



Ocean Blue Engineers, Inc.

August 21, 1996

OBE Ref: 1134.96.02-09

Santa Monica-Malibu Unified School District
1651 16th Street
Santa Monica, CA 90404

Attention: Mr. Robert Cornell

**SUBJECT: SUMMARY REPORT OF PREVIOUS SITE INVESTIGATIONS AND CLOSURE
REQUEST FOR MALIBU PARK SCHOOL LOCATED AT 30215 MORNING VIEW
DRIVE, MALIBU, CALIFORNIA**

Dear Mr. Cornell:

Enclosed with this transmittal are three copies of the summary report of the previous investigations at the above referenced site and closure request for the site.

If you have any questions or require additional information, please call us at (310) 473-5911.

Sincerely

OCEAN BLUE ENGINEERS, INC.

Jahan Nazarian, Ph.D, R.E.A.
Project Manager

**SUMMARY REPORT OF PREVIOUS SITE INVESTIGATIONS AND
CLOSURE REQUEST FOR MALIBU PARK SCHOOL LOCATED AT
30215 MORNING VIEW DRIVE, MALIBU, CALIFORNIA**

PREPARED FOR :

**SANTA MONICA-MALIBU UNIFIED SCHOOL DISTRICT
1651 16TH STREET
SANTA MONICA, CA 90404**

BY:

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AUGUST 21, 1996

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SUMMARY REPORT OF PREVIOUS SITE INVESTIGATIONS AND CLOSURE REQUEST FOR MALIBU PARK SCHOOL LOCATED AT 30215 MORNING VIEW DRIVE, MALIBU, CALIFORNIA

1.0 INTRODUCTION

Ocean Blue Engineers, Inc. (OBE) has been retained by Santa Monica-Malibu School Unified School District to review the previous reports of site investigations conducted at Malibu Park School located at 30215 Morning View Drive, Malibu, California, and prepare a summary report of the previous investigation and a closure report for submittal to the California Regional Water Quality Control Board (CRWQCB) for their review and request approval for the closure of the site.

2.0 OBJECTIVES

The objectives of this project is to prepare a summary report of the previous investigations conducted at the above referenced site, assess and evaluate the data and present discussion, conclusions and recommendations for the closure of the site.

3.0 SITE DESCRIPTION

The school is located at 30215 Morning View Drive Malibu. It is situated near the local foot hills and has an approximate elevation of 118 feet above mean sea level (MSL) (1). The area of interest at the school is the site of the former underground storage tanks (USTs) that were removed in August 1992 (2). Three garage and/or maintenance buildings are located in the vicinity. Following the completion of the tank removal activities, and two subsurface investigation programs (3) and (4), the excavations were backfilled and the area was paved with new asphalt. The location of the former tank located in the eastern parts of the site can be easily identified from the boundaries of the new asphaltic paving at the site. However, the location of the former tank located in the western parts of the site cannot be so readily identified as a large area in that vicinity has been paved with new asphaltic paving.

Figures 1 and 2 enclosed in Appendix A present the site vicinity map and a scaled plot plan of the site as it currently exists, respectively.

4.0 PREVIOUS INVESTIGATIONS

Several investigations have been conducted at the site and the reports of the investigations have been submitted under separate covers. The following presents a comprehensive summary of the investigations:

a. Underground Storage Tank Removals

Two 10,000 gallon underground storage tanks which had been used for the storage of diesel and their associated dispensers were removed from the property in August 1992 (2). Figure 3 enclosed in Appendix A present the former USTs location and configuration as well as the location of the soil samples collected underneath the former USTs and the dispensers and locations of soil pile samples. The soil samples were submitted to a State of California certified laboratory for analyses for total

petroleum hydrocarbons (TPH) by the Modified EPA Method 8015 to diesel standard and by the EPA Method 8020 for benzene, toluene, ethylbenzene and total xylenes (BTEX). Table 1 presents the results of the analyses of the soil samples collected after the removal of the tanks:

Table 1 - Analyses Results of Soil Samples Collected After Tank Removals

Sample I.D.	Analyses				
	EPA 8015(M) Diesel mg/kg ♦	EPA 8020 µg/kg ♠			
		Benzene	Toluene	Ethylbenzene	Xylenes
SST1AW	2,400	ND	68	64	500
SST1BE	5,400	ND	38	26	300
SST2AW	5,800	ND	10,000	15,000	130,000
SST2BE	11	ND	32	32	320
SSD1C	450	ND	ND	ND	ND
SSD2C	2,700	ND	16	ND	36
SSSP1N	ND	ND	ND	ND	ND
SSSP1E	1,200	ND	6.2	ND	880
SSSP1S	ND	ND	ND	ND	ND
SSSP1W	16	ND	ND	ND	ND
SSSP1SE	180	ND	ND	ND	430

♦ Detection Limit = Not Provided
♠ Detection Limit = Not Provided
ND - Not Detected

The analyses of the samples collected from underneath the tanks and the dispensers showed that leakage of products previously stored in the tanks had occurred. The contamination was more elevated underneath tank #1 (the western tank) and in the western end of tank #2 (the eastern tank). Contamination was also detected underneath the dispensers. In addition, one of the soil samples collected from the excavated soil pile contained a moderately high concentration (1,200 mg/kg) of TPH. It appears that the contaminated soils were transported for disposal to a permitted facility for treatment. The excavations were subsequently backfilled and resurfaced.

b. Preliminary Subsurface Investigation

In October 1992, eight borings (B1 through B8) were drilled at the site of the former underground storage tanks to characterize the site and to determine the extent of the soil contamination (3). Figure 4 enclosed in Appendix A present the approximate locations of the borings. Borings B3 and B8 were drilled to depths of 40 feet and 35 feet, respectively, while the rest of he borings (B1, B2, B4, B5, B6 and B7) were drilled to depths of 20 feet. Soil samples were collected at depths of one and four feet and at five foot intervals to the bottom of each boring. In addition, a sample of the

excavated soil pile was also collected. However, a limited number of the soil samples were submitted to a State of California certified laboratory for analyses by the Modified EPA Method 8015 for TPH to diesel standard and by the EPA Method 8020 for BTEX. Table 2 presents the results of the analyses:

Table 2 - Analyses Results of Soil Samples Pertaining to Preliminary Site Investigations

Sample I.D.	Analyses				
	EPA 8015(M) Diesel mg/kg ♦	EPA 8020 $\mu\text{g}/\text{kg}$ ♣			
		Benzene	Toluene	Ethylbenzene	Xylenes
B1 @ 19'	2,200	56	17,000	32,000	310,000
B2 @ 14'	BQL	BQL	BQL	BQL	BQL
B3 @ 19'	BQL	BQL	BQL	BQL	BQL
B3 @ 39'	BQL	360	280	520	2,000
B4 @ 19'	BQL	BQL	BQL	BQL	BQL
B5 @ 14'	BQL	BQL	BQL	BQL	BQL
B6 @ 14'	BQL	10	12	BQL	23
B7 @ 14'	BQL	BQL	BQL	BQL	BQL
B8 @ 14'	BQL	BQL	BQL	BQL	BQL
Soil Pile	2,300	NA	NA	NA	NA

♦ Detection Limit = 10 mg/kg

♣ Detection Limit = 5 $\mu\text{g}/\text{kg}$ for benzene, toluene and ethylbenzene, 20 $\mu\text{g}/\text{kg}$ for total xylenes

BQL - Below Quantitation Limit

NA - Not Analyzed

The analyses of a limited number of the soil samples showed that relatively elevated concentrations of TPH to diesel standard and BTEX were detected in boring B1 at a depth of 19 feet. Moderately high concentrations of BTEX were also detected at a depth of 39 feet in boring B3. In addition, low concentrations of benzene, toluene and xylenes were detected at a depth of 14 feet in boring B6. A sample collected from the excavated soil pile also contained a relatively elevated concentration of TPH. The subsurface investigation did not determine the lateral and vertical extent of the contamination and a recommendation was made to conduct additional subsurface investigations (3).

