH Diesel	360	670	1100	1700	1200	ND	2600	1500	2000
Benzene	600	2400	3800	3400	2300	29		2300	2100
Toluene	5.1	6.1	ND	44	35	16		44	35
Ethylbenzene	13	41	120	140	180	5.8		260	250
Xylenes	18	ND	ND	150	57	26		170	140
Oil and Grease	ND	NA	NA	NA	ND	NA		NA	NA
Luft Metals									
Lead	NA	NA	NA	NA	0.005	NA		NA	NA
Cadmium	NA	NA	NA	NA	ND	NA		NA	NA
Chromium	NA	NA	NA	NA	ND	NA		NA	NA
Nickel	NA	NA	NA	NA	0.37	NA		NA	NA
Zinc	NA	NA	NA	NA	0.12	NA		NA	NA

*Note: All figures in Parts per Billion(ppb)

MW-1

Volatile Halocarbons	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94	2/13/95
Chlorobenzene			ND					ND
Chloroethane			ND					ND
1,2 - Dichloroethane			ND					ND
cis 1,2 - Dichloroethene			1.1					1.3
trans 1,2 - Dichloroethene			ND					ND
Tetrachloroethene			5.4					ND
Trichloroethene			ND					ND
Vinyl Chloride			ND					ND

Table 1B - Summary of Groundwater analysis for MW-2

Analysis	7/27/92	11/6/92	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94
TPH Gasoline	20000	19000	14000	11000	16000	18000		15000	15000
TPH Diesel	1500	17000	37000	6000	5400	720		3000	5300
Benzene	110	2800	3800	5200	1700	87		2000	1500
Toluene	6.0	120	110	140	120	79		72	81
Ethylbenzene	37	790	950	1000	640	42		550	410
Xylenes	39	1100	1100	990	710	400		520	520
Oil and Grease	ND	NA	N A	32000	ND			7900	13
Luft Metals									
Lead	NA	NA	NA	ND	ND	NA		NA	0.010
Cadmium	NA	NA	NA	ND	ND	NA		NA	0.015
Chromium	NA	NA	NA	ND	ND	NA		NA	0.014
Nickel	NA	NA	NA	ND	ND	NA		NA	0.024
Zinc	NA	NA	NA	50	ND	NA		NA	0.049

*Note: All figures presented in Parts Per Billion(ppb)

MW-2

Volatile Halocarbons	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94	2/13/95
Chlorobenzene			10			6.5		12
Chloroethane			1.3			ND		ND
1,2 - Dichloroethane			0.66			ND		ND
cis 1,2 - Dichloroethene			3.2			ND		ND
trans 1,2 - Dichloroethene			ND			ND		ND
Tetrachloroethene			ND			ND		ND
Trichloroethene			ND			ND		ND
Vinyl Chloride			2.2			ND		ND

Table 1C - Summary of Groundwater analysis MW-3

Analysis	7/27/92	11/6/92	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94
TPH Gasoline	8800	10000	3900	7400	7100	7900		8400	6300
TPH Diesel	4000	21000	9300	4400	8200	230		1500	2700
Benzene	150	78	120	570	180	30		230	140
Toluene	8.6	3.1	ND	4.1	15	14		13	8.7
Ethylbenzene	88	830	240	640	110	12		93	68
Xylenes	13	13	37	8.4	9.4	62		7.6	25
Oil and Grease	ND	NA	NA	ND	ND			NA	7.3
Luft Metals									
Lead	NA	NA	NA	NA	ND	NA			NA
Cadmium	NA	NA	NA	NA	ND	NA			NA
Chromium	NA	NA	NA	NA	ND	NA			NA
Nickel	NA	NA	NA	NA	ND	NA			NA
Zinc	NA	NA	NA	NA	ND	NA			NA

Note: All Figures Presented in Parts Per Billion(ppb)

MW-3

Volatile Halocarbons	3/2/93	5/26/93	8/27/93	12/23/93	3/27/94	6/24/94	10/16/94	2/13/95
Chlorobenzene			ND			ND		ND
Chloroethane			ND			ND		ND
1,2 - Dichloroethane			ND			ND		ND
cis 1,2 - Dichloroethene			ND			6.0		4.3
trans 1,2 - Dichloroethene			ND			1.5		1.3
Tetrachloroethene			ND			ND		ND
Trichloroethene			16			ND		5.1
Vinyl Chloride			ND			ND		ND

