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ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

6/6/96

Closure Report
Polvorosa Business Park
1555 Doolittle Drive
San Leandro, California
June 6, 1996
1204.00-003

Prepared for
Chamberlin Associates
32990 Alvarado-Niles Road, Suite 900
Union City, California 94587

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June 6, 1996 LF 1204.00-03

Mr. Scott Seery
Senior Hazardous Materials Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Way Parkway
Alameda, California 94501

Subject: Closure Report, Polvorosa Business Park, 1555 Doolittle Drive, San Leandro, California

Dear Mr. Seery:

Please find enclosed the Closure Report for the subject site. This report was prepared by Levine·Fricke on behalf of Chamberlin Associates. In this report, we summarize existing soil and ground-water quality data and provide our recommendation for no further action.

If you have any questions, please call either of the undersigned.

Sincerely,

Ted Splitter, P.E., G.E.
Principal Engineer

John Sturman, P.E., R.G.
Senior Engineer

cc: Stephen Chamberlin, Chamberlin Associates

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CERTIFICATION

All hydrogeologic and geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a Levine•Fricke California Registered Geologist.

6/5/96

John O. Sturman
Senior Geologist
California Registered Geologist (5714)
Certified Engineering Geologist (1986)

Date

1.0 INTRODUCTION

This closure report is submitted by Levine•Fricke, Inc. ("Levine•Fricke") on behalf of Chamberlin Associates for the Polvorosa Business Park, located at 1555 Doolittle Drive in San Leandro, California ("the Site"; Figure 1). This report is submitted pursuant to Section 2652 (d) of Title 23, California Code of Regulations. This report presents summaries of initial site conditions, ground-water monitoring, and remedial activities conducted during 1986 through 1995 at the Site, and closure rationale and recommendations.

2.0 BACKGROUND

The Polvorosa Business Park site consists of approximately 11.6 acres on the northwest corner of Doolittle Drive and Polvorosa Avenue in San Leandro, California. The Site is generally flat with a slight slope toward the west. The eastern half of the Site is occupied by an office park development, while the western half is the Viking truck terminal. The Site was reportedly used as a truck terminal by several different owners from 1959 to 1986.

In 1986, the terminal buildings were demolished, and the underground tanks were removed. Blymyer and Sons ("Blymyer") were retained by Rouse and Associates to assess the extent of the product migration. Blymyer retained Groundwater Technology, Inc., to perform this work. Seven exploratory borings were drilled and nine wells were installed. Samples of the soil and ground water were collected for chemical testing. Seven of the wells were destroyed during subsequent construction of the business park buildings.

In June 1987, Hazardous Materials Mitigation Professionals (HMMP) was retained to further examine the concentrations and extent of hydrocarbons in the soil and ground water. HMMP constructed two new wells and drilled seven exploratory soil borings. Water samples were collected on several occasions from the new and remaining wells for chemical testing. Pumping and recovery tests were performed by HMMP in June 1988 to evaluate the transmissivity and storativity of the shallow water-bearing zone.

Levine·Fricke was retained by Rouse and Associates in August 1988 to review the work performed at the Site by the previous consultants, and to develop and carry out a program to better define the extent and amount of hydrocarbons in the ground water. Levine·Fricke installed and sampled four new monitoring wells, measured ground-water levels, and conducted a survey to obtain ground-water elevations.

In 1989, Levine·Fricke installed a remediation system, consisting of a product recovery/ground-water extraction system, which was in operation until 1993. Levine·Fricke began a ground-water monitoring program in September 1994, which consisted of four quarterly sampling events (Levine·Fricke 1994, 1995a, b, c). This

section summarizes the initial conditions existing at the Site before the remedial action, and the results of the monitoring activities.

2.1 Initial UST Removal Observations

Four 10,000-gallon diesel underground storage tanks (USTs), two 10,000-gallon gasoline USTs, and one motor oil UST of unknown size were removed from the central area of the present Building C (see Figure 2) in September 1986 (Blaine 1986). Although all tanks tested tight according to a precision tank test performed earlier in the year, it was evident upon removal that a release had occurred. The bottom of the excavation was below the ground-water level, and only samples of the water were obtained at the time of the excavation. The samples were found to contain concentrations of motor oil, diesel, and gasoline constituents. The stockpiled excavated soil was composite sampled, and seven out of ten various stockpiles tested in excess of 1,000 parts per million (ppm) total petroleum hydrocarbons (TPH). The remaining three stockpiles, which tested below 1,000 ppm TPH, were replaced in the excavation.

2.2 Initial Soil and Ground-Water Quality Investigation

Soil samples and ground-water samples had been collected and analyzed by several previous consultants. A summary of the chronology of events is presented in a letter report from HMMP dated May 20, 1988. A letter dated October 26, 1994 from Levine·Fricke to the Alameda County Department of Environmental Health lists all the technical reports associated with the assessment and remediation activities at the Site, as well as the chronology of Levine·Fricke activities at the Site.

2.2.1 Initial Soil Quality Investigation

Analyses of soil samples by the previous consultants from soil borings SB-1 through SB-5 and MW-1 through MW-9 indicate the presence of petroleum hydrocarbons in the soil beneath Building C and the central parking lot between Buildings A, B, and C. Soil samples were taken at 5.5 and 10.5 feet below ground surface (bgs). The water level during the time of sampling was at 10 feet bgs; therefore, the samples collected at 10.5 feet bgs were saturated. Results of the analytical tests range from a low of "not detected" in soils from locations MW-5, MW-7, and MW-9 to 2,800 ppm diesel under Building C. Three concentrations exceed 1,000 ppm. Two of the locations are under Building C and one is in the central parking lot. Figure 2 presents the test results for TPH at the respective sample depths and locations.