c. Additional Subsurface Investigation

In January 1993, an additional subsurface investigations was conducted at the site to better define the extent of the contamination. Borings B9, B10 and B11 were drilled to depths of 40, 30 and 40 feet, respectively (4). Figure 4 also shows the locations of the additional borings. In borings B9 and B11, soil samples were collected from a depth of 15 feet and at five foot intervals to the bottom of each boring. Boring B10 was slant drilled underneath the dispenser and the building, and sampled at depths of 12, 21 and 30 feet. Also, soil samples were collected directly underneath the two

dispensers. In addition, perched water was encountered in boring B11 at a depth of approximately 40 feet which settled at 34 feet. A sample of the groundwater was collected through the annulus of the augers. Some of the soil samples and the groundwater sample were submitted to a State of California certified laboratory for analyses by the Modified EPA Method 8015 for TPH to diesel standard and by the EPA Method 8020 for BTEX. Table 3 presents the results of the analyses:

Table 3 - Analyses of Soil Samples Pertaining to the Additional Site Investigations

Sample I.D.	Analyses				
	EPA 8015(M) Diesel mg/kg ♦	EPA 8020 µg/kg ♣			
		Benzene	Toluene	Ethylbenzene	Xylenes
B9 #3 @ 25'	BQL	BQL	BQL	BQL	BQL
B9 #4 # 30'	BQL	5.4	BQL	18	43
B9 #5 @ 35'	BQL	500	25	190	1,300
B9 #6 @ 40'	BQL	BQL	280	130	BQL
B10 #1 @ 12'	BQL	BQL	BQL	BQL	BQL
B10 #2 @ 21'	BQL	BQL	BQL	BQL	BQL
B10 #3 @ 30'	BQL	BQL	BQL	BQL	BQL
B11 #1 @ 15'	BQL	BQL	BQL	BQL	BQL
B11 #2 @ 20'	BQL	BQL	BQL	BQL	BQL
B11 #3 @ 25'	BQL	BQL	36	16	190
B11 #4 @ 30'	14	20	690	320	2,900
B11 #5 @ 35'	BQL	10	96	17	120
B11 #6 @ 40'	10	BQL	59	74	360
W.Dispenser #1 @ 3 ft	18	BQL	BQL	BQL	BQL
E. Dispenser #2 @ 4 ft	290	BQL	BQL	BQL	BQL
B-11 Groundwater		1,500	19,000	2,300	15,000

♦ Detection Limit = 10 mg/kg

♣ Detection Limit = 5 µg/kg for benzene, toluene and ethylbenzene, 20 µg/kg for total xylenes

BQL - Below Quantitation Limit

NA - Not Analyzed

The analyses of a limited number of the samples showed that BTEX was present in low to moderately high concentrations in boring B9 at depths of 30, 35 and 40 feet and in boring B11 at depths of 25, 30, 35 and 40 feet. Low concentrations of TPH was detected underneath the dispensers. The groundwater showed the presence of elevated concentrations of BTEX. Approximate plumes of soil contamination were constructed as a result of the two investigations (3) and (4). Figures 5 and 6 enclosed in Appendix A present the cross sections of the referenced plumes.

d. Groundwater Investigation

At the request of the Los Angeles County Department of Public Works, UST Local Oversight Program (LOP) (5), OBE submitted a work plan (6) for the installation of four groundwater monitoring wells at the subject property. The work plan was approved by the LOP (7 and 8) with some modifications. The monitoring wells were installed in April 1995 by Vector Three Environmental, Inc. (VTE) (9), and survey to a known point. Figure 7 presents the locations of the groundwater monitoring wells. Table 4 presents the boring specifications:

Table 4 - Boring Specifications and Sampling Depths Pertaining to Groundwater Monitoring Well Installations

Boring No.	MW-1	MW-2	MW-3	MW-4
Total Depth (Feet)	50	50	50	42
Sampling Depths (Feet)	5, 10, 15, 20, 25, 30, 35, 40, 45	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	5, 10, 15, 20, 25, 27, 30, 35, 40, 50	5, 10, 15, 20, 25, 32, 35, 42

The soil and groundwater samples were submitted to a State of California certified laboratory for analyses by the Modified EPA Method 8015 for TPH to diesel standard and by the EPA Method 8020 and/or 602 for BTEX. Table 5 presents the results of the analyses of the soil samples:

Table 5 - Analyses Results of Soil Samples Pertaining to Groundwater Monitoring Well Installations

Sample I.D.	Analyses				
	EPA 8015(M) Diesel mg/kg ◆	EPA 8020 µg/kg ▲			
		Benzene	Toluene	Ethylbenzene	Xylenes
MW1 @ 5'	ND	ND	ND	ND	ND
MW1 @ 10'	ND	ND	ND	ND	ND
MW1 @ 15'	ND	ND	ND	ND	ND
MW1 @ 20'	ND	ND	ND	ND	ND
MW1 @ 25'	ND	ND	ND	ND	ND
MW1 @ 30'	ND	ND	ND	ND	ND
MW1 @ 35'	ND	ND	ND	ND	ND
MW1 @ 40'	ND	ND	ND	ND	ND
MW2 @ 5'	ND	ND	ND	ND	ND
MW2 @ 10'	ND	ND	ND	ND	ND
MW2 @ 15'	ND	ND	ND	ND	ND
MW2 @ 20'	ND	ND	ND	ND	ND
MW2 @ 25'	ND	ND	ND	ND	ND

Sample I.D.	Analyses				
	EPA 8015(M) Diesel mg/kg ♦	EPA 8020 µg/kg ♣			
		Benzene	Toluene	Ethylbenzene	Xylenes
MW2 @ 30'	ND	ND	ND	ND	ND
MW3 @ 5'	ND	ND	ND	ND	ND
MW3 @ 10'	ND	ND	ND	ND	ND
MW3 @ 15'	ND	ND	ND	ND	ND
MW3 @ 20'	ND	ND	ND	ND	ND
MW3 @ 25'	ND	ND	ND	ND	ND
MW3 @ 27'	ND	ND	ND	ND	ND
MW3 @ 30'	ND	ND	ND	ND	ND
MW3 @ 35'	ND	ND	ND	ND	ND
MW3 @ 40'	ND	ND	ND	ND	ND
MW3 @ 50'	ND	ND	ND	ND	ND
MW4 @ 5'	ND	ND	ND	ND	ND
MW4 @ 10'	ND	ND	ND	ND	ND
MW4 @ 15'	ND	ND	ND	ND	ND
MW4 @ 20'	ND	ND	ND	ND	ND
MW4 @ 25'	ND	ND	ND	ND	ND
MW4 @ 32'	ND	444	19	212	193
MW4 @ 35'	ND	443	63	90	158
MW4 @ 42'	ND	8	ND	10	ND

♦ Detection Limit = 10 mg/kg

♣ Detection Limit = 5 µg/kg for benzene, toluene and ethylbenzene, 15 µg/kg for total xylenes

ND - Not Detected

None of the soil samples analyzed have been impacted by TPH. However, in boring MW4 relatively low to moderately high concentration of BTEX were detected to be present in the soil samples collected at depths of 32, 35 and 42 feet. BTEX were not detected in the other soil samples analyzed.

Table 6 presents the results of the groundwater sampling and analyses performed in 1995 following the installation and development of the groundwater monitoring wells:

Table 6 - Analyses Results of Groundwater Samples Collected After Well Development

Well I.D.	Analyses				
	EPA 8015(M) Diesel mg/l ♦	EPA 602 µg/l ♣			
		Benzene	Toluene	Ethylbenzene	Xylenes
MW1	ND	ND	ND	ND	ND
MW2	ND	ND	ND	ND	ND
MW3	1.2	42.9	16.3	6.9	41.5
MW4	0.8	3.4	2.5	3.8	5.3

♦ Detection Limit = 0.5 mg/l

♣ Detection Limit = 0.3 µg/l for benzene, toluene and ethylbenzene, 0.5 µg/l for total xylenes

ND - Not Detected

TPH and BTEX were not detected in monitoring wells MW1 and MW2. However, relatively low concentrations of TPH and BTEX were detected in monitoring wells MW3 and MW4.