Table 1D- Summary of Groundwater Analysis, MW-4

Analysis	3/27/94	6/24/94	10/16/94	2/13-2/14/94
TPH Gasoline		2300	3500	2600
TPH Diesel		420	900	630
Benzene		2.9	3.8	100
Toluene		1.6	2.0	100
Ethylbenzene		2.8	5.2	3.8
Xylenes		4.6	24	7.1
Oil and Grease		NA	NA	NA
Luft Metals				
Lead			NA	NA
Cadmium			NA	NA
Chromium			NA	NA
Nickel			NA	NA
Zinc			NA	NA

MW-4

Volatile Halocarbons	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
Chlorobenzene		NA		ND
Chloroethane		NA		ND
1,2 - Dichloroethane		NA		ND
cis 1,2 - Dichloroethene		NA		ND
trans 1,2 - Dichloroethene		NA		ND
Tetrachloroethene		NA		ND
Trichloroethene		NA		ND
Vinyl Chloride		NA		ND

Table 1E - Summary of Groundwater Analysis MW-5

Analysis	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
TPH Gasoline		6100	4300	4600
TPH Diesel		950	1100	1200
Benzene		220	120	130
Toluene		12	5.1	7.9
Ethylbenzene		38	27	38
Xylenes		24	13	29
Oil and Grease		NA	NA	NA
Luft Metals				
Lead			NA	NA
Cadmium			NA	NA
Chromium			NA	NA
Nickel			NA	NA
Zinc			NA	NA

Forgot to fill in.

MW-5

Volatile Halocarbons	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
Chlorobenzene		0.53		ND
Chloroethane		ND		ND
1,2 - Dichloroethane		ND		ND
cis 1,2 - Dichloroehtene		11		20
trans 1,2 - Dichloroethene		3.1		5.1
Tetrachloroethene		ND		ND
Trichloroethene		ND		ND
Vinyl Chloride		7.5		8.4

Table 1F - Summary of Groundwater Analysis MW-6

Analysis	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
TPH Gasoline		8000	6300	5500
TPH Diesel		660	850	1000
Benzene		1200	870	1000
Toluene		21	14	17
Ethylbenzene		210	140	210
Xylenes		54	49	55
Oil and Grease		NA	NA	NA
Luft Metals				
Lead			NA	NA
Cadmium			NA	NA
Chromium			NA	NA
Nickel			NA	NA
Zinc			NA	NA