The soil samples were also tested for benzene, toluene, and xylene (BTX) at depths of 5.5 and 10.5 feet. Generally the chemical test results were relatively low for BTX. The only slightly elevated concentration was 0.77 ppm of benzene taken at 10.5 feet bgs in soil boring SB-1, which is now under Building C in the former tank location.

2.2.2 Initial Product Thickness

Levine·Fricke noted free diesel product during the drilling and sampling process at well LF-12. No other Levine·Fricke well samples encountered free product. Well LF-12 was drilled on August 19, 1988, and developed and sampled on August 31, 1988. At that time, no floating product was observed; however, droplets of product were noted in the Teflon bailer. On September 29, 1988, free product was observed in the well. The product thickness was 21.4 inches (Levine·Fricke 1988).

Free product had been measured in the existing wells MW-3 and MW-8 by previous consultants. The maximum thickness of product was recorded on August 11, 1986 by Blaine Technical Services. The thickness measured was 7.5 inches in well MW-3 and 0.25 inch in well MW-8. On September 29, 1988, when Levine·Fricke personnel checked the product thickness, MW-3 showed 0.3 inch of diesel product. Free product has not been observed by Levine·Fricke in well MW-8 or any of the remaining Levine·Fricke or previously drilled wells (Levine·Fricke 1988).

Figures 2 and 3 were prepared using available data. They present the estimated extent of floating diesel product on the ground water, where it was greater that 0.25 inch in thickness. These figures present a reasonable boundary for the extent of floating product in the former tank area.

2.2.3 Preremediation Ground-Water Quality

In 1986, ground-water samples collected by Blymyer from the site soil borings indicated detectable concentrations of petroleum hydrocarbons in each location. The highest concentration was 750,000 ppm detected in well MW-2 (presently located under Building C). It was noted that free-phase hydrocarbons characterized as diesel were encountered in this sample.

Of seven borings drilled south of the tank farm in the supplemental investigation performed by HMMP in 1987, five had hydrocarbon sheen and/or odor. New wells were constructed in two of the borings (MW-10 and MW-11) under the direction of HMMP. Samples from these wells did not contain detectable concentrations of TPHd but contained low concentrations of toluene and xylenes. Well MW-10 contained 0.0019 ppm toluene and 0.00093 ppm xylenes; well MW-11 contained 0.00051 ppm toluene and 0.00069 ppm xylenes.

In 1988, Levine·Fricke installed monitoring wells LF-12 through LF-15. Water samples collected from wells LF-13 and LF-15, which bound the Site to the east and west, respectively, indicated that the plume of hydrocarbon-affected ground water had not reached these limits. Monitoring results from wells LF-12 and LF-14 indicated that the ground water under building C and slightly north of the building was affected by hydrocarbons. TPHd was detected in samples from LF-12 and LF-14 at 60 and 3.9 ppm, respectively. In Levine·Fricke's 1988 sampling event, only benzene at a

concentration of 0.037 ppm in well LF-12 (under Building C) was detected among the gasoline constituents benzene, toluene, ethylbenzene, and xylenes (BTEX).

Figure 3 shows the highest recorded concentrations of TPHd detected in site wells and the estimated lateral extent of free-phase hydrocarbons in September 1988. As expected, the highest detected concentrations of dissolved hydrocarbons are in the area of measured free-phase hydrocarbon product.

2.3 Ground-Water Remediation

Ground-water remediation at the Site was conducted by Levine·Fricke, and initially consisted of a single-well combined product recovery and ground-water extraction system in well LF-12A, a well constructed specifically for this purpose, next to monitoring well LF-12. The system went into operation in August 1989. The system consisted of a total-fluids Ejector Systems, Inc., pneumatic pump and an oil/water separator. Free product was skimmed and piped into 55-gallon drums, and ground water was discharged to the City of San Leandro sanitary sewer system under a City of San Leandro discharge permit. In March 1993, a second pneumatic pump was installed in nearby well LF-12. In April 1993, the extraction system was turned off, because free product was no longer being recovered.

A summary of the monthly discharge data for the extraction system is presented in Table 1. The total volume of product recovered was approximately 283 gallons. Approximately 766,000 gallons of water were extracted. The depth of free product was reduced from the initially measured 1.8 feet in well LF-12 in September 1988 (Levine·Fricke 1988) to 0.05 foot in September 1994, during the first quarter of ground-water monitoring (Table 2).

2.4 Ground-Water Monitoring

Levine·Fricke conducted quarterly ground-water monitoring at the Site from January 1994 through June 1995 (Levine·Fricke 1994, 1995a, b and c). The following site activities were performed during each reporting period:

- collection of water-level measurements from monitoring wells MW-3, MW-8, MW-10, LF-12, LF-13, LF-14, and LF-15
- measurement of free-product thickness in monitoring well LF-12

collection and analysis of ground-water samples from monitoring wells MW-3, MW-8, MW-10, LF-13, LF-14, and LF-15

2.4.1 Ground-Water Level Measurements

Ground-water level measurements were collected from all accessible monitoring wells. Ground-water elevation data for all wells are summarized in Table 2 for all quarters and are shown in Figure 4 for the last quarter. The water-level measurement collected from well LF-12 was not used in plotting the ground-water elevation contours presented in Figure 4, because of the depression of the ground-water surface caused by the presence of free product.

Depth to ground-water levels measured in site monitoring wells ranged from approximately 6 to 11 feet bgs. Local ground water gradient did not change significantly during the four sampling quarters. As shown in Figure 4, the general direction of ground-water flow at the Site, according to the most recent data (Levine·Fricke 1995c), is to the north under a horizontal hydraulic gradient of approximately 0.001 foot/foot (ft/ft). The direction of the hydraulic gradient reported in 1988 was to the northwest (Levine·Fricke 1988, 1994).