Quarterly groundwater sampling and analyses was conducted for the first three quarters of 1996 (10 through 12). The results of the analyses of these samples are presented in Table 7 below:

Table 7 - Analyses of Quarterly Groundwater Samples Collected at the Subject Site

Well I.D.	Date	Analyses				
		EPA 8015(M) mg/l ♦	EPA 602 µg/l ♣			
			Benzene	Toluene	Ethylbenzene	Xylenes
MW1	1/16/1996	ND	ND	ND	ND	ND
	4/4/1996	ND	ND	ND	ND	ND
	7/18/1996	ND	ND	ND	ND	ND
MW2	1/16/1996	ND	ND	ND	ND	ND
	4/4/1996	ND	ND	ND	ND	ND
	7/18/1996	ND	ND	ND	ND	ND
MW3	1/16/1996	ND	57.3	ND	80.1	1.6
	4/4/1996	ND	21.3	1.3	31.3	2.3
	7/18/1996	ND	33.4	ND	34.7	ND
MW4	1/16/1996	ND	128.7	ND	69.5	ND
	4/4/1996	ND	119.7	1.5	9.6	1.9
	7/18/1996	ND	ND	ND	ND	ND

♦ Detection Limit = 0.5 mg/l

♣ Detection Limit = 0.3 µg/l for benzene, toluene and ethylbenzene, xylenes have a detection limit of 0.5 µg/l

ND - Not Detected

TPH was not detected in any of the monitoring wells. However, low to moderate concentrations of BTEX were detected in monitoring wells MW3 and MW4. The concentrations in general show a declining trend.

Table 8 presents the groundwater depths and elevations measured at the time of groundwater sampling at the subject property:

Table 8 - Groundwater Elevation Data at the Subject Site

Well I.D.	Date	Top of Casing Elevation ♦	Depth to Groundwater (Feet)	Groundwater Surface Elevation ♦
MW1	5/5/95	98.83	27.69	71.14
	1/16/96		31.85	66.98
	4/4/96		31.58	67.25
	7/18/96		36.78	62.05
MW2	5/5/95	99.72	28.78	70.94
	1/16/96		32.92	66.80
	4/4/96		32.66	67.06
	7/18/96		37.86	61.86
MW3	5/5/95	98.55	29.22	69.33
	1/16/96		32.83	65.72
	4/4/96		32.53	66.02
	7/18/96		37.65	60.90
MW4	5/5/95	99.29	30.22	69.07
	1/16/96		34.23	65.06
	4/4/96		34.65	64.64
	7/18/96		38.65	60.64

♦ Elevations are relative to benchmark of 100 feet above Mean Sea Level

The direction of groundwater flow at the subject property has been determined to be southerly (9 through 12). The groundwater elevation data presented in Table 8 shows that since May 1995 the water depth at the site has steadily dropped by a total of about eight to nine feet.

5.0 SITE GEOLOGY

The boring logs that are included in the reports (3, 4 and 9) have been reviewed. The boring logs of the site investigations (3 and 4) show that the soil profile at the site consists of sandy clay, clayey sand and clayey silt to a depth of 40 feet. The boring logs that were prepared during the groundwater monitoring well installations (9) show that the soil profile at the site consists of silty sand and sandy silt both with clay and gravel to depths of approximately 50 feet. At about 50 feet from the surface, siliceous sand stone and siliceous siltstone bedrock was encountered in monitoring wells MW1, MW2 and MW3 (9). In monitoring well MW4, black siliceous siltstone bedrock was encountered at 42 feet below the surface (9).

6.0 DISCUSSION

The subsurface investigations conducted at the site have established that leakage and/or spillage of diesel fuel has occurred. In this section the data regarding the presence of the contamination in the soil and in the groundwater are evaluated and discussed.

a. Soil Contamination Underneath the Dispensers

The presence of TPH underneath the dispensers was established at the time of tank removals (2). Very low concentrations of toluene and xylenes were also detected under the eastern dispenser. Additional soil samples collected at a depth of three feet underneath the western dispenser and at a depth of four feet underneath the eastern dispenser and analyzed showed that the concentration of TPH dropped to 18 mg/kg and 290 mg/kg, respectively (4). TPH and BTEX were not detected in soil samples collected from boring B10 that was slant drilled under the eastern dispenser and the building. These data indicate that the vertical extent of TPH underneath the dispensers is limited to the near surface soils. Since the vertical extent of the TPH is limited and considering that near surface contamination was not detected in any of the other borings that were drilled in close vicinity of the dispensers and the type of soils that were encountered at the site, the lateral extent of the TPH at these two locations is considered to be limited to the immediate area around the dispensers.

b. Soil Contamination Underneath and in the Vicinity of the Underground Storage Tanks

The presence of TPH underneath the USTs was also established at the time of tank removals (2). The contamination was more elevated underneath tank #1 (the western tank) and in the western end of tank #2 (the eastern tank).

Soil sampling and analyses around the western tank excavation (3) showed that TPH and BTEX were not present immediately adjacent to the western tank excavation. The soil samples were collected from borings B2, B7 and B8 at depths of 14 feet. The analyses did not detect TPH and BTEX. The field monitoring of the soil samples collected from these borings at depths less than and greater than 14 feet did not indicate the presence of petroleum contamination. It is likely that the soil contamination detected underneath the western tank is confined to a limited area directly beneath the western tank. Figure 5 shows an approximate vertical cross section of the plume associated with the western tank. Further soil sampling and analyses at the time of the installation of monitoring wells to the west (MW1) and northeast (MW2) of the western tank showed that TPH and BTEX were not present to a depth of fifty feet (9). These data also indicate that the soil contamination associated with the western tank has not migrated laterally and is likely to be confined to a limited depth directly beneath the tank invert.

Soil sampling and analyses around the eastern tank excavation (3) and (4) showed that relatively elevated TPH and BTEX concentrations were present in boring B1 at a depth of 19 feet. Low to moderately high concentrations of BTEX were detected in borings B3 at a depth of 39 feet, in boring B6 at a depth of 14 feet, in boring B9 at depths of 30, 35 and 40 feet, and in boring B11 at depths of 25, 30, 35 and 40 feet. Soil samples collected from the slant boring B10 showed that the contamination in the vicinity of the eastern tank has not migrated underneath the building. Based on these results, a plume of soil contamination associated with the eastern tank was constructed. Figures 5 and 6 show the approximate vertical cross sections of the plume associated with the eastern tank. Further soil sampling and analyses at the time of the installation of monitoring wells to the northwest (MW2) and southwest (MW3) of the eastern tank did not detect any TPH and BTEX to depths of 30 and 50 feet, respectively. Another attempt has been made to define the soil plume of contamination in relation to the eastern tank (9), but the outcome appears to be inadequate and does not enhance the previous approximate plume presented in Figures 5 and 6.

Soil samples collected from monitoring well MW4 at depths of 32, 35 and 42 feet and analyzed showed the presence of BTEX. This phenomenon may indicate that the contaminants had migrated through possible subsurface fractures and/or other conduits to this location.

The results of the investigations show that the subsurface soils north of the tanks and underneath the building has not been impacted with TPH and BTEX. However, leakage and/or spillage from the eastern tank has impacted the soils in south-southwesterly and westerly directions.

There are no regulatory concentration limit for soil contamination that can be left in place. However, in an effort to determine the concentration of the contaminants that can be safely left in-place without threatening groundwater, the leaching potential analysis method as presented in the Leaking Underground Fuel Tank (LUFT) Manual (13) was used. The method consists of employing several characteristics in a table (often referred to as the LUFT Manual Table 2-1) to determine the concentration of the soil contaminants that can be safely left in-place. The characteristics include groundwater depth, historical groundwater depth in the locality, subsurface fractures, average annual precipitation, manmade conduit, and unique site features.