MW-6

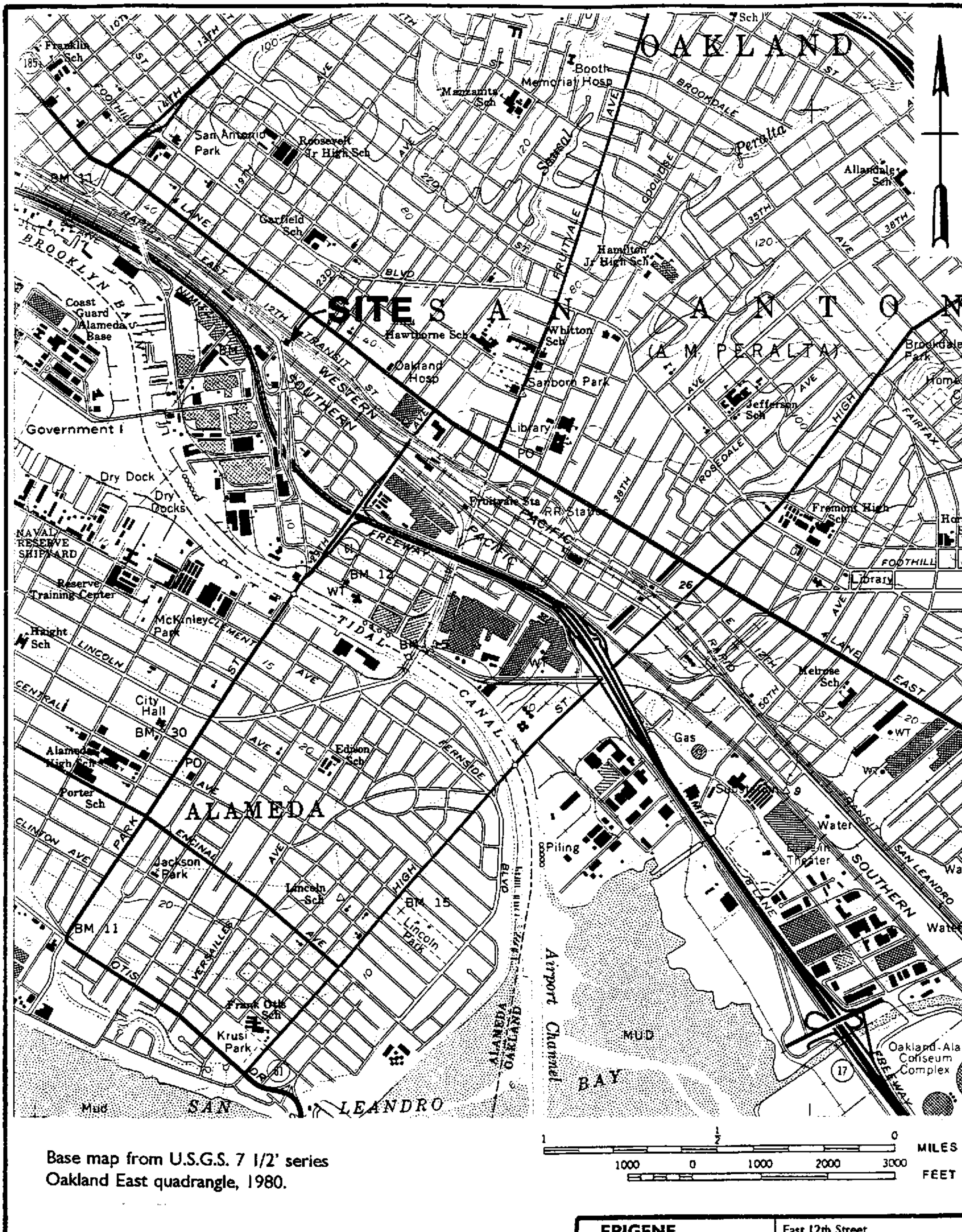
Volatile Halocarbons	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
Chlorobenzene		NA		ND
Chloroethane		NA		ND
1,2 - Dichloroethane		NA		ND
cis 1,2 - Dichloroehtene		NA		40
trans 1,2 - Dichloroethene		NA		13
Tetrachloroethene		NA		ND
Trichloroethene		NA		99
Vinyl Chloride		NA		87

Table 1G - Summary of Groundwater Analysis EW-1

Analysis	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
TPH Gasoline		4600	4900	3900
TPH Diesel		1200	1200	1000
Benzene		410	310	380
Toluene		5.6	5.2	5.9
Ethylbenzene		78	30	41
Xylenes		22	32	22
Oil and Grease		NA	6.4	ND
Luft Metals				
Lead			ND	ND
Cadmium			ND	ND
Chromium			0.070	0.085
Nickel			0.21	0.17
Zinc			0.049	ND

EW-1

Volatile Halocarbons	3/27/94	6/24/94	10/16/94	2/13 - 2/14/95
Chlorobenzene		ND		ND
Chloroethane		ND		ND
1,2 - Dichloroethane		1.3		ND
cis 1,2 - Dichloroehtene		42		4.3
trans 1,2 - Dichloroethene		11		1.3
Tetrachloroethene		ND		ND
Trichloroethene		68		5.1
Vinyl Chloride		3.2		ND



Base map from U.S.G.S. 7 1/2' series Oakland East quadrangle, 1980.

