LEVINE·FRICKE

June 21, 1990

LF 1547

PHASE II SOIL AND GROUND-WATER INVESTIGATION KAISER MOSSWOOD BUILDING 3505 BROADWAY OAKLAND, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of Levine·Fricke's Phase II soil and ground-water investigation conducted for Kaiser Foundation Health Plan, Inc. (Kaiser) at the Mosswood Building, 3505 Broadway, Oakland, California ("the Site"; Figure 1). The Work Plan for this Phase II investigation was submitted by Levine·Fricke to Kaiser on August 16, 1989, and was approved by Kaiser on August 21, 1989.

2.0 BACKGROUND

In February 1989, Kaiser personnel discovered a leak in a component of the mechanism that pumped gas from two underground gasoline tanks at the Site. Gasoline also was observed to be seeping into a transformer vault located in the northeast corner of the Site (Figure 2). Kaiser requested that Levine·Fricke conduct a site inspection to assess the extent of gasoline in the subsurface due to the leak. Based upon a site inspection, a report was prepared that recommended performing a soil gas survey to assess the lateral extent of gasoline in the subsurface. The report, dated March 28, 1989, was submitted to Kaiser, the County Department of Health, and the Regional Water Quality Control Board.

In general, the soil-gas survey indicated the presence of elevated concentrations of total petroleum hydrocarbons in the vadose zone in several locations near the underground storage tanks, and along the perimeter of the building between the tank locations and the transformer vault. Based upon the results of the soil-gas survey, four ground-water monitoring wells were installed to assess the lateral extent of petroleum compounds in ground water. Installation of all four wells was not completed until April 1990, due to CalTrans' delay in granting permission to install a well on its property.

3.0 FIELD INVESTIGATION

3.1 Field Methodology

Four wells were installed at the Site by Hew Drilling of Palo Alto, California, under the supervision of a Levine·Fricke Registered Geologist. The boring for well LF-1 was drilled on September 30, 1989; borings for wells LF-2 and LF-3 were drilled on November 6, 1989; and the boring for well LF-4 was drilled on April 10, 1990. Figure 2 presents the locations of the borings. Details of field methodologies are presented in Appendix A and borehole logs are included in Appendix B.

3.2 Geology

In general, the upper 5 feet of sediment encountered at each well location consisted of interbedded clayey silt and sand, and sandy-clayey gravel. At each location, a sandy gravel or gravelly sand interval was identified from approximately 5 to 12 feet below grade. Sandy and/or silty clay was identified below those coarser-grained sediments.

During the drilling of well LF-1, petroleum vapors were detected in soil samples collected from approximately 10, 15, and 20 feet below grade. Petroleum vapors were also identified in the soil sample collected from approximately 10 feet below grade at LF-2.

3.3 Ground-Water Flow

Depth to ground water was measured at each well on June 4, 1990. Ground-water elevations were calculated by subtracting the measured depth to water from the surveyed elevation of the top of the PVC casing. Based on these measurements, ground-water flow is towards the east under a gradient of 13 percent. Figure 3 illustrates ground-water elevations measured on June 4, 1990. The hydraulic gradient on that date appears to be somewhat steeper than would be expected for the Site, and may be influenced by irrigation, leaking pipes, leaking sewers, or artificial flow barriers such as building foundations.

4.0 ANALYTICAL RESULTS

4.1 Soil Quality Results

Two soil samples from LF-1 and LF-2 and one soil sample from LF-3 were submitted to Med-Tox, a California State-certified analytical laboratory in Pleasant Hill, California. Soil samples were analyzed for total petroleum hydrocarbons (TPH) characterized as regular gasoline, using modified EPA Method 8015; and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020. Field screening (by OVM, odor, and discoloration) of soil samples collected from well boring LF-4 did not indicate the presence of petroleum compounds in soil at that location. Because of this, soil samples from well LF-4 were not submitted to the analytical laboratory for TPH or BTEX analysis.

Results of the soil analyses are summarized in Table 1, and are illustrated on Figure 4. Laboratory reports are included in Appendix C. The highest concentration of TPH (8 parts per million [ppm]) was detected in the soil sample collected from the boring for well LF-2 at a depth of 9 to 9.5 feet below grade. The highest BTEX concentrations (0.310 ppm benzene, 0.770 ppm toluene, 0.077 ppm ethylbenzene, and 0.670 ppm xylenes) were detected in the soil sample collected from the boring for well LF-2 at a depth of 14 to 14.5 feet below grade.