Table B1 enclosed in Appendix B presents the leaching potential analyses resulting in a score of 34 which allows a maximum TPH concentration of 100 mg/kg as diesel to remain at the site, while BTEX concentrations are not applicable. The maximum TPH concentration detected at the site was 5800 mg/kg at a depth of about 13 feet from the surface (2), while BTEX concentrations have also been detected at various depths at this site. These concentrations employed in the leaching potential evaluation are all above those allowed under the LUFT Field Manual. However, it must be appreciated that the source of the contaminants (the former USTs) have been removed from the site and since the site is paved it is unlikely that the contaminants within the soil matrix to a depth of 25 feet below the surface can migrate further from the locations where they have been detected. As a result, the groundwater at the site cannot be impacted further by the contaminants that are within the soil matrix, unless the groundwater rises dramatically.

c. Groundwater Contamination at the Site

The groundwater at the site was first encountered in boring B11 at a depth of 40 feet which settled at 34 feet (4). In this boring a groundwater sample was collected through the annulus of the augurs and analyzed which showed the presence of significant concentrations of BTEX. It is likely that the contaminants had accumulated at the surface of the water table and since no purging of the groundwater was conducted, the BTEX concentrations are exaggerated.

The original sampling and analyses of the groundwater was conducted in May 1995. The analyses results show that TPH and BTEX were not present in the up-gradient monitoring wells MW1 and MW2. However, minute concentrations of TPH was detected in down-gradient monitoring wells MW3 and MW4. In addition, low concentrations of toluene, ethylbenzene and xylenes were detected in MW3 and MW4. The concentration of benzene in MW3 was moderately high and its concentration in MW4 was low.

The quarterly sampling and analyses of the groundwater from the monitoring wells confirm that TPH and BTEX are not present in the up-gradient monitoring wells MW1 and MW2. In addition, TPH was not detected in the down-gradient monitoring wells MW3 and MW4. However, low concentrations of toluene, ethylbenzene and xylenes have been detected in these wells, while the concentrations of benzene have been moderately high. The concentrations in general show a declining trend and in the last quarterly monitoring (July 1996) conducted at the site, BTEX was not detected in monitoring well MW4.

The results of the quarterly monitoring shows that the concentrations of benzene and ethylbenzene detected in MW3 and MW4 are in general higher than the concentrations detected immediately after

the installation of the monitoring wells in May 1995. This is likely to be a result of the accumulation of the contaminants at the surface of the water table and inadequate well purging prior to sampling.

The State of California maximum contaminant levels (MCLs) for BTEX are 1 $\mu\text{g/l}$, 150 $\mu\text{g/l}$, 700 $\mu\text{g/l}$ and 1,750 $\mu\text{g/l}$, respectively (14). The concentrations of toluene, ethylbenzene, and xylenes have not exceeded their respective MCLs in any of the groundwater samples collected and analyzed. However, benzene concentrations detected in monitoring well MW3 and MW4 have been higher than its MCL. Currently diesel has no MCL.

The depth of the groundwater has dropped at the site since the start of groundwater monitoring in May 1995. The fluctuations in the water level can be attributable to rainfall and recharge in the area. The rainfall data at the Zuma Beach weather station the nearest weather station to the site for the water year 1994/1995 (October 1, 1994 to September 30, 1995) was 31.37 inches and for the water year 1995/1996 (October 1, 1995 to July 1996) has been reported to be 13.12 inches (15). The average yearly rainfall at the Zuma Beach weather station is 16 inches. The fluctuation of the groundwater depth at the site is of some significance, as it can cause the smearing of the subsurface soils within the aquifer with the contaminants. The presence of TPH and/or BTEX at depths greater than 25 feet in borings B3, B9 and B11 may be attributed to this phenomenon.

The groundwater aquifer included in this investigation is not utilized as a drinking water source and it is not anticipated that it will have such beneficial uses in the future. It is unlikely that any health hazards will arise due to the presence of the contaminants detected at the site.

7.0 CONCLUSIONS

Unauthorized release or discharge of diesel has occurred at the site. However, the underground storage tanks and the dispensers that had caused the subsurface contamination have been removed from the site.

The impact of the contaminants underneath the western tank appears to be limited to soils directly under the tank and does not appear to have migrated vertically and/or laterally to cause any impact on the groundwater. The soils underneath the western parts of the eastern tank have been impacted with TPH and BTEX. The vertical soil plume of contamination has been fairly well defined.

Since the sources of the contamination at the site have been removed, the soils plume of contamination do not appear to be of environmental significance at the present time.

The groundwater at the site has been impacted with the products previously stored in the tanks. The down gradient wells MW3 and MW4 show the presence of BTEX. However, according to the quarterly monitoring results the concentrations of the contaminants have generally been declining.

The plume of the groundwater contamination has not been fully defined. But the groundwater flow direction is generally in a southerly direction.

8.0 RECOMMENDATIONS

No further investigation and/or action is recommended at this time, unless requested by the CRWQCB.

It is recommended that the CRWQCB consider issuing a closure certificate for the site.

If closure is granted, it is recommended to abandon the monitoring wells according to the water well standards of the State of California.

9.0 LIMITATIONS

The conclusions and recommendations in this report are based on the following:

- a. Subsurface conditions assessed from the borings drilled by others at the site;
- b. Review of referenced documents and rainfall data;
- c. The observations made in field trips to the site;
- d. The results of laboratory analyses of the soil and groundwater samples collected by others from the site;
- e. Conclusions are based on data and other information provided to or reasonably available to OBE; and

It is possible that variations in the soil or ground conditions could exist beyond the points explored by the various others parties that conducted site investigations. Also, changes in the groundwater conditions could occur in the future due to variations in rainfall, temperature, regional water usage, or other factors.

Further regulatory modifications, agency inspections, and/or attitude changes may affect the environmental status of the site.

10.0 DISCLAIMER

Our Professional services have been performed using the degree of care and skill ordinarily exercised under similar circumstances by professionals practicing in this field. However, the recommendations in this case have not been based on risk assessment.

No warranty, of the overall conditions of the entire site, expressed or implied, of any kind is made or intended in connection with this report, or by the fact that you are being furnished with this report, or by any other oral or written statement.

OBE does not warrant or guarantee the site suitable for any particular purpose or certify the property as clean.

11.0 SUMMARY

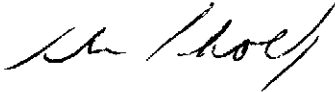
This report has presented a summary of our review of previous subsurface investigations that were conducted by others at the Malibu Park School located at 30215 Morning View Drive, Malibu, California, conclusions, recommendations as well as request for closure.

If you have any questions or require additional information, please call us at (310) 473-5911.

Sincerely
OCEAN BLUE ENGINEERS, INC.