EPIGENE INTERNATIONAL	East 12th Street, Oakland, California.
Fig. 1	**SITE LOCATION MAP**

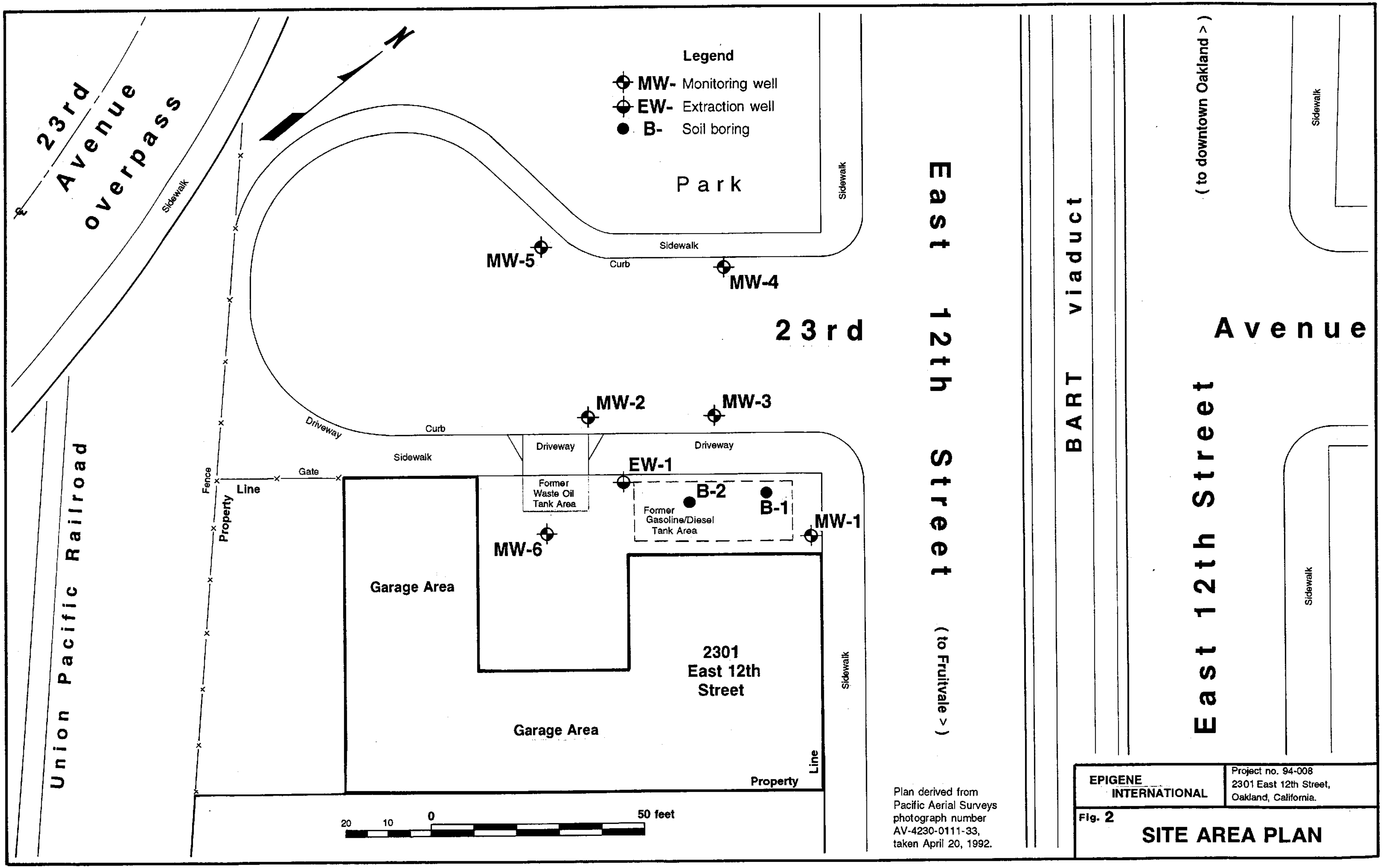
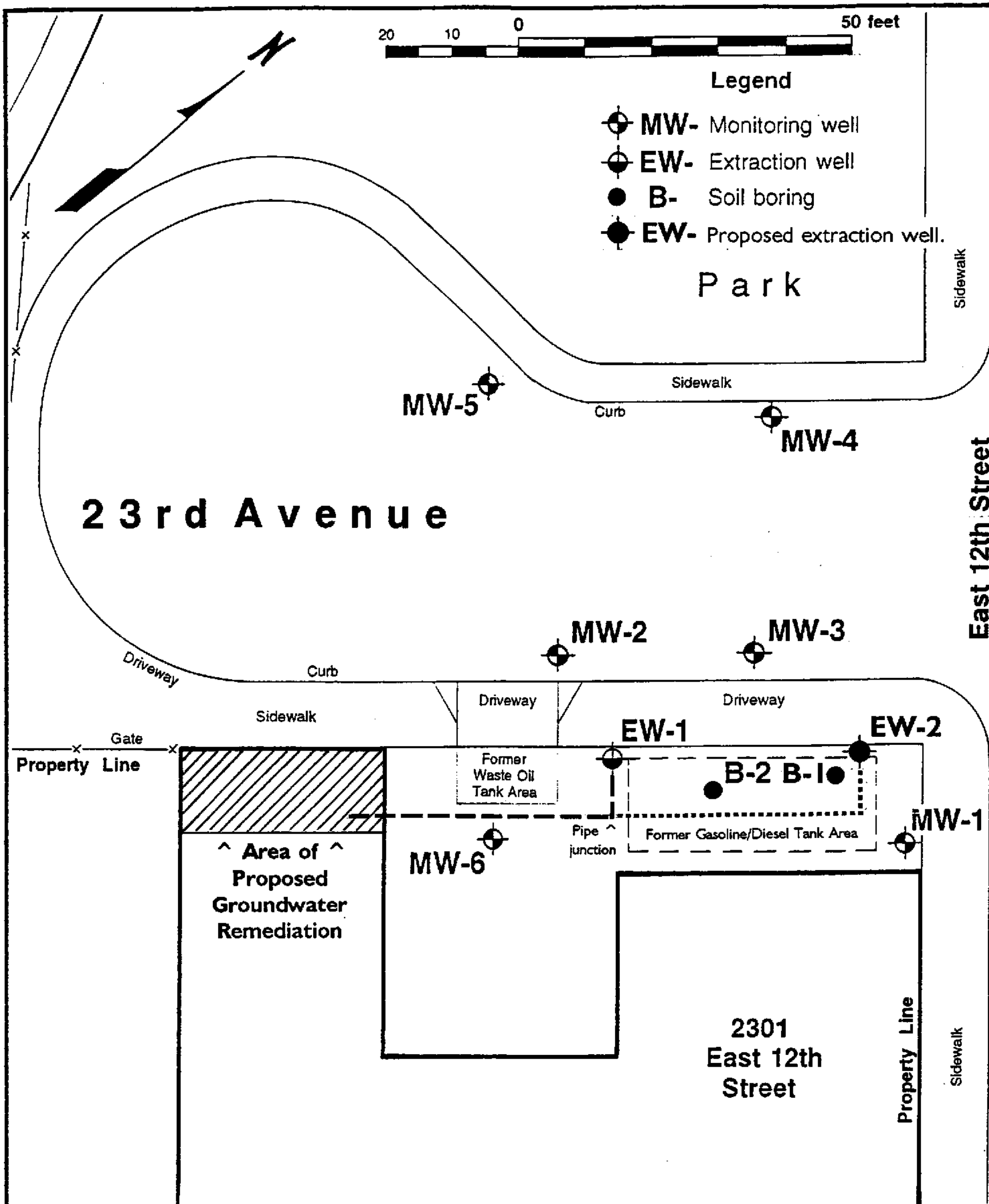