2.4.2 Free-Product Thickness

Approximately 0.02 foot of free petroleum product was measured in monitoring well LF-12 in May 1995. There has been no significant change in the free product thickness compared to the 0.01-foot thickness measured March 1995. The depth of free product has decreased from the 0.05 foot measured during the first sampling round in September 1994 (Table 2).

2.4.3 Ground-Water Sampling and Analysis

Ground-water samples were collected from monitoring wells MW-3, MW-8, MW-10, LF-13, LF-14, and LF-15 during all quarterly sampling events. Ground-water samples were not collected from monitoring well LF-12 because of the presence of free product in this well. Ground-water quality data for TPHd, TPHg, and BTEX are presented in Table 3 for all quarters, and are shown in Figure 5 for the last quarter.

- The water-quality data for all quarters are presented in Table 3, and indicate the following:

- The ground-water samples collected from monitoring wells MW-3, MW-8, MW-10, LF-13, and LF-15 were below method detection limits for BTEX compounds for the last two sampling events.

- Benzene was detected at 0.0009 ppm in monitoring well LF-14 during the last sampling round. Low levels of benzene (0.0006 to 0.0009 ppb) were detected in monitoring well LF-14 during all sampling events.

- The ground-water samples collected from monitoring wells MW-10 and LF-13 were below method detection limits for TPHd and TPHg during all sampling events.

- Monitoring well MW-3 had the highest levels of TPHg (21 ppm) and TPHd (38 ppm) detected in the last quarter. These values are significantly lower than those detected during the first quarter (Table 3).

- Concentrations of TPHg and TPHd have been consistently detected at low levels in monitoring wells MW-8 (2.1 ppm and 15.0 ppm maximum, respectively) and LF-14 (1.7 ppm and 13.0 ppm maximum, respectively), during all sampling events.

The laboratory reported that the TPHg detected in the ground-water samples was not typical of a gasoline chromatogram (Levine·Fricke 1995c). This information, coupled with the low incidence of BTEX compounds in the ground-water samples, suggests that the reported TPHg was likely the lighter fraction hydrocarbons present in diesel.

3.0 RATIONALE FOR CLOSURE REQUEST

Case closure of the UST leak is requested based on the effectiveness of the ground-water extraction system in removing and containing diesel and gasoline hydrocarbons and the lack of cost-effective measures to further improve ground-water quality at the Site.

The removal of over 766,000 gallons of water and approximately 283 gallons of free-phase hydrocarbons over the approximately three and one-half years of operation have effectively improved site ground-water quality. Based on field and laboratory data, the thickness of free-phase product and dissolved-phase hydrocarbons in site wells have been significantly reduced. Reduction of hydrocarbon thickness in well LF-12 from 1.8 feet (September 1988) to 0.02 foot (May 1995) shows the effectiveness of the ground-water recovery system. The plume of affected ground water has been contained such that the potential for off-site migration of hydrocarbons in ground water is minimal.

Dissolved-phase hydrocarbons in site wells have been reduced to non-detectable or low concentrations based on the four quarters of ground-water monitoring performed from September 1994 to May 1995. Analyses results from these sampling events indicate that no compounds were detected at concentrations greater than their respective state or federal maximum contaminant levels (MCLs) for drinking water. We note that since there are no drinking water wells in the vicinity of the Site, the MCL standard is very conservative in this case.

Although some hydrocarbons remain in soil, most of the affected soils are below Building C and thus not accessible by excavation. Additionally, most of the soils with higher TPH concentrations measured in September 1988 were in the saturated zone or

near floating product. Thus, remaining hydrocarbons do not appear to be significantly affecting shallow ground water.

In our opinion, active remediation would not be effective in further improving soil and ground-water quality. A recently published set of recommendations on underground fuel leak cases in California stated that "remedial alternatives that utilize pump and treat are recognized as being ineffectual at reaching MCL groundwater cleanup standards for FHCs [fuel hydrocarbons] in many geologic settings. Passive bioremediation can provide a remediation alternative that is as efficient as actively engineered remediation processes such as pump and treat" (Environmental Protection Department 1995). In the case of this site, a pump and treat (separation) system effectively removed free-phase hydrocarbons to the extent practicable. It is our opinion that intrinsic bioremediation will continue to reduce hydrocarbon concentrations. Since the Site is not adjacent to drinking water wells, it is our opinion that the remaining hydrocarbons do not present a significant risk.

but not all, or most...

Ground-water monitoring results have indicated very similar results over the four quarters of monitoring. Therefore, further monitoring does not seem to be valuable in this case.

4.0 RECOMMENDATIONS

We recommend that ground-water monitoring be terminated and that the site wells be properly destroyed. Because the site ground-water remediation efforts have been effective and the concentrations of dissolved hydrocarbons measured in ground water are non-detectable or low, we recommend that the fuel leak case be closed.

REFERENCES

Blaine Technical Services. 1986. Field Sampling at 1555 Doolittle Drive, San Leandro, California, on September 19, 1986. September 22.

Environmental Protection Department, Environmental Restoration Division. 1995. Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks (LUFTs). October 16.

Levine·Fricke. 1988. Report on Hydrogeologic Assessment. Polvorosa Business Park Site, San Leandro California. Prepared for Rouse and Associates. November 1.

_____.1994. Quarterly Ground-Water Monitoring Report. July 1 through September 30, 1994. Polvorosa Business Park Site, San Leandro California. Prepared for Chamberlin Associates. October 31.

_____.1995a. Quarterly Ground-Water Monitoring Report. October 1 through December 31, 1994. Polvorosa Business Park Site, San Leandro California. Prepared for Chamberlin Associates. January 31.

_____.1995b. Quarterly Ground-Water Monitoring Report. January 1 through March 31, 1995. Polvorosa Business Park Site, San Leandro California. Prepared for Chamberlin Associates. April 27.

_____.1995c. Quarterly Ground-Water Monitoring Report. April 1 through June 30, 1995. Polvorosa Business Park Site, San Leandro California. Prepared for Chamberlin Associates. August 7.