Jahan Nazarian, Ph.D., R.E.A.
Project Manager



John Schock - P.E.
Registered Civil Engineer

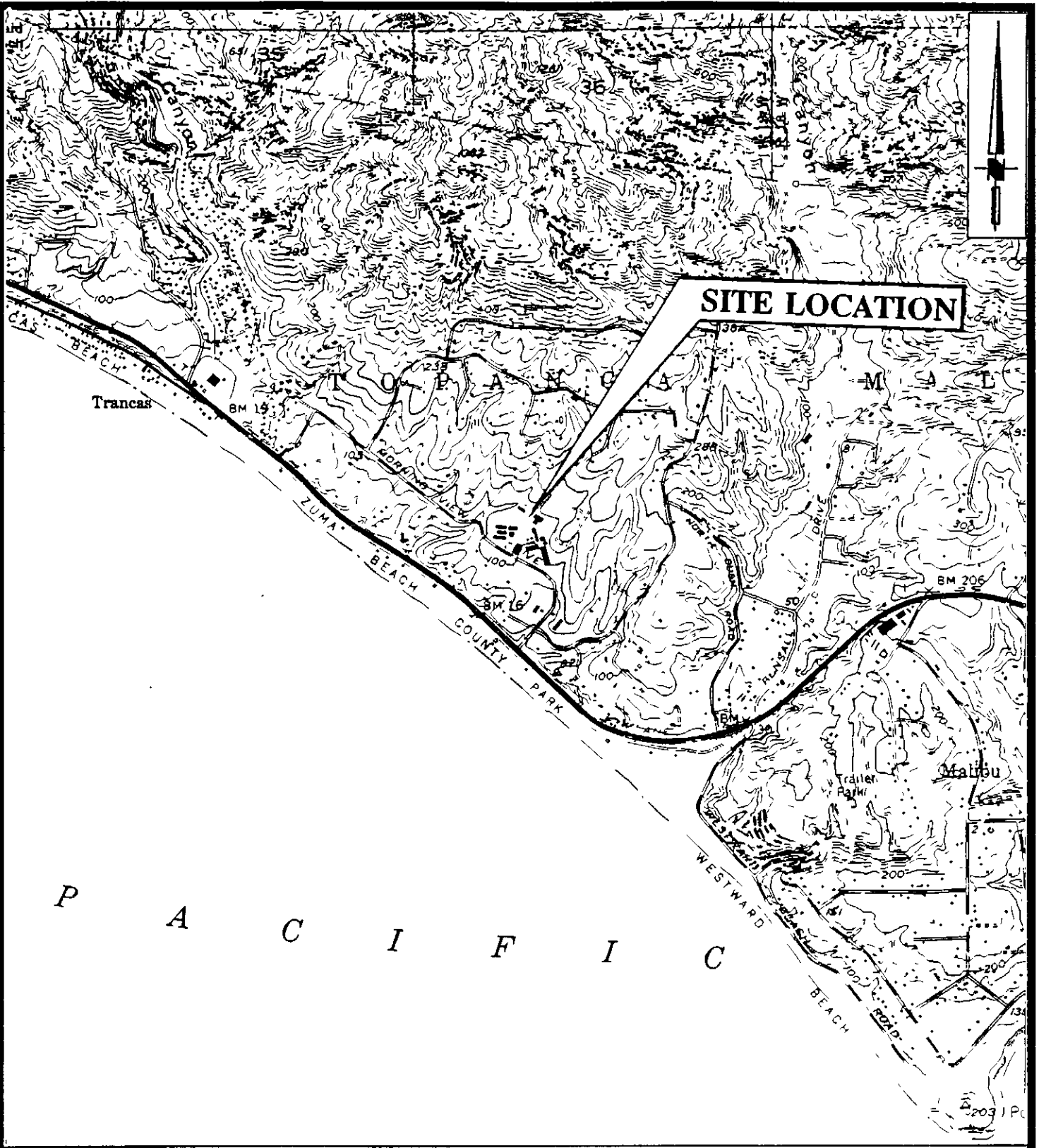


12.0 REFERENCES

1. USGS Map, Point Dume Quadrangle, 7.5 Minute Series (Topographic), 1950, Photorevised 1981.
2. Tank Removal Report, Malibu Park School, TTMS, August 1992.
3. Report of Environmental Activities for Malibu Park School and Webster Elementary School Sites, Malibu, California, Earth Systems Environmental, Inc., November 16, 1992.
4. Report of Additional Site Assessment Activities, Malibu Park School, Malibu, California, Earth Systems Environmental, Inc., February 8, 1993.
5. Letter by the Los Angeles County Department of Public Works, Waste Management Division (WMD), UST Local Oversight Program (LOP), August 17, 1993.
6. Subsurface Investigation by Drilling Four Borings and Soil Sampling, and Possible Installation, Development and Sampling of Four Groundwater Monitoring Wells at Malibu Park School, Malibu, California, Ocean Blue Engineers, Inc. April 4, 1994.
7. Letter by the Los Angeles County Department of Public Works, Waste Management Division (WMD), UST Local Oversight Program (LOP), May, 18, 1994.
8. Letter by the Los Angeles County Department of Public Works, Waste Management Division (WMD), UST Local Oversight Program (LOP), June 16, 1994.
9. Interim Report of Groundwater Monitoring, Well Installation and Site Assessment Report at 30215 Morning View Drive, Malibu, CA 90265, Vector Three Environmental, Inc. December 7, 1996.
10. Groundwater Monitoring Report, Malibu Park School, 30215 Morning View Drive, Malibu, California, The Reynolds Group Environmental Services, January 1996.
11. Groundwater Monitoring Report, Malibu Park School, 30215 Morning View Drive, Malibu, California, The Reynolds Group Environmental Services, April 1996.
12. Groundwater Monitoring Report, Malibu Park School, 30215 Morning View Drive, Malibu, California, The Reynolds Group Environmental Services, July 1996.
13. Leaking Underground Fuel Tank Field Manual, State of California, Leaking Underground Storage Tank Task Force, October 1989.
14. United States Environmental Protection Agency Region IX, Drinking Water Standards and Health Advisories Table, December 1995.
15. Rainfall Data for the Zuma Beach Weather Station Obtained from the Los Angeles County Department of Public Works, August 20, 1996.

APPENDIX A

Figures



P A C I F I C

Source: USGS Map, Point Dume Quadrangle, 7.5 Minute Series (Topographic), 1950, Photorevised 1981.

Scale: 1" = 2,000'



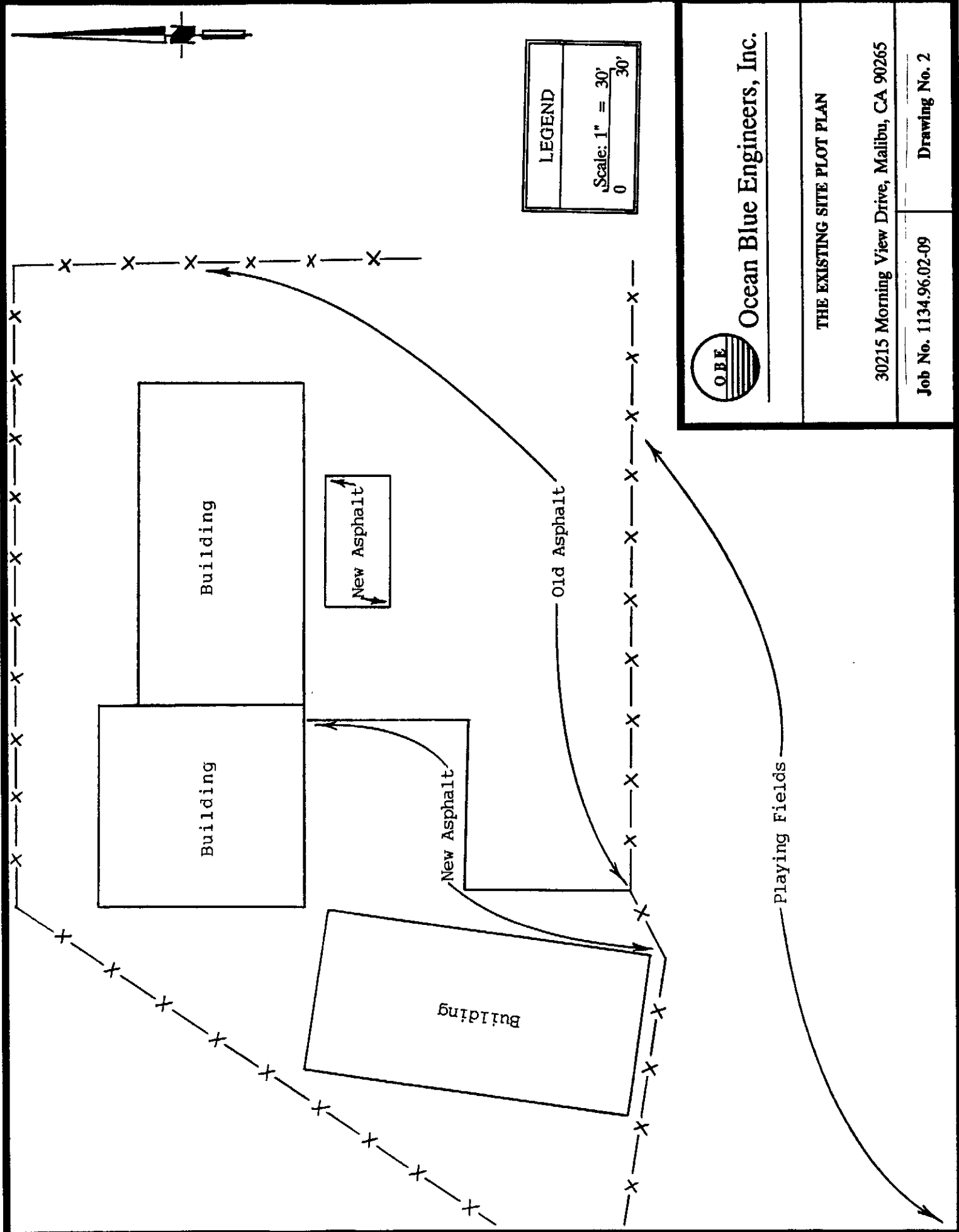
Ocean Blue Engineers, Inc.