Fig. 2 SITE AREA PLAN



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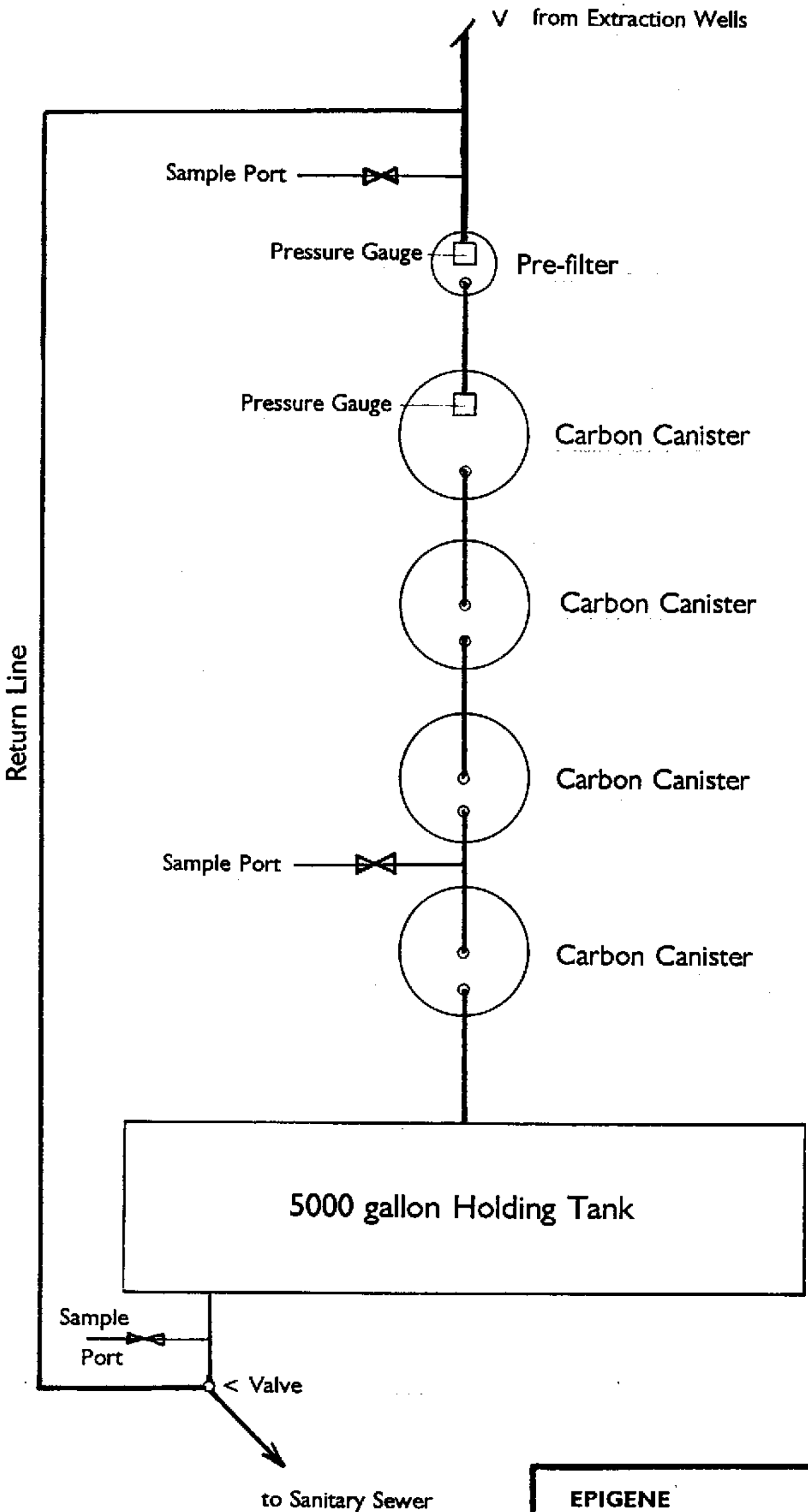
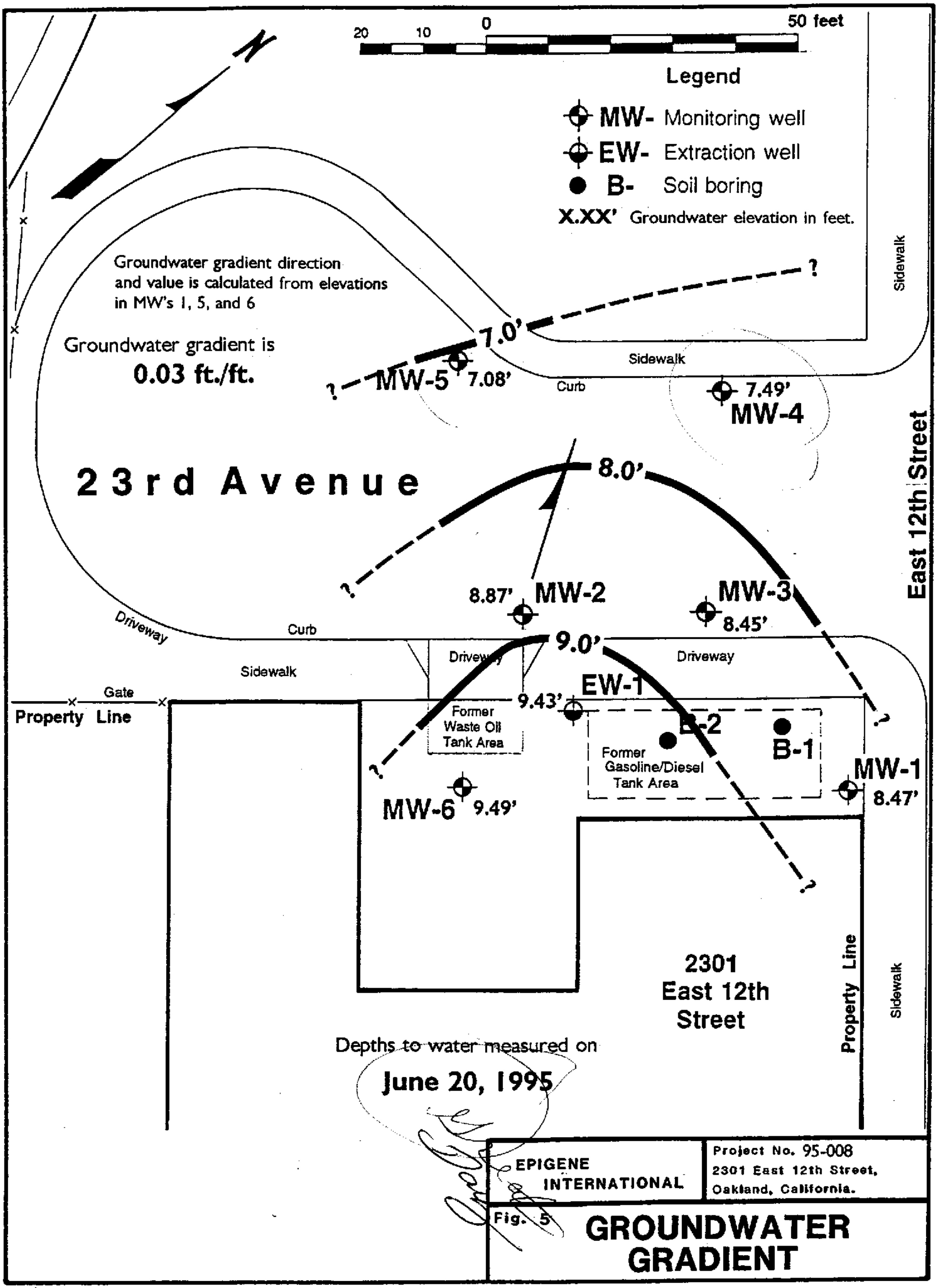
Project No. 95-008
2301 East 12th Street,
Oakland, California.

Fig. 3 REMEDIATION PLAN



Drawing Not To Scale

EPIGENE INTERNATIONAL	Project #95-008 2301 EAST 12TH STREET, Oakland, California.
Fig. 4	**SCHEMATIC OF CARBON SORPTION UNIT**



20 10 0 50 feet
Legend
MW- Monitoring well
EW- Extraction well
B- Soil boring
X.XX' Groundwater elevation in feet.
Groundwater gradient direction and value is calculated from elevations in MW's 1, 5, and 6
Groundwater gradient is
0.03 ft./ft.
7.0'
MW-5 7.08'
Sidewalk
Curb
7.49' MW-4
23rd Avenue
8.0'
East 12th Street
8.87' MW-2
MW-3 8.45'
Driveway
Curb
9.0'
Driveway
Driveway
Sidewalk
Gate
Property Line
9.43' EW-1
Former Waste Oil Tank Area
B-2
B-1
Former Gasoline/Diesel Tank Area
MW-1 8.47'
MW-6 9.49'
2301 East 12th Street
Property Line
Sidewalk
Depths to water measured on
June 20, 1995
EPIGENE INTERNATIONAL
Project No. 95-008
2301 East 12th Street, Oakland, California.
Fig. 5
GROUNDWATER GRADIENT