TABLE 1
Summary of Monthly Discharge Data (1)
Polvorosa Business Park
1555 Doolittle Drive, San Leandro

Period Ending	Meter Reading	Product Extracted (gallons)	Water Extracted (gallons)	Days Operating	Notes
01-Aug-89	0	NM	0	0	
30-Sep-89	18,918	NM	0	60	
31-Jan-90	35,879	NM	24,957	123	
15-Jun-90	88,328		69,233	135	
28-Jun-90	—	100	—	—	From Evergreen Envir. Svcs. invoice
29-Aug-90	140,297	NM	68,599	75	
02-Oct-90	—	100	—	—	From Evergreen Envir. Svcs. invoice
02-Nov-90	169,932	NM	39,118	65	
13-Dec-90	196,350	NM	34,872	41	
14-Jan-91	210,171	NM	18,244	32	
30-Apr-91	273,709	NM	83,870	106	
30-Oct-91	352,977	NM	60,201	183	
17-Feb-92	469,713	NM	154,092	110	
01-May-92	545,472	NM	100,002	44	New Meter Installed
29-May-92	16,649	NM	13,668	29	Cleaned Meter Filter
29-Jun-92	37,319	NM	20,670	30	
31-Jul-92	50,574	5.34	13,255	33	
31-Aug-92	58,319	6.9	7,745	31	
28-Sep-92	69,270	4.83	10,951	28	
02-Oct-92	—	55	—	—	From Evergreen Envir. Svcs. invoice
30-Oct-92	77,711	5.44	8,441	33	
23-Nov-92	89,945	2.77	12,234	24	
28-Dec-92	96,929	1.82	6,984	35	
29-Jan-93	9,861	NM	12,932	32	Meter Resets at 99,999
26-Feb-93	11,946	0.21	2,085	18	
31-Mar-93	16,628	0.58	4,682	33	
30-Apr-93	16,628	0	0	0	System off-line
31-May-93	16,628	0	0	0	System off-line
30-Jun-93	16,628	0	0	0	System off-line
31-Jul-93	16,628	0	0	0	System off-line
31-Aug-93	16,628	0	0	0	System off-line
TOTAL		282.89	766,835		

Data entered by PCA 13-Mar-96.

Notes:

(1) Summary of data presented in reports submitted to the City of San Leandro, Water Pollution Plant

NM - Not Measured

Table 2
Post-Remediation Ground-Water Elevation Data
Polvorosa Business Park
1555 Doolittle Drive
San Leandro, California

(all measurements in feet above mean sea level)

Well Number	Well Elevation	Ground-Water Elevation 28-Sep-94		Product Thickness 28-Sep-94 (feet)	Ground-Water Elevation 22-Nov-94		Product Thickness 22-Nov-94 (feet)	Ground-Water Elevation 01-Mar-95		Product Thickness 01-Mar-95 (feet)	Ground-Water Elevation 26-May-95		Product Thickness 26-May-95 (feet)
MW-3	12.18	3.15		NP	4.06		NP	4.10		NP	4.08		NP
MW-8	12.83	3.24		NP	3.97		NP	3.45		NP	4.11		NP
MW-10	14.22	3.17		NP	4.08		NP	2.10		NP	4.14		NP
LF-12	14.89	2.57	(1)	0.05	2.43	(1)	0.06	3.73	(1)	0.01	3.97	(1)	0.02
LF-13	14.58	3.10		NP	3.92		NP	1.57		NP	3.97		NP
LF-14	10.76	2.98		NP	3.84		NP	5.46		NP	3.96		NP
LF-15	11.20	NM		NM	NM		NM	4.98		NP	3.89		NP

Data input by RCM/02-Jun-95. Data proofed by BCC.

Notes:

NP - No product detected

NM - Not measured

(1) Ground-water surface may be depressed due to the presence of floating product.

Table 3
Post-Remediation Ground-Water Sample Analytical Results
Petroleum Hydrocarbon Compounds
Polvorosa Business Park
1555 Doolittle Drive
San Leandro, California