VICINITY MAP

Malibu Park School
Morning View Dr., Malibu, CA 90265

Job No.
1134.96.02-09

Drawing No.
1



LEGEND

Scale: 1" = 30'

0 30'



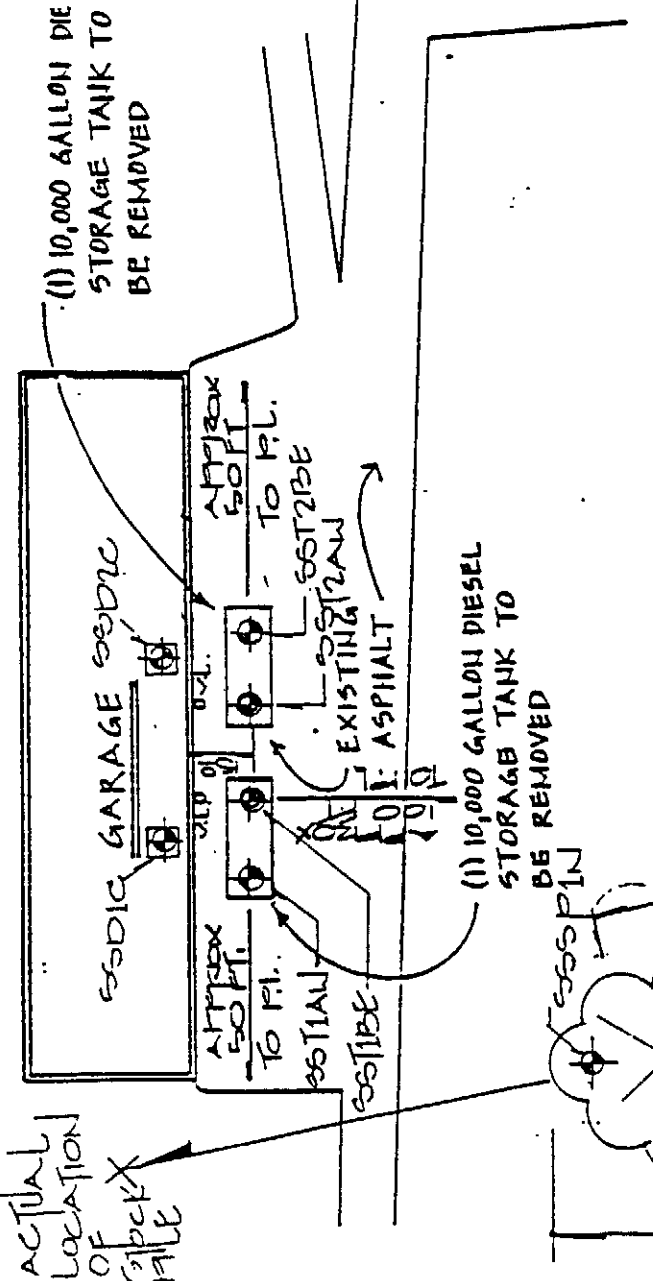
Ocean Blue Engineers, Inc.

THE EXISTING SITE PLOT PLAN

30215 Morning View Drive, Malibu, CA 90265

Job No. 1134.96.02-09

Drawing No. 2



Ocean Blue Engineers, Inc.

PROPERTY PLOT PLAN

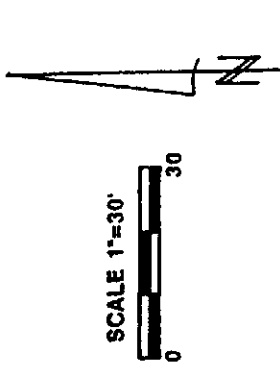
Showing the Tanks and Sample Locations
 30251 Morning View Drive, Malibu, CA 90265

Job No. 1134.96.02-09

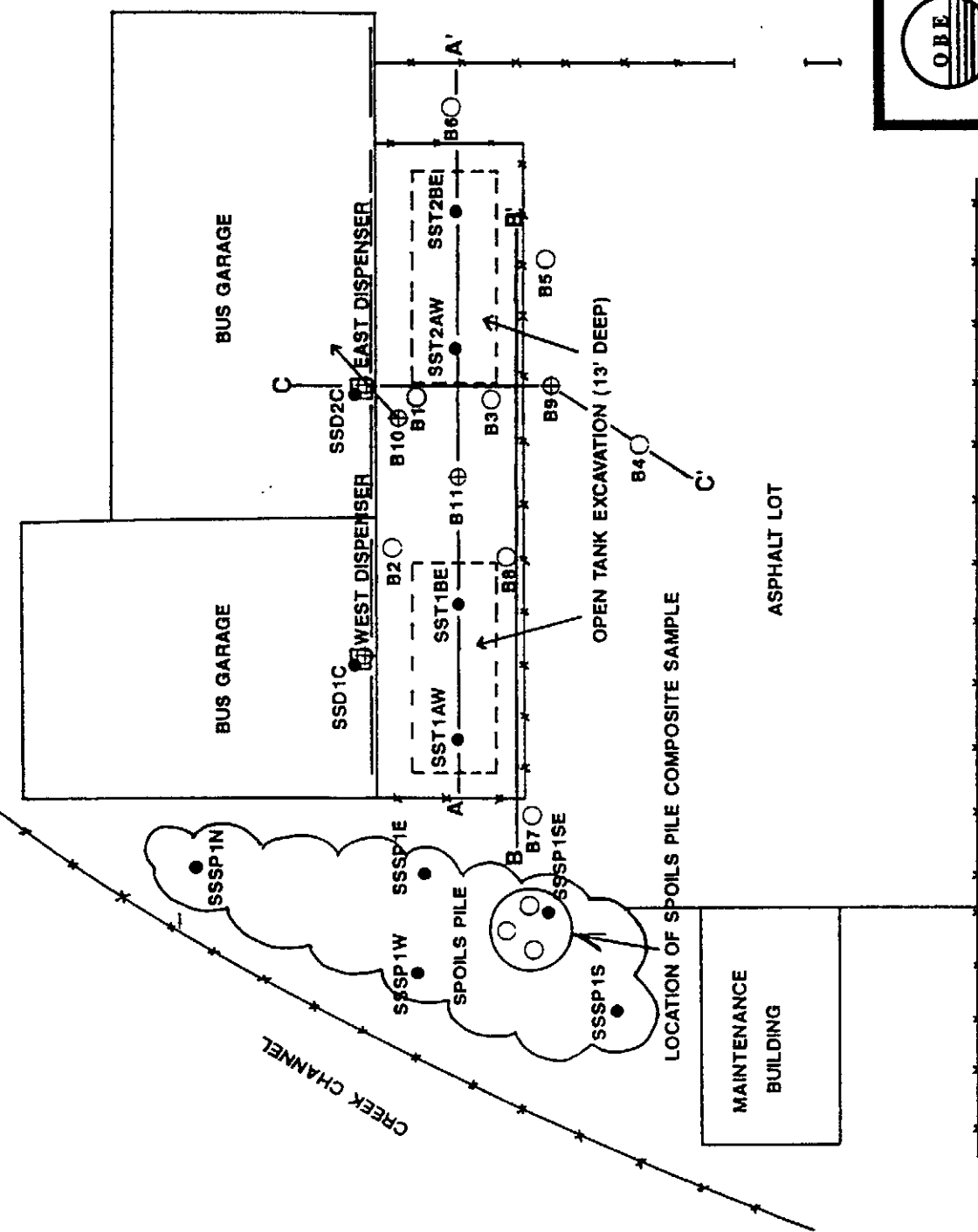
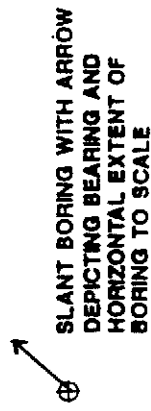
Drawing No. 3

LEGEND

Source TTMS, Inc (2)



- B9 ⊕ SAMPLE COLLECTED BY
EARTH SYSTEMS ENVIRONMENTAL -
JANUARY 1993
- B2 ○ SAMPLE COLLECTED BY
EARTH SYSTEMS ENVIRONMENTAL -
OCTOBER 1992
- SST2AW ● SAMPLE COLLECTED DURING
TANK REMOVAL - AUGUST 1992



Ocean Blue Engineers, Inc.