4.2 Ground-Water Quality Results

Ground-water samples collected from ground-water monitoring wells LF-2 and LF-3 were submitted to Med-Tox Associates, of Pleasant Hill, California, a California State-certified laboratory, for TPH and BTEX analysis using EPA Methods 8015 and 8020, respectively. The ground-water sample collected from LF-4 was submitted for the same analyses to the BC Analytical Laboratory, also a California State-certified laboratory, in Emeryville, California. Results of these analyses are summarized in Table 2 and are illustrated on Figure 5.

A ground-water sample was not collected from well LF-1 because approximately 1.5 feet of floating hydrocarbon product was measured on the ground-water surface in well LF-1 in November 1989. Approximately 7.9 feet of hydrocarbon product was measured in the well on June 4, 1990. Approximately 8.3 feet of hydrocarbon product was measured in the well on June 18, 1990. Gasoline products tend to collect in monitoring wells at significantly greater thicknesses than those actually existing on the ground water. Therefore, the 7.9- and 8.3-foot measurements probably represent an actual product thickness significantly less than that in surrounding soils. The increase in product thickness measured in LF-1 is most likely due to the residual product in the permeable tank backfill soil migrating and accumulating in well LF-1.

Low concentrations (0.200 to <0.0001 ppm) of TPH and BTEX were detected in ground-water samples collected from wells LF-2, LF-3, and LF-4. The ground-water sample collected from LF-2 contained the highest concentrations relative to the other two wells at 0.017 ppm, 0.005 ppm, 0.001 ppm, and 0.018 ppm for BTEX and 0.200 ppm for TPH. No detectable concentrations of TPH and BTEX were detected in the ground-water sample collected from well LF-3, with the exception of a trace concentration of toluene at 0.0008 ppm.

5.0 CONCLUSIONS

Based upon the results of Phase II soil and ground-water investigations, soil and ground water at the Site appear to be affected by gasoline in the proximity of the underground tanks. The soils in the vicinity of the tanks are generally clayey in nature and have limited product movement away from the source. Floating gasoline product was detected on the shallow ground water in well LF-1, which is adjacent to the tanks. However, ground water in the other three wells, which are 20 to 30 feet away from the tanks, were affected only by low concentrations of hydrocarbons dissolved in ground water. Thus, it appears that the native clayey sediments of low permeability are restricting migration of gasoline away from the underground tanks.

Static ground-water measurement data indicate a fairly steep flow gradient to the east of 13 percent (0.13 ft/ft). This flow gradient seems abnormally high and may not represent natural ground-water flow. The gradient may be influenced by recharge through irrigation or barrier effects such as building foundations.

6.0 RECOMMENDATIONS

Levine·Fricke recommends that Kaiser evaluate remediation alternatives, including removing floating gasoline product from the ground water, monitoring ground-water flow and quality with the existing wells and possibly additional monitoring wells, and performing soil vapor remediation in the area of the tanks.

Levine·Fricke will discuss with Kaiser the remaining tasks necessary to initiate remediation, and present a Work Plan to perform these tasks.

TABLE 2

SOIL ANALYSES SUMMARY
(Concentrations expressed in ppm)

Boring ID Depth Interval (feet below grade)	Analytical Method	Lab	Benzene	Toluene	Ethylbenzene	Xylene	Total Petroleum Hydrocarbons Concentration	Total Petroleum Hydrocarbons Characterization
LF-1								
8.0-8.5	8020	Med-Tox	0.004	0.003	<0.001	0.004		
	8015						0.200	Gasoline
LF-2								
27.0-27.5	8020	Med-Tox	0.037	0.120	0.025	0.120		
	8015						1.300	Gasoline
LF-3								
9.0-9.5	8020	Med-Tox	0.110	0.260	0.059	0.330		
	8015						8.00	Gasoline
LF-4								
14.0-14.5	8020	Med-Tox	0.310	0.770	0.077	0.670		
	8015						3.900	Gasoline
LF-5								
12.0-12.5	8020	Med-Tox	0.003	0.017	<0.001	<0.003		
	8015						0.600	Gasoline

Notes: Med-Tox Associates Inc., Pleasant Hill, CA

TABLE 2

GROUND-WATER SUMMARY
(Concentrations expressed in ppm)