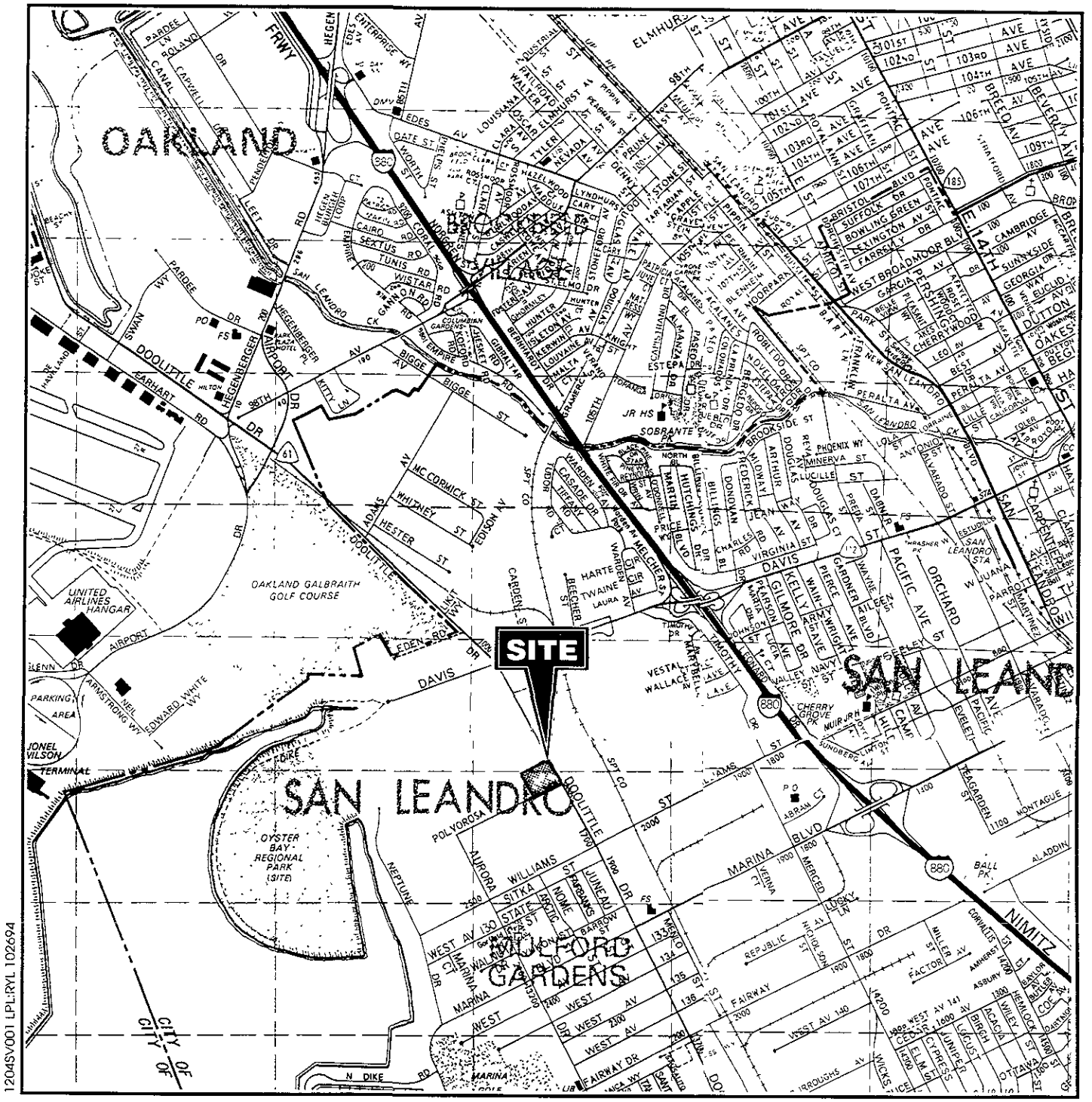
(results expressed in ppm)

Sample ID	Date	Notes	Benzene	Toluene	Ethyl-benzene	Xylenes, Total	TPHg	TPHd
MW-3	28-Sep-94		<0.01	<0.01	<0.01	<0.04	58.0	87.0
	22-Nov-94		0.0005	0.001	0.0008	0.003	7.8	56.0
	22-Nov-94	Dup	0.0006	0.001	<0.0005	<0.002	2.6	67.0
	01-Mar-95		<0.005	<0.005	<0.005	<0.02	4.3	110.0
	26-May-95		<0.005	<0.005	<0.005	<0.02	21.0	34.0
	26-May-95	Dup	<0.005	<0.005	<0.005	<0.02	6.4	38.0
MW-8	28-Sep-94		<0.0005	<0.0005	<0.0005	<0.002	0.1	2.1
	28-Sep-94	Dup	<0.0005	<0.0005	<0.0005	<0.002	1.6	1.5
	22-Nov-94		<0.0005	<0.0005	<0.0005	<0.002	0.7	8.0
	01-Mar-95		<0.0005	<0.0005	<0.0005	<0.002	1.9	8.7
	26-May-95		<0.0005	<0.0005	<0.0005	<0.002	2.1	15.0
MW-10	28-Sep-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	23-Nov-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	01-Mar-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	26-May-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
LF-13	28-Sep-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	22-Nov-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	01-Mar-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
	26-May-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
LF-14	28-Sep-94		0.0006	<0.0005	<0.0005	<0.002	1.7	13.0
	22-Nov-94		0.0008	<0.0005	<0.0005	<0.002	1.0	9.2
	01-Mar-95		0.0007	<0.0005	<0.0005	<0.002	0.7	7.8
	26-May-95		0.0009	<0.0005	<0.0005	<0.002	0.9	11.0
LF-15	01-Mar-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	0.05
	26-May-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	0.06
Blanks								
MW-8-FB	28-Sep-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
MW-8-FB	22-Nov-94		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05
MW-8-BB	26-May-95		<0.0005	<0.0005	<0.0005	<0.002	<0.05	<0.05

Data entered by RCM 07-Jul-95. Proofed by AIK.

NOTES:

TPHd = total petroleum hydrocarbons as diesel
TPHg = total petroleum hydrocarbons as gasoline



Modified from:
Thomas Brothers Map
Alameda and Contra Costa Counties
1994 Edition