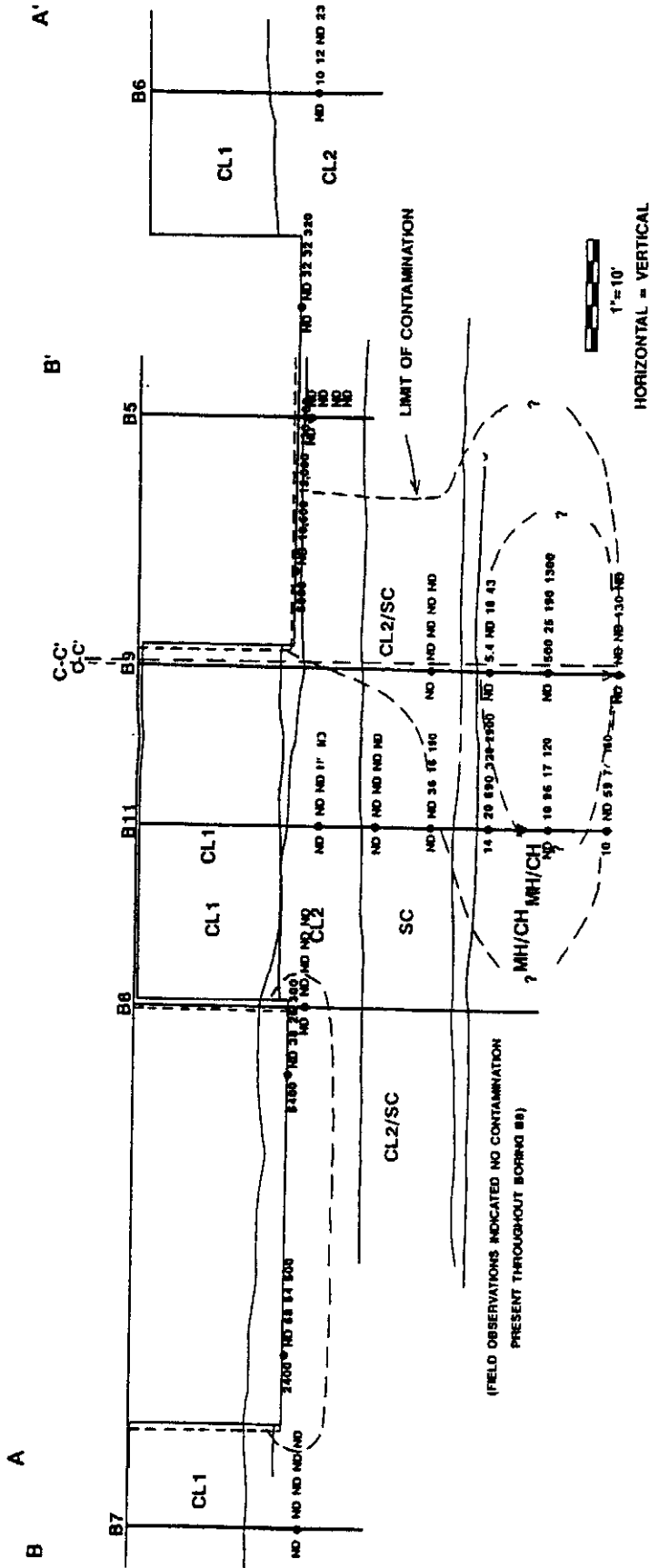
FORMER TANK SITE
Showing the Boring Locations

30215 Morning View Drive, Malibu, CA 90265

Job No. 1134.96.02-09

Drawing No. 4

LEGEND
Sources: Earth Systems Environmental, Inc (3) and (4)



CL1 SANDY CLAY TO CLAYEY SAND: red-brown, fine to coarse grained sand, some angular gravel
 CL2 SANDY CLAY: orange-brown, fine to coarse grained sand, some gravel lenses
 SC CLAYEY SAND: orange-brown, silty, fine grained sand
 MH/CH WEATHERED SHALE (CLAYEY SILT): mottled orange-brown and greenish yellow, fine grained sand, waxy
 THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

14 20 890 326 2900

TPH ● BENZENE TOLUENE ETHYL BENZENE TOTAL XYLENES (PPM)
 ND = NOT DETECTED

▽ STATIC GROUNDWATER LEVEL FOLLOWING DRILLING



Ocean Blue Engineers, Inc.

Job No.
1134,96,02-09

SITE PLOT PLAN
 Showing Cross Sections AA and BB
 Malibu Park School
 Morning View Drive, Malibu, CA 90265

LEGEND
 Sources Earth Systems Environmental, Inc. (4)

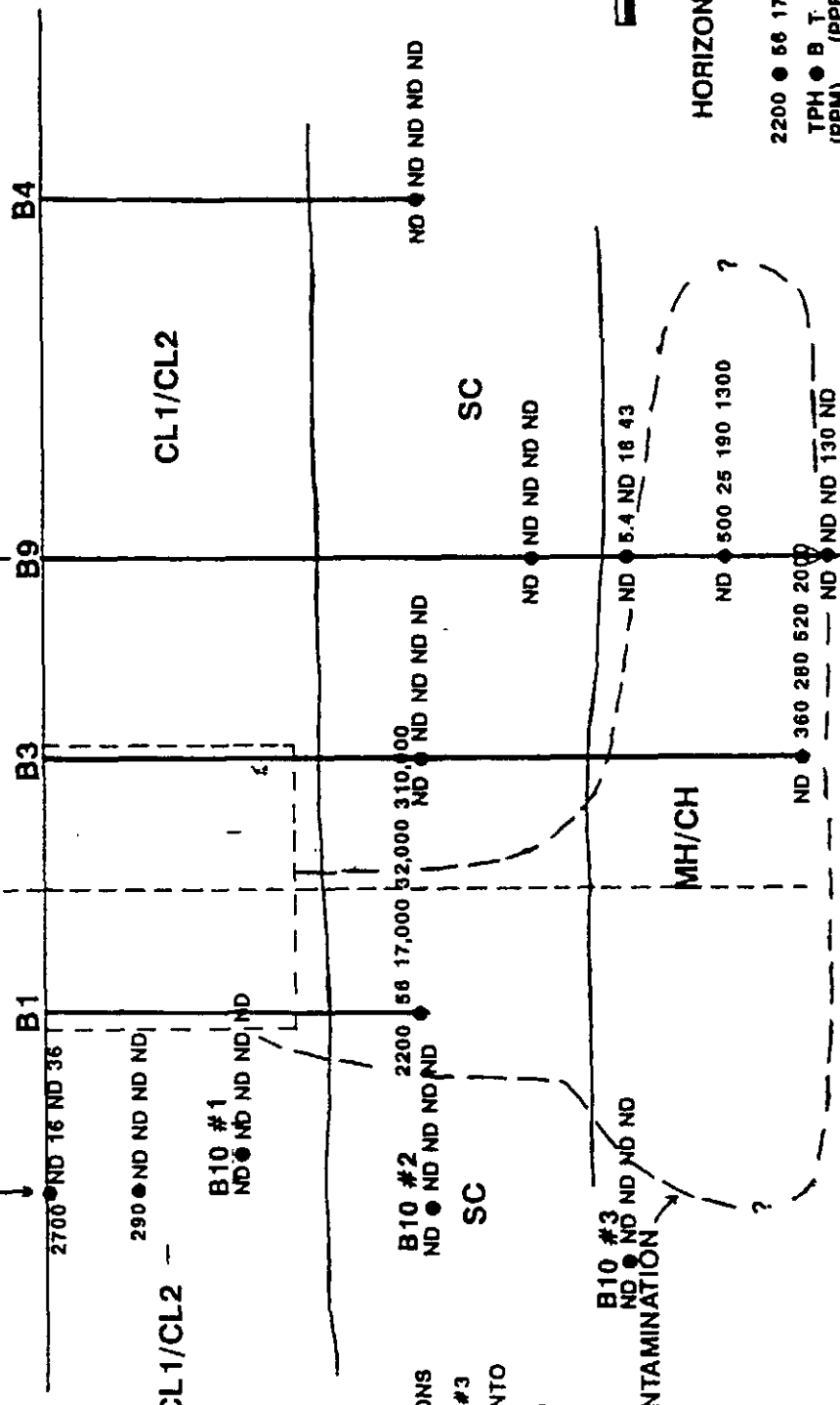
Drawing No.
5

C

EAST DISPENSER

A-A'