Well	Laboratory Analysis	Sample Date	Lab	Benzene	Toluene	Ethylbenzene	Xylene	Total Petroleum Hydrocarbons	
								Concentration	Characterization
LF-2	8020	Nov 89	Med-Tox	0.017	0.005	0.001	0.018	NA	
	8015	Nov 89	Med-Tox	NA	NA	NA	NA	0.200	GASOLINE
LF-3	8020	Nov 89	Med-Tox	<0.0005	0.0008	<0.0005	<0.002	NA	
	8015	Nov 89	Med-Tox	NA	NA	NA	NA	<0.0001	NA
LF-4	8020	Apr 89	BC	<0.0003	0.0007	0.0003	0.0018	NA	
	8015	Apr 89	BC	NA	NA	NA	NA	<0.050	NA

Notes: NA - Not Analyzed.
BC - Brown & Caldwell Analytical, Emeryville, CA
Med-Tox - Med-Tox Associates, Inc., Pleasant Hill, CA

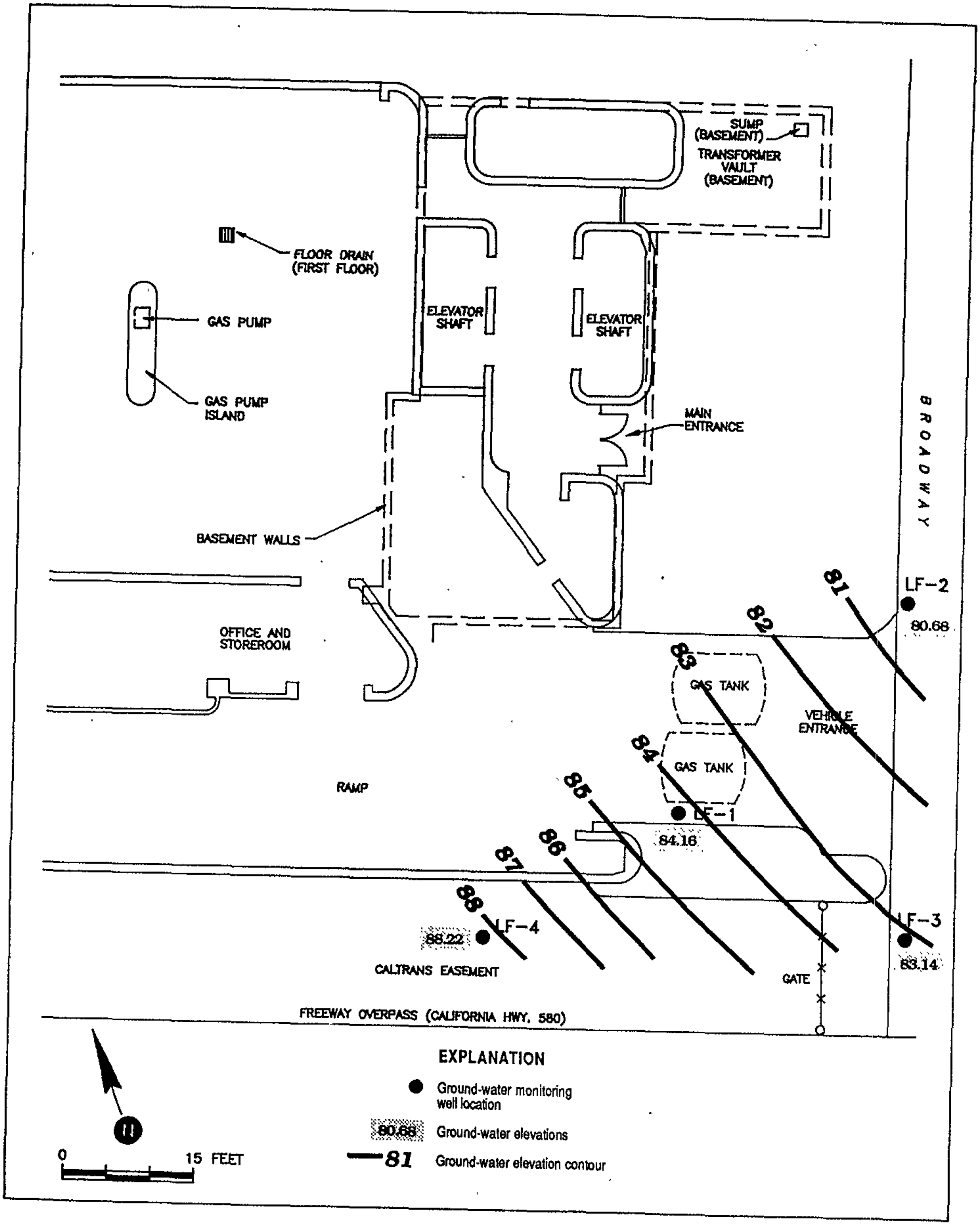

Figure 3: CONTOURED GROUND-WATER ELEVATIONS, JUNE 4, 1990

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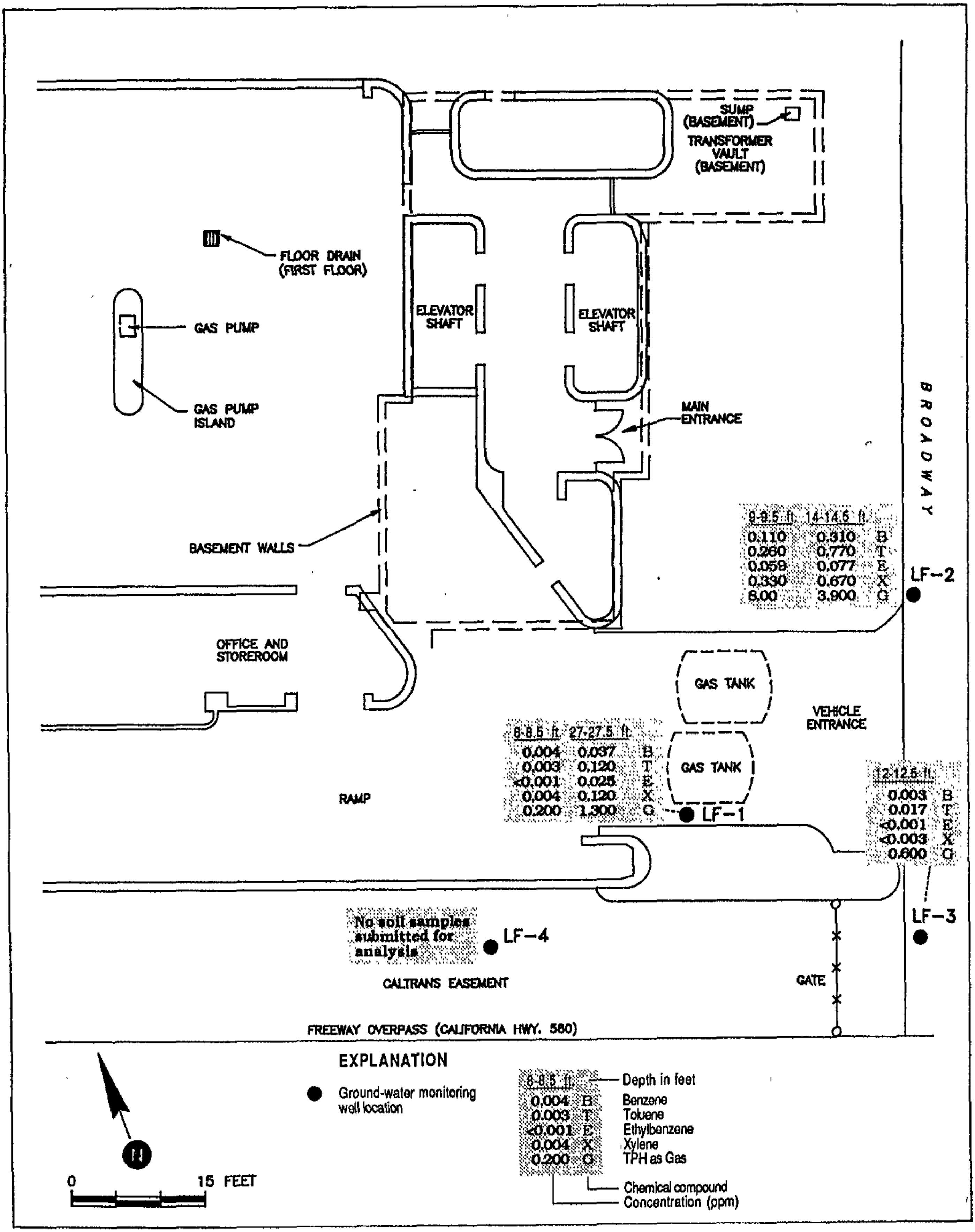

Figure 4 : CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS (TPH) AND BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE (BTEX) IN SOIL

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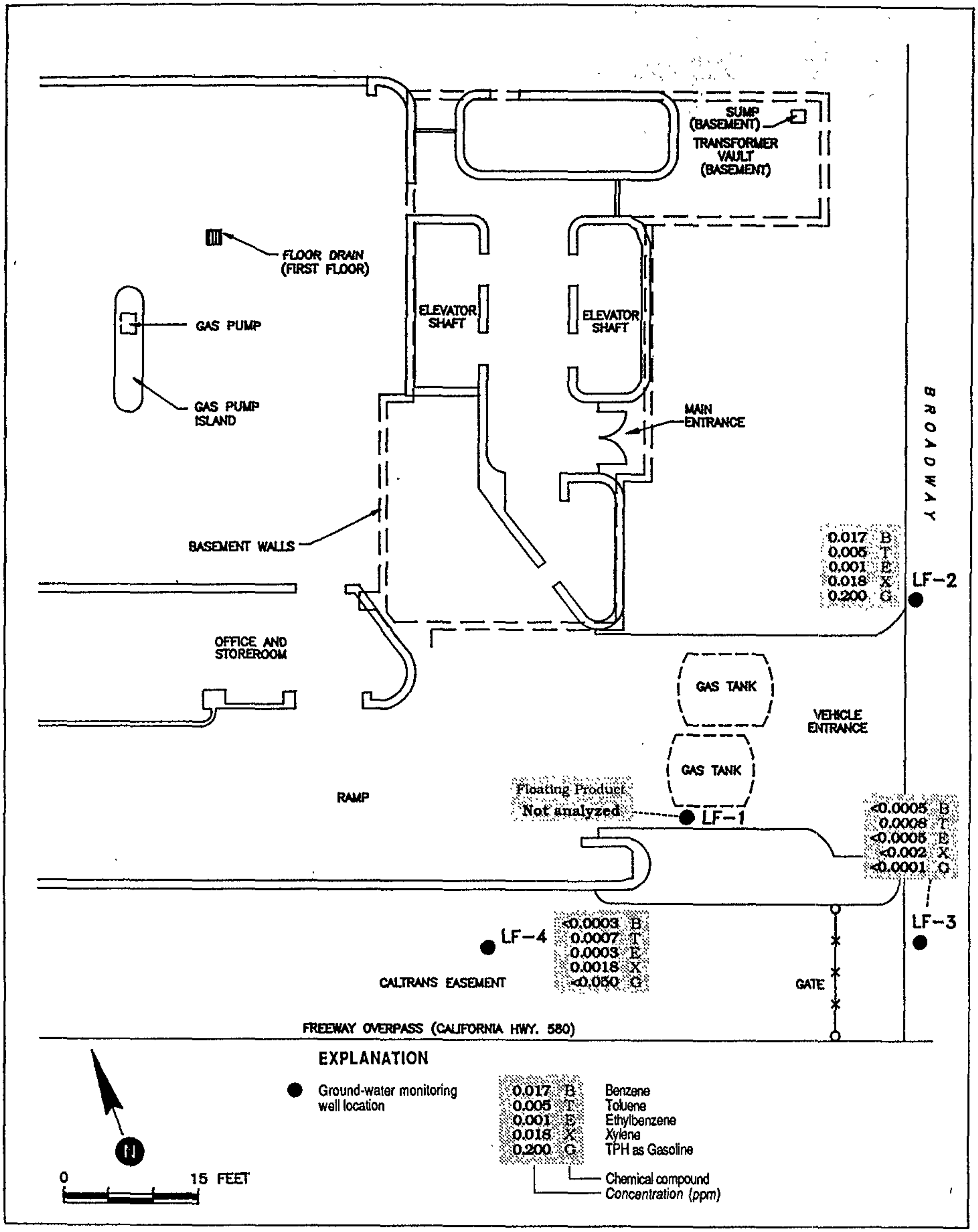

Figure 5: CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS (TPH) AND BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE (BTEX) IN GROUNDWATER

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