0 1/2 1 MILE

Figure 1 : SITE LOCATION MAP
POLVOROSA BUSINESS PARK, 1555 DOOLITTLE DRIVE, SAN LEANDRO, CALIFORNIA

Project No 1204

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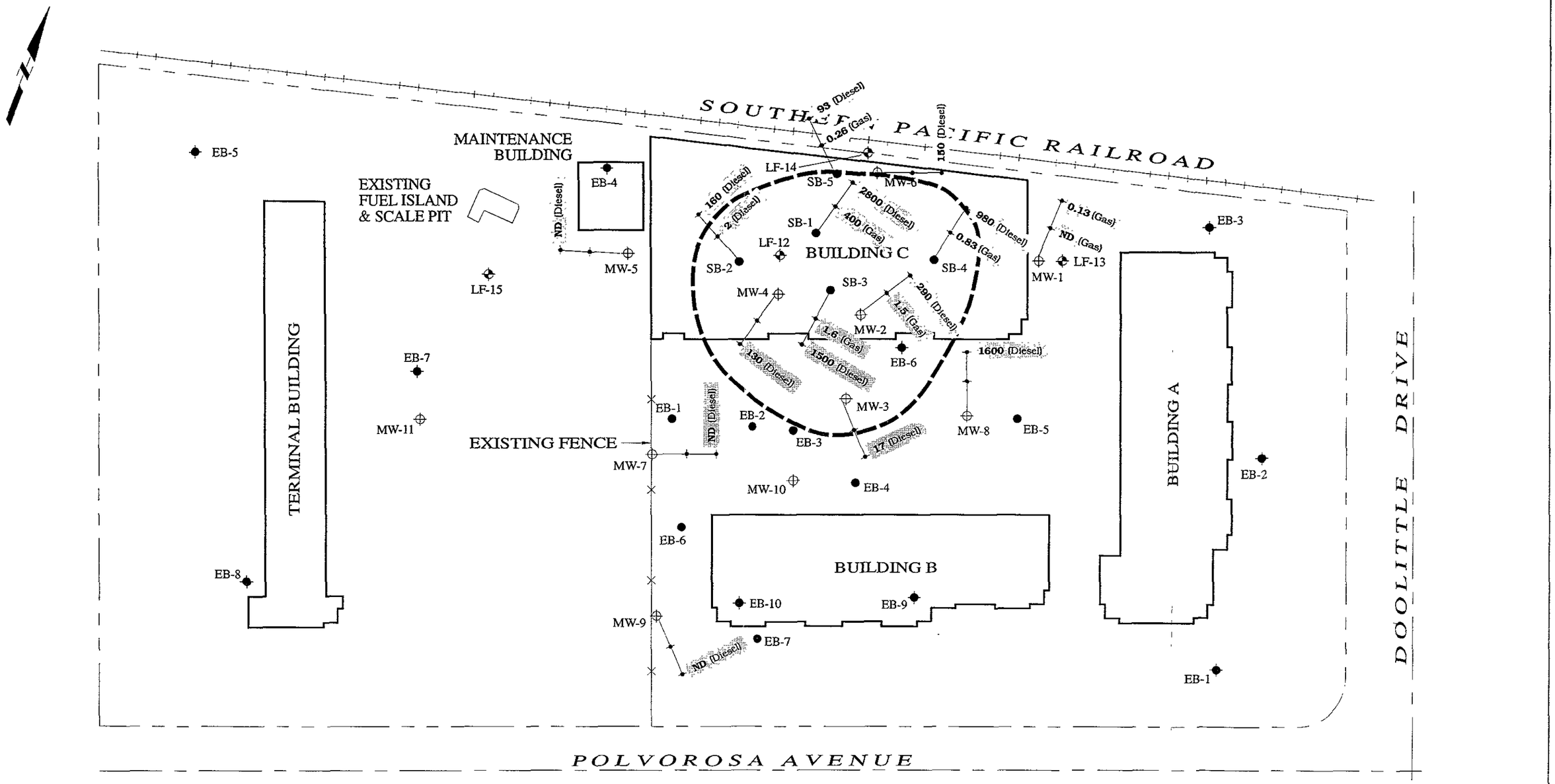
1204C001.CDR 031596RYL



EXPLANATION

- Approximate well location installed for this study
- Approximate well location installed and tested by others
- Approximate soil boring location drilled by Donald E. Banta and Associates
- Approximate soil boring location drilled by others

Depth (feet)
- Approximate well/boring location
- 5-1/2 — 0.83 (Gas)
- 10-1/2 — 980 (Diesel)
- Total Petroleum Hydrocarbons, as noted (mg/kg)
- Sample location

Estimated area of floating diesel product greater than 1/4-inch thick in September 1988

0 40 80 FEET

Note: Ground-water level during soil sample collection was at 10 feet bgs. Soil samples collected were all at 5.5 and 10.5 feet bgs.
Samples taken on 14 October 1986

Figure 2 :

TOTAL PETROLEUM HYDROCARBONS IN SOIL FROM HYDROGEOLOGIC ASSESSMENT NOVEMBER 1988

Project No. 1204

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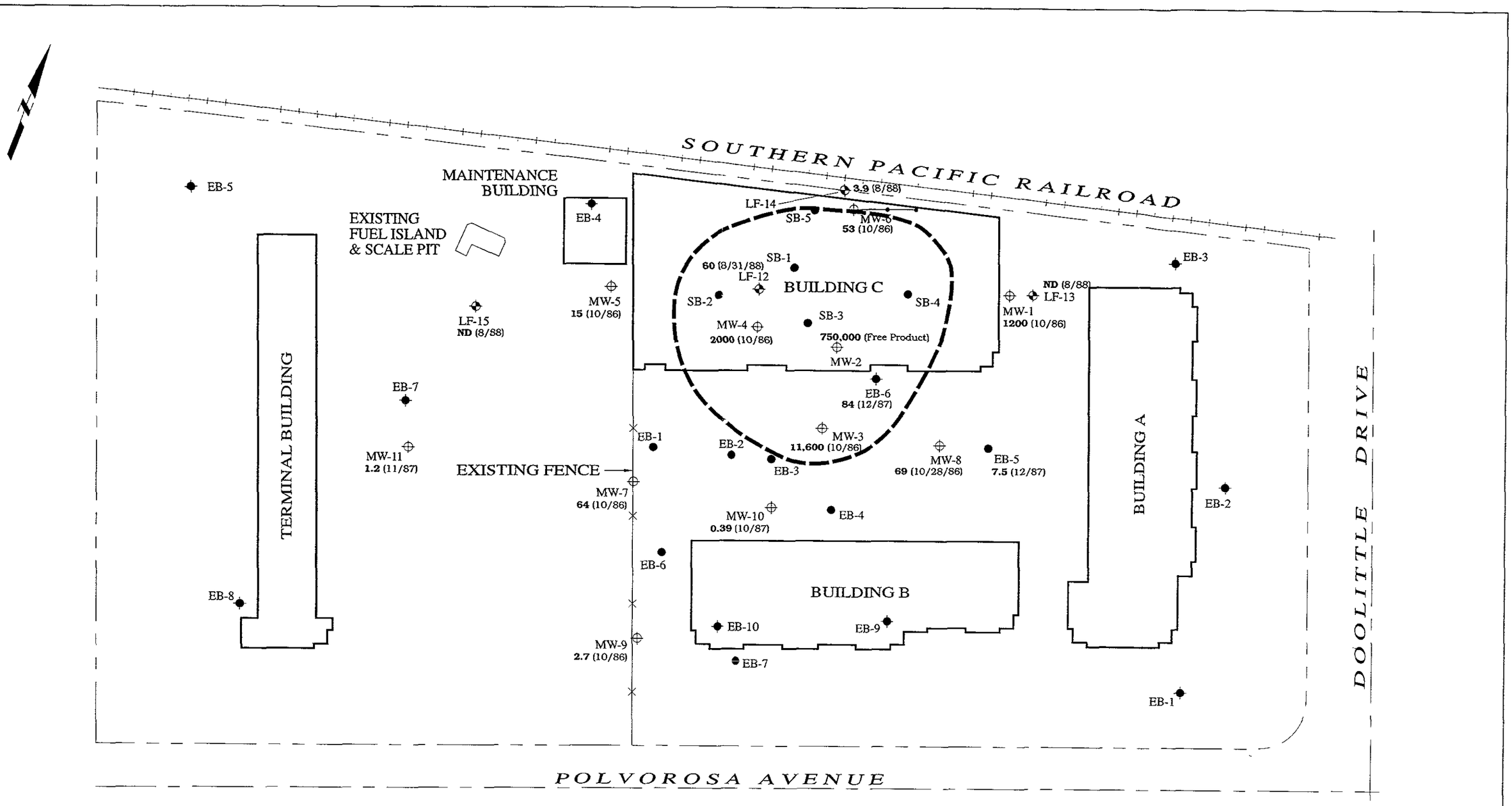
1204B001.CDR 031396RYL