B-B'



1" = 10'

HORIZONTAL = VERTICAL

2200 ● 56 17,000 32,000 310,000
 TPH ● B T E X
 (PPM) (PPB)

ND = NOT DETECTED

(SAMPLE LOCATIONS
 B10 #2 AND B10 #3
 ARE PROJECTED INTO
 THE PLANE C-C')

▽ GROUNDWATER LEVEL AT THE TIME OF DRILLING


CL1/CL2 SANDY CLAY TO CLAYEY SAND: red-brown to orange-brown, fine to coarse grained sand, some gravel
 SC CLAYEY SAND: orange-brown, silty fine grained sand
 MH/CH WEATHERED SHALE (CLAYEY SILT): mottled orange-brown and greenish yellow, fine grained sand, waxy

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

Job No.
 1134,96,02-09

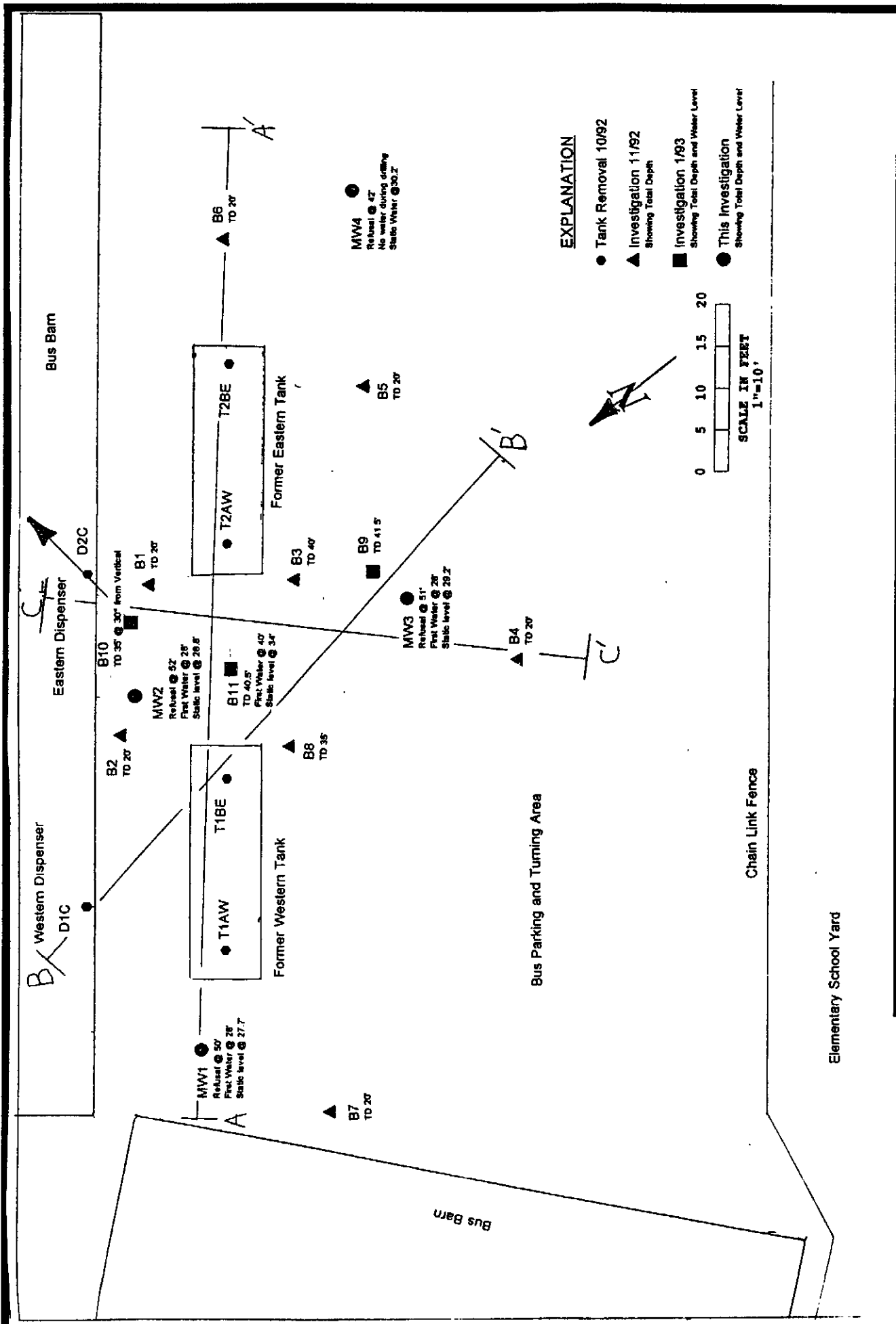
Drawing No.
 6

SITE PLOT PLAN
 Showing Cross Section CC
 Malibu Park School
 Morning View Drive, Malibu, CA 90265

 Ocean Blue Engineers, Inc.

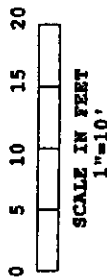
LEGEND

Source: Earth Systems Environmental, Inc (4)



EXPLANATION

- Tank Removal 10/92
- ▲ Investigation 11/92 Showing Total Depth
- Investigation 1/93 Showing Total Depth and Water Level
- This Investigation Showing Total Depth and Water Level



Job No.
1134.96.02-09

SITE PLOT PLAN
Showing the Monitoring Wells
Malibu Park School
Morning View Drive, Malibu, CA 90265

Ocean Blue Engineers, Inc.



LEGEND

Source: Vector Three Environmental, Inc. (9)

Drawing No.
7

APPENDIX B

Leaching Potential Evaluation

Table B1 - Leaching Potential Analyses for TPH and BTEX

Site Feature	Score	Score 10 Points if Condition is Met	Score	Score 9 Points if Condition is Met	Score	Score 5 Points if Condition is Met
Minimum Depth to Groundwater from the Soil Sample (Feet)		Condition > 100'		Condition: 51-100	0	Condition: 25-50 Estimated 14'
Fractures in Subsurface (Applies to Foothills or Mountain Areas)		Condition: None		Condition: Unknown	5	Condition: Present Actual Present
Average Annual Precipitation (Inches)		< 10"	9	Condition: 10-25 Actual 16"		Condition: 26-40
Man-made Conduits which Increase Vertical Migration of Leachate	10	Condition: None Actual None		Condition: Unknown		Condition: Present
Unique Site Features: Recharge Area, Coarse Soils, Nearby Wells, etc....	10	Condition: None Actual None		Condition: At Least One		Condition: More than One
Column Totals & Total Points	20	+	9	+	5	= 34
RANGE OF TOTAL POINTS	49 Points or More		41 - 48 Points or More		40 Points or Less	
MAXIMUM ALLOWABLE B/T/E/X LEVELS (ppm)	1/50/50/50		0.3/0.3/1/1		NA	
MAXIMUM ALLOWABLE TPH LEVELS (PPM)	Gasoline	1,000	100		10	
	Diesel	10,000	1,000		100	