1204C002.CDR 031596RYL



EXPLANATION

- Approximate well location installed for this study
- Approximate well location installed and tested by others
- Approximate soil boring location drilled by Donald E. Banta and Associates
- Approximate soil boring location drilled by others

15 (10/86) TPH concentration, ppm, in ground water; date shown in parentheses

ND Not detected

Estimated area of floating diesel product greater than 1/4-inch thick in September 1988

0 40 80 FEET

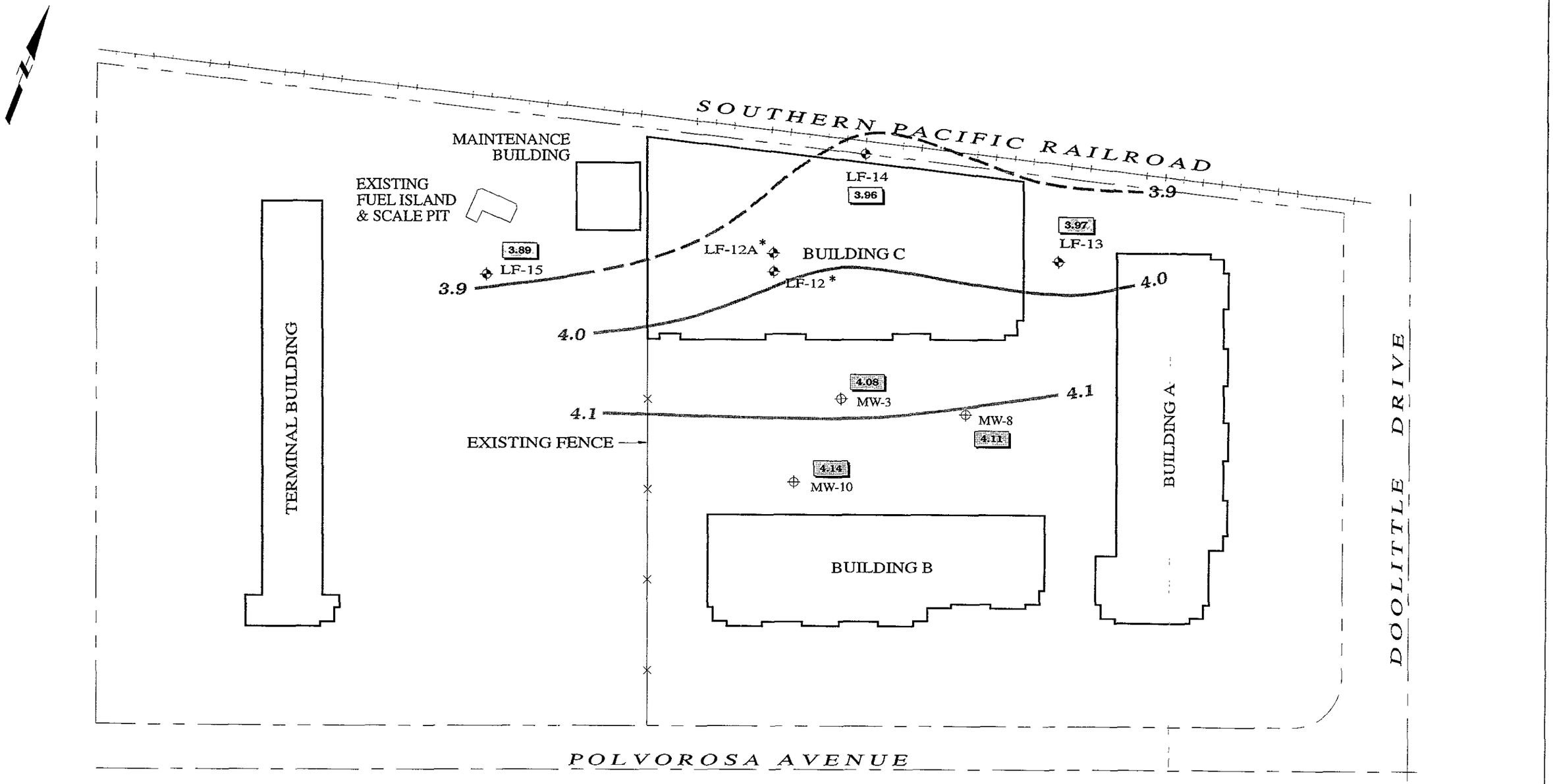
Figure 3 :

HIGHEST RECORDED CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBON AS DIESEL IN GROUND WATER FROM HYDROGEOLOGIC ASSESSMENT NOVEMBER 1988

Project No. 1204

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

1204B001.CDR 031396RYL



EXPLANATION

- Approximate well location (installed by Levine-Fricke)
- Approximate well location (installed by others)
- 4.14 Ground-water elevation (feet above mean sea level)
- 4.0 Ground-water elevation contour dashed where inferred (feet above mean sea level)
- * Water levels in these wells were not considered in the elevation contouring due to presence of floating product

0 40 80 FEET

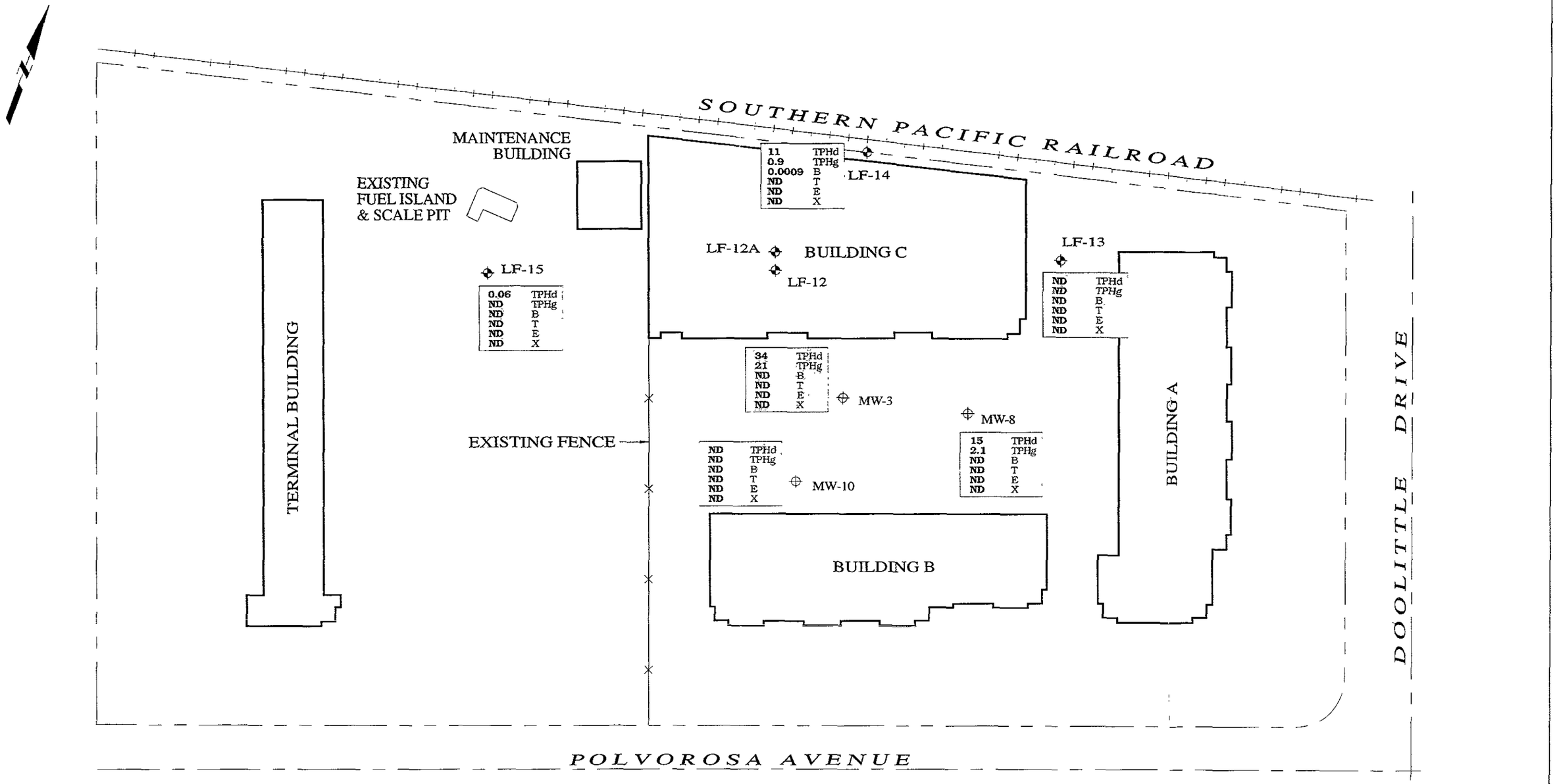
Figure 4 :

GROUND-WATER ELEVATION CONTOURS MAY 26, 1995

Project No. 1204

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

1204S001 CDR 031396RVL



EXPLANATION

- Approximate well location (installed by Levine-Fricke)
- Approximate well location (installed by others)

Wells LF-12 and LF-12A were not sampled

0.9 TPHg
- TPHg: Chemical compound
- 0.9: Sample concentration (ppm)
- ND: Not detected

Note: 0.02 feet of free-phase hydrocarbon product was measured in well LF-12

KEY TO ABBREVIATIONS

TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
B	Benzene
T	Toluene
E	Ethybenzene
X	Xylene

0 40 80 FEET

Figure 5 :

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUND WATER (ppm) MAY 26, 1995

Project No. 1204

